



# Parent Involvement in the Getting Ready for School Intervention Is Associated With Changes in School Readiness Skills

Maria Marti<sup>1\*</sup>, Emily C. Merz<sup>2</sup>, Kelsey R. Repka<sup>1</sup>, Cassie Landers<sup>1</sup>, Kimberly G. Noble<sup>2</sup> and Helena Duch<sup>1</sup>

<sup>1</sup> Heilbrunn Department of Population & Family Health, Mailman School of Public Health, Columbia University, New York City, NY, United States, <sup>2</sup> Neurocognition, Early Experience and Development Lab, Neuroscience & Education, Teachers College, Columbia University, New York City, NY, United States

## OPEN ACCESS

### Edited by:

Kai S. Cortina,  
University of Michigan, United States

### Reviewed by:

Ageliki Nicolopoulou,  
Lehigh University, United States  
Kristel Thomassin,  
University of Guelph, Canada

### \*Correspondence:

Maria Marti  
mm4110@cumc.columbia.edu

### Specialty section:

This article was submitted to  
Developmental Psychology,  
a section of the journal  
Frontiers in Psychology

**Received:** 27 December 2017

**Accepted:** 30 April 2018

**Published:** 31 May 2018

### Citation:

Marti M, Merz EC, Repka KR,  
Landers C, Noble KG and Duch H  
(2018) Parent Involvement in the  
Getting Ready for School Intervention  
Is Associated With Changes in School  
Readiness Skills.  
Front. Psychol. 9:759.  
doi: 10.3389/fpsyg.2018.00759

The role of parent involvement in school readiness interventions is not well-understood. The Getting Ready for School (GRS) intervention is a novel program that has both home and school components and aims to improve early literacy, math, and self-regulatory skills in preschool children from socioeconomically disadvantaged families. In this study, we first examined associations between family characteristics and different indices of parent involvement in the GRS intervention. We then examined associations between parent involvement and change in children's school readiness skills over time. Participants were 133 preschool children attending Head Start and their parents who participated in the GRS intervention during the academic year 2014–2015. Parent involvement was operationalized as attendance to GRS events at the school, time spent at home doing GRS activities, and usage of digital program materials, which included a set of videos to support the implementation of parent-child activities at home. Although few family characteristics were significantly associated with parent involvement indices, there was a tendency for some markers of higher socioeconomic status to be linked with greater parent involvement. In addition, greater parent involvement in the GRS intervention was significantly associated with greater gains in children's early literacy, math, and self-regulatory skills. These findings suggest that parent involvement in comprehensive early interventions could be beneficial in terms of improving school readiness for preschoolers from disadvantaged families.

**Keywords:** school readiness, Head Start, parent involvement, early intervention, prevention

## INTRODUCTION

Children from socioeconomically disadvantaged families tend to enter school behind their peers in terms of pre-academic and self-regulatory skills (Bradley and Corwyn, 2002; Noble et al., 2005). This lack of early preparation for school leads to an academic achievement gap that widens over time (West et al., 2001; Reardon, 2011), putting children from disadvantaged families at risk for school failure, dropout, and markedly fewer professional opportunities in adulthood. Family-oriented early interventions that support parents' capacity to promote child development can help reduce this gap in school readiness. Active engagement of

parents is essential to the successful implementation of such interventions (Shaw et al., 2006). However, parental participation remains a challenge for many programs (Patterson and Chamberlain, 1994). In addition, it is unclear how parents engage with different intervention components (e.g., in-person workshops, use of program materials at home) and whether or not these components are differentially associated with children's school readiness outcomes.

In this study, we explore these issues through the lens of Getting Ready for School (GRS), a novel early intervention targeting teachers and parents that supports the development of school readiness skills in preschool children from socioeconomically disadvantaged backgrounds (Noble et al., 2012; Marti et al., 2018). GRS is unique in its focus on all three of the main school readiness domains (early literacy, math, and self-regulation) and its equal emphasis on teachers and parents as agents of change. The home component, which is the focus of the current study, promotes parental use of activities that support the development of literacy, math, and self-regulation skills. Parents are provided with activities to integrate into day-to-day, play-time interactions with their children. To support the implementation of these activities, GRS offers a series of workshops, parent-child activities in the classroom, videos demonstrating how to implement the activities, and a bi-weekly parent-teacher letter.

By better understanding how parents engage in early interventions such as GRS and the implications of parent involvement for improving children's school readiness, researchers can begin to improve delivery models and increase the effectiveness of family-oriented early interventions. In the present study, we focused on parent involvement with different components of GRS. Parent involvement with GRS was operationalized as (1) attendance to workshops and classroom events, (2) time spent using GRS activities at home, and (3) usage of the digital program materials. We explored how family characteristics relate to parent involvement with GRS, and the associations between parent involvement and children's growth in school readiness skills across the preschool year.

## Background

Parental involvement in children's early development and education includes initiating learning activities in the home, building positive relationships, engaging in preschool activities, and communicating with teachers (Epstein, 2001). Ecological theories of parent involvement acknowledge its multidimensional nature and recognize that parents are involved across different contexts, such as home and school (Seginer, 2006; Garbacz et al., 2015; McWayne et al., 2015). Home-based parent involvement refers to the ways in which parents support learning by playing and interacting with their children, providing learning activities, and offering materials that support development. School-based parent involvement includes participation in school-based events like field trips, activities, and workshops, or volunteering in the classroom.

Parent involvement has the potential to bolster school readiness in children from disadvantaged families and reduce the income-achievement gap. In fact, home- and school-based parent

involvement facilitate pre-academic skills and social competence during preschool (Miedel and Reynolds, 1999; Fan and Chen, 2001; Dearing et al., 2004; McWayne et al., 2004; Gonzalez-DeHass et al., 2005; Van Voorhis et al., 2013). A longitudinal study that followed children from kindergarten to 5th grade showed that increased school-based parent involvement (e.g., attending parent-teacher conferences, participating in school activities, or volunteering in the classroom) predicted improved child literacy skills (Dearing et al., 2006). Similar results have been reported for home-based parent involvement. In Head Start families, parent involvement at home (e.g., self-reports of reading to the child or providing learning activities) was associated with positive growth in children's attention, persistence, motivation to learn, and receptive vocabulary; and decreased problem behaviors (Fantuzzo et al., 2004).

In the last decade, many early interventions have been developed to support parenting practices and parent involvement in early education. A range of different interventions have demonstrated positive impacts on school readiness in preschool children, including those that promote positive parenting practices and parent-child relationships; those that promote home learning activities and effective teaching strategies; and those that strengthen parent-teacher partnerships (Bierman et al., 2017). These programs have used various methods of connecting with parents, including face-to-face intensive individual coaching (Sheridan et al., 2011; Landry et al., 2012) and regular parenting groups (Mendez, 2010; Brotman et al., 2011). Often, program content is also delivered through videotaped demonstrations of parent-child interactions (Whitehurst et al., 1994; Webster-Stratton, 1998; Landry et al., 2012), written information, and/or enrichment materials and activities for home use with children (Bierman et al., 2008a,b).

Embedded in this literature is a call to better understand and improve parent involvement in early interventions (Bierman et al., 2017). Indeed, a common challenge in family-oriented interventions is getting parents involved and sustaining parent involvement throughout the course of the intervention (Fishel and Ramirez, 2005; Shaw et al., 2006; Gross et al., 2009; Halgunseth et al., 2009). These challenges are especially relevant for programs that rely on group-based training or workshops. Recent studies on preventive interventions for behavior problems reported that only about 30–48% of targeted families participate in at least one workshop (Heinrichs et al., 2005; Garvey et al., 2006). Slightly more encouraging, results from three school readiness interventions indicated that about 60–80% of families participate in parent sessions. In terms of sustaining parent involvement, parents have been found to attend only between 20 and 35% of offered parent workshops (Miedel and Reynolds, 1999; Mendez, 2010; Dawson-McClure et al., 2015).

Few studies of parent involvement have focused on parent use of written and/or internet-based program materials, such as those focused on activities to support child learning and development at home (e.g., videos that depict parent-child learning activities). Interventions that use home visiting models suggest high levels of parent involvement with program materials. For example, almost 90% of parents' participating in REDI-P engaged with program materials at home on a weekly basis as observed by

home visitors (Bierman et al., 2015). However, use of program materials in workshop-based interventions tends to be lower. For example, although most parents participating in *The Companion Curriculum* used program materials (i.e., parent-child activities) at some point across the intervention, only 50% of parents used them once a week (Mendez, 2010). Thus, research is needed on how much parents use intervention-related program materials meant to enhance home-based parent involvement and which family characteristics might facilitate parental use of program materials.

Various family characteristics might be expected to influence parent involvement both at home and at school (Grolnick et al., 1997; Cooper et al., 2010). Studies examining family sociodemographic characteristics associated with attendance to workshops have been inconsistent. For example, unemployed parents had greater attendance at *ParentCorps* workshops while the least educated families attended fewer sessions (Dawson-McClure et al., 2015). In a study of Head Start parents, there were no differences in parent participation in *The Companion Curriculum* workshops by parental education level (Mendez, 2010). Single parenthood has also been associated with lower attendance in some prevention programs (Reyno and McGrath, 2006; Baker et al., 2011) yet others have not found these associations (Orrell-Valente et al., 1999). Similar mixed findings have emerged for minority status. Some research suggests that African-American and Hispanic/Latino families have lower levels of attendance, even when controlling for SES factors (Nix et al., 2009; Baker et al., 2011). Nonetheless, research with a nationally representative sample of Head Start parents found that Hispanic/Latino and Asian families showed greater school-based parent involvement than other ethnic groups (Hindman et al., 2012). Thus, attendance for minority families may depend on factors such language needs or cultural appropriateness of interventions (Murry et al., 2004).

To our knowledge, there is no research that has examined the associations between family characteristics and indices of parent involvement in early interventions other than attendance. Some of the factors associated with attendance may also play a crucial role in how parents spend time at home using program materials. For example, being an immigrant or single parent has been associated with lower levels of home-based parent involvement in Head Start (e.g., reading books, playing games, teaching about letters, words, and numbers) (Hindman et al., 2012). Research has also documented socioeconomic differences in the amount of developmentally relevant time (e.g., playing and reading) parents spend with children (Guryan et al., 2008; Kalil et al., 2012). Yet, family characteristics may be differentially associated with school-based parent involvement (e.g., attendance and participation) and home-based parent involvement (e.g., use of program activities at home) in family-oriented school readiness interventions such as GRS. For example, despite Latino Head Start mothers being highly involved in school activities, they reported less home-based involvement compared to other ethnic groups (Hindman et al., 2012). Therefore, research is needed to address this gap in the literature.

Another important research question is the extent to which parent involvement may explain variability in children's school

readiness outcomes following early interventions (Reynolds et al., 1996, 2017). Parent involvement has been found to moderate the impact of behavioral interventions (Breitenstein et al., 2012; Gross et al., 2014; Patel et al., 2016). For example, parent attendance and completion of between-session activities have been associated with treatment gains in parenting skills and mental health (Nix et al., 2009; Clarke et al., 2015). In addition, more frequent parent attendance at *ParentCorps* workshops was associated with greater knowledge of positive parenting practices and effective behavior management strategies (Brotman et al., 2011, 2013, 2016). Research on school readiness interventions has yielded similar findings. For instance, more frequent attendance to *The Companion Curriculum* workshops was associated with more optimal parent-teacher relationships (Mendez, 2010). However, previous work has not detected effects of parent attendance on children's school readiness outcomes or explored the effects of parents' use of program materials at home on children's school readiness outcomes. Certain interventions, like *Head Start REDI-P*, which used a home visiting model, have demonstrated that the frequency and quality of how parents use home learning materials was associated with academic performance in kindergarten (Bierman et al., 2015). Thus, it is important to examine to what extent parental attendance to workshops and time spent at home using intervention-related activities is associated with children's school readiness outcomes following early interventions. This type of formative research is critical to improving strategies that support parent involvement and thus potentially increasing the impact of interventions.

## Present Study

In the present study, we examined the associations between family characteristics and parent involvement in GRS and the associations between parent involvement and children's gains in school readiness skills across the preschool year. Parent engagement in GRS was operationalized as (1) attendance to workshops and classroom events, (2) time spent using GRS activities at home, and (3) usage of digital content. Thus, this study offers a comprehensive picture of different ways in which parents may engage in school readiness interventions.

We had three specific research questions:

- 1) What are the rates of parental attendance, time spent doing activities at home, and usage of digital content? Given that relatively little is known about patterns of parent involvement in early interventions, it was crucial to first explore and describe how parents engage with the different components of GRS.
- 2) Which family characteristics (e.g., income-to-needs ratio, parental education, parental employment, language, father's presence, country of origin, and use of social services) are associated with parent involvement in GRS? Because findings from previous research have been inconsistent, we did not have any formal hypotheses about these associations.
- 3) Which indices of parent involvement predict children's school readiness outcomes following the intervention? We hypothesized that children whose parents attended more events and/or spent more time using GRS activities would

show more growth in self-regulatory and pre-academic skills across the preschool year.

## METHODS

### Participants

Children and their parents ( $N = 147$ ) at four Head Start centers in New York City were invited to participate in the GRS intervention. Overall, 90.5% ( $n = 133$ ) of families consented to participate in the evaluation; 8.8% ( $n = 13$ ) did not return the consent form; and one family refused to participate. Informed consent and all study procedures were approved by the Columbia University Medical Center Institutional Review Board. Of the respondents who participated in the study, 88.24% were mothers, 5.88% were fathers, and 2.94% were grandmothers. Most caregivers spoke English (51.9%) or Spanish (38.3%), and 9.8% spoke Chinese. Child age at baseline ranged from 40 to 57 months ( $M = 50.28$ ;  $SD = 4.12$ ), and child sex was evenly distributed (51% male). The majority of children were Hispanic/Latino (72%). Parent education ranged from less than high school (25.49%) to graduate degree (13.73%); they had an average of 12.11 years of education ( $SD = 3.09$ ). Average family income-to-needs ratio was below the poverty line ( $M = 0.85$ ,  $SD = 0.79$ ). In more than two thirds of families, the father was present in the child's life (73.53%). Full child and family demographics (collected via school records and parent questionnaires) are provided in **Table 1**.

### Intervention Procedures

The GRS intervention was implemented in 4 Head Start centers from October 2014 to June 2015. All centers offered a full day program and followed the Teaching Strategies Creative curriculum (Dodge et al., 2002). A total of seven classrooms received the GRS intervention. Selection of centers and classrooms receiving GRS was not randomized. School directors chose which classrooms participated in the intervention. This was the first time schools, teachers, and families had participated in GRS.

GRS was originally designed as an intervention for parents in low and middle income countries to promote math and literacy skills through activities and bi-weekly parent workshops. A small randomized study with Head Start families demonstrated improvements in math skills over and above a Head Start-as-usual experience (Noble et al., 2012). GRS was subsequently enhanced by developing a classroom curriculum, adding activities to support children's self-regulation, and enhancing the parent component. A 2-year collaborative development process of the activities that included parents and teachers from partner Head Start centers ensured that new materials were culturally appropriate.

The resulting enhanced model is a preschool intervention targeting children's development of language, literacy, mathematics, and self-regulation skills by enhancing the home and classroom environments. The GRS intervention offers teachers and parents a set of activities that are meant to be integrated into playful time. The activities are designed to promote joint engagement and encourage parents and teachers

**TABLE 1 |** Descriptive statistics for sample characteristics.

|                                  | <i>M(SD) or %</i> |
|----------------------------------|-------------------|
| Child sex: male                  | 51.40             |
| Child age in months              | 50.28 (4.12)      |
| Child ethnicity: Hispanic/Latino | 72.00             |
| Child race                       |                   |
| White                            | 8.84              |
| Black or African American        | 8.84              |
| Asian                            | 5.44              |
| American Indian                  | 1.36              |
| Other                            | 22.45             |
| Biracial                         | 0.68              |
| Not reported                     | 21.77             |
| Respondent                       |                   |
| Mother                           | 88.24             |
| Father                           | 5.88              |
| Grandmother                      | 2.94              |
| Not reported                     | 2.94              |
| Respondent education (years)     | 12.11 (3.09)      |
| Less than high school diploma    | 25.49             |
| High school diploma or GED       | 35.29             |
| Some college                     | 13.73             |
| College degree                   | 13.73             |
| Not reported                     | 11.76             |
| Family income-to-needs ratio     | 0.85 (0.79)       |
| Father present: yes              | 73.53             |
| Marital status (*)               |                   |
| Two-parent household             | 55.07             |
| One-parent household             | 40.58             |
| Other                            | 2.90              |
| Not reported                     | 1.45              |
| Respondent US born (*)           | 36.23             |
| Respondent employment (*)        |                   |
| Full-time                        | 28.99             |
| Part-time                        | 14.49             |
| Homemaker                        | 28.99             |
| Not working                      | 26.09             |
| Not reported                     | 1.45              |
| Social services (*)              |                   |
| SNAP                             | 47.83             |
| WIC                              | 31.88             |
| TANF                             | 7.25              |

*Child characteristics were collected from school records. At baseline, families reported on maternal and paternal education and income. Percentages are based on 102 families that completed these questionnaires. At posttest, families were administered a survey that included extra demographic questions marked with \*. For these variables, percentages are based on 69 families that returned the survey.*

*U.S., United States; SNAP, Supplemental Nutrition Assistance Program; WIC, Women, Infants and Children; TANF, Temporary Assistance for Needy Families.*

to ask open-ended questions and follow the children's lead. The classroom component consists of a series of supplemental classroom activities designed to promote literacy, math, and self-regulation. These classroom activities are organized into



nine units following a developmentally-appropriate sequence, and include tools to help teachers choose activities that will easily integrate into chosen themes or target skills (see **Table 2**). Teachers are asked to implement two to three GRS activities each day, for a total of about 30–45 min. Throughout program implementation, teachers receive a full-day introductory training and individualized support from a classroom coach, who was also a member of the research team. Teachers also receive biweekly coaching from a GRS staff member who guides them in implementing the GRS activities in the classroom following the principles of Practice Based Coaching (PBC; Head Start, 2015). During coaching meetings, teachers planned the implementation of GRS activities and reflected on previous activities implemented. On alternate weeks, coaches observed classroom activity implementation, with modeling and live coaching support accompanying these sessions. All classrooms coaches either held or were pursuing a Masters or PhD degree in educational or psychological fields and received rigorous training and supervision by the project principal investigators (Marti et al., 2018).

The GRS enhanced home component uses three delivery models to support parent involvement: print, in-person and digital. At the beginning of the academic year, parents receive a color-printed workbook and a set of materials to complete GRS activities from the book. Parents are offered learning activities, organized into nine units following a developmentally appropriate sequence (see **Table 2**). Activities can be easily completed with everyday household materials, are meant to be integrated into everyday family life, and include activities that can be done in the home or the neighborhood. For example,

children can practice counting, sorting, and adding by playing “what belongs? what does not?” where children take different objects they have at home and they have to sort them following different rules. Another example is “hunt for letters” where children practice letter and sound recognition by going for a walk and finding the letters of their names. Children and parents can also practice self-regulation skills playing “let’s play freeze” as they dance their favorite song or talk about different feelings as they engage in “make a feelings bookmark” using pictures from newspapers and magazines. The book also offers twelve extra tips on self-regulation such as how to help children stay calm, how to build the child’s helping skills, how to use think-aloud strategies, or how to talk about feelings. Self-regulation activities and tips were developed in partnership with the team of investigators who designed the Social Emotional Cognitive Understanding and Regulation (SECURE) curriculum (Jones et al., 2014a,b). Activities in the parent book are aligned with GRS classroom activities. Materials are available in English, Spanish, and Mandarin, and were designed for a 3rd grade reading level. In addition, in collaboration with a program coach, teachers give parents a biweekly letter that assigns activities from the program activity book to be done at home, which are parallel to the classroom activity schedule.

GRS provides one tablet computer per classroom, which includes a collection of videos depicting real parents demonstrating how to implement program activities at home. Tablets are available in every classroom and caregivers can check them out for a week, much like a library book. Videos are available in Spanish and English and are designed with special attention to culturally diverse and low-literacy parents. In

**TABLE 2 |** Scope and sequence of GRS parent component.

| Unit | Math                                                                                                      | Literacy                                                                                              | Self-regulation                                                                                        |
|------|-----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| 1    | Counting to determine quantity, counting sets of objects up to 5, comparing groups with “more” and “less” | Letter recognition, letter-sound correspondence, print conventions                                    | Paying attention, self-control skills                                                                  |
| 2    | Sorting objects into groups, counting sets of objects up to 5, recognizing numbers 1–5                    | Print conventions, sound and letter recognition name, identifying rhymes, letter-sound correspondence | Recognizing, managing, and talking about feelings                                                      |
| 3    | Recognizing numbers 6–10, counting sets of objects up to 10, sorting objects, comparing groups of objects | Expressive language, creating stories, phonological awareness, identifying rhymes                     | Talking about feelings of characters in stories                                                        |
| 4    | Recognizing numbers 6–10, counting sets of objects up to 10                                               | Identifying favorite words, expressive language, identifying rhymes, creating stories                 | Working memory, identifying and talking about feelings                                                 |
| 5    | Measuring length and weight, comparing objects, making predictions                                        | Letter recognition, print conventions, expressive language, writing, letter-sound correspondence      | Paying attention, working memory, self-control, managing emotions                                      |
| 6    | Identifying, recognizing, and counting shapes; sorting objects by shape, color, and size                  | Expressive language, rhyming, story sequencing                                                        | Thinking about feelings, making lists to help children follow directions, remember, and complete tasks |
| 7    | Identifying and making patterns                                                                           | Identifying words, expressive language, creating stories, story sequencing                            | Working memory, paying attention using the “if-then” rule                                              |
| 8    | Practicing simple addition                                                                                | Reading and writing, expressive language, recognizing words                                           | Taking turns, cooperation and working together                                                         |
| 9    | Practicing simple subtraction, Learning about zero                                                        | Reading and writing, story sequencing, expressive language                                            | Paying attention, discussing feelings about Kindergarten                                               |

*This sequence of units corresponds to that which was followed by teachers in the GRS intervention.*

addition, a program website with all videos and print lessons is available to all parents.

In addition to the print and online materials, 11 GRS events are offered for parents to attend (one orientation, eight workshops through the year, and two classroom parties) which aim to support parents' implementation of the activities at home (see **Table 3**). At the beginning of the year, parents are invited to an orientation where they receive the print materials. If parents are unable to attend, materials are left in children's cubbies with a pamphlet that contains information about the program. During this first meeting, team members define GRS and facilitate hands-on group activities so that parents can experience the GRS materials. The team then offers a series of eight parent workshops throughout the school year: three in the fall, four in the winter, and one in the spring. Each workshop lasts 1 h and includes didactics, modeling, role-plays, discussions, and group activities designed to teach math, literacy, and self-regulation skills. Workshops are led by team members who hold at least a Bachelors or Master's degree in an education or mental health field. Group leaders are trained by the GRS program director and a postdoctoral fellow and followed a facilitator's guide. To assess program fidelity and program efficacy (Matthews and Hudson, 2001), group leaders filled out a form after each session comprised by 11 items rating adherence to the program, group leader self-efficacy, and overall participant engagement on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*). On average,

self-reported fidelity to the intervention ranged from 3.72 to 4.90 ( $SD = 0.44$ ).

At different points in the year, two 1-h classroom parties take place at dismissal time. GRS facilitators prepare three GRS activities (one from each domain) and invite parents to play with their children while facilitators and teachers supported parent involvement with children by reflecting on positive interaction and using role model when needed. At the end of each party, parents, children, teachers, and the GRS team do an activity together, led by one of the GRS facilitators (e.g., read a poem and find rhyming words). Classroom parties conclude with raffles to win art supplies and child magazines. **Table 3** presents the outline and themes of workshops and parties delivered by GRS.

## Assessment Procedures

At baseline and ~7 months later, parents and teachers completed questionnaires and children completed direct assessments of school readiness skills. Teacher questionnaires asked about child social-emotional skills and behavior. Parents completed a set of questionnaires that asked about demographics and language dominance. At post-test, parents responded to questions about their experience with GRS. Research staff handed questionnaires to caregivers at drop off or pick up both at baseline and post-test. Research staff went twice to each classroom to make sure all caregivers received the questionnaires. If children were not

**TABLE 3** | GRS events offered at the school.

| Month                | Theme                                                                  | Content                                                                                                                              | Average parent attendance % |
|----------------------|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| October              | Orientation                                                            | Program presentation and materials exploration                                                                                       | 38                          |
| December (Weekly)    | Self-regulation workshop: What is and how can help at home and school. | Overview of different components of self-regulation. Focus on emotion recognition and expression                                     | 31                          |
|                      | Literacy workshop: Getting ready to read and write.                    | Overview of pre-literacy skills that support development of reading and writing. Letter recognition and phonological awareness       | 17                          |
|                      | Math workshop: numbers and counting                                    | Overview of math skills and expectations for preschoolers. Counting, one-to-one correspondence, number recognition, simple addition. | 17                          |
| February             | GRS party                                                              | Parent and children play 3 activities that focus on letter identification, counting, emotion recognition                             | 31                          |
| March-April (Weekly) | Literacy workshop: Asking questions and making stories.                | Build vocabulary and creativity using open-ended questions and making stories together.                                              | 16                          |
|                      | Math workshop: Measurement, shapes and patterns.                       | Measurement in preschool: using non-standard units of measurement. Patterns: learning to make predictions                            | 19                          |
|                      | Self-regulation workshop: Understanding emotions.                      | How to support children to identify their emotions and talk about them. Pretend play, story making.                                  | 17                          |
|                      | Self-regulation workshop: Managing emotions and behavior.              | Emotion regulation. How to prevent and manage conflicts.                                                                             | 12                          |
| May                  | GRS party                                                              | Parent and children play 3 activities that focus on rhyme identification, making shape patterns, working memory                      | 30                          |
| June                 | Transition: prepare your children for kindergarten.                    | How to support the transition to kindergarten before, the first day, and the first weeks.                                            | 16                          |

present, questionnaires were left in children's cubbies. Parents could fill out the questionnaires in the classroom with the support of research assistants if requested or take them home and bring them back that same week. Parents filled out the surveys in their preferred language. Children were pulled out of their regular classrooms twice on different days by a bilingual, trained research assistant for 20–30 min to participate in assessments of early literacy, oral language, early mathematics skills, and self-regulation.

### Language Dominance

Children who spoke Spanish as reported by their parents were administered three subtests from the *Preschool Language Assessment Scale* (PreLAS 2000; Duncan and De Avila, 1998) to determine language dominance. Children who spoke Chinese as reported by their parents were administered the first 15 items of the *Expressive One Word Picture Vocabulary Test* (EOWPVT; Gardner, 1990) in English and Chinese, and dominance was determined by the higher scoring language. Once language dominance was determined, the dominant language was used for all subsequent assessments. Chinese dominant children only completed the *Head-Toes-Knees-Shoulders* and *toy wrap* tasks in Chinese. Instructions for these self-regulation tasks were translated into Chinese by a native Chinese-speaker who was bilingual in English. Based on language dominance tests, 78.3% children were dominant in English, 17.4% in Spanish, and 4.3% in Chinese.

## MEASURES

### Parent Involvement in GRS

#### Parent Attendance at GRS Events

Parent attendance was recorded at each of the 11 total GRS events (one orientation, eight workshops through the year, and two parties). Because centers had open enrollment and some families enrolled after GRS started, we calculated a percentage of events attended for each parent based on date of enrollment. This percentage was used in analyses rather than the total number of events attended. In addition, we also calculated attendance separately for the parent orientation, workshops, and parties to examine differences in attendance across different events.

At the end of each workshop, parents completed a survey that asked about the usefulness of different aspects of the workshop (presentation, group discussion, group work, videos; 1 = *very unhelpful* to 5 = *very helpful*), how prepared they felt to do GRS activities at home (1 = *very unprepared* to 5 = *very prepared*), and how well they understood the workshop (1 = *very confused* to 5 = *I understand very well*).

#### Parental Time Spent Doing GRS Activities at Home

At each GRS party and at the end of the GRS program, parents were asked to fill out a brief survey about time spent doing GRS activities, usage of GRS materials, and satisfaction with materials. We administered this brief survey three times across the year to collect information from as many families as possible. Seventy-seven parents returned this survey at least once. Parents who

returned these surveys attended a higher percentage of GRS events ( $M = 33.08$ ;  $SD = 24.79$ ) compared with families who did not return the surveys ( $M = 9.10$ ;  $SD = 12.55$ ),  $t_{(131)} = 7.18$ ,  $p = 0.000$ . We did not find differences in family or child characteristics between parents who filled out the forms and parents who did not.

As part of this survey, parents were asked how much time they spent doing GRS activities each week (0 = *didn't do GRS activities*, 1 = *<10 min*, 2 = *10–30 min*, 3 = *30–60 min*, 4 = *> 60 min*). Most of the parents who returned the survey did so at the end of the GRS program ( $n = 66$ , 86%). For parents who returned the survey more than once, we averaged their responses across time points.

In addition, we examined parental perceptions about the activities they did. Parents were asked to rate (1 = *strongly disagree* to 4 = *strongly agree*) the following statements: “The description of the activities is easy to understand” and “The activities in the book are easy to do.”

### Parental Usage of Digital Materials

To measure usage of digital materials, parents were asked whether they had used the classroom tablet computers or the GRS website to access the videos. Usage of digital materials was dichotomized as 0 = *never accessed GRS videos*, 1 = *accessed GRS videos* (on the tablet and/or the website).

## School Readiness Skills

### Early Literacy

The *Woodcock-Johnson Test of Academic Achievement* (WJ III)/*Bateria III Woodcock Munoz* (WJ III; Woodcock et al., 2001) is a widely used, standardized battery of academic skills, with strong validity and reliability in both English and Spanish. The Letter-Word Identification subtest involves identifying printed letters and later reading printed words aloud. The Picture Vocabulary subtest assesses oral language and lexical knowledge. Internal consistency (Cronbach's alpha) for these subtests ranges from 0.81 to 0.98. Test-retest reliability ranges from 0.89 to 0.92 (Bradley-Johnson et al., 2004).

The *Clinical Evaluation of Language Fundamentals—Preschool—2* (CELF-P-2 and CELF-P-2-Spanish; Semel et al., 2003) phonological awareness subtests, normed in both English and Spanish, assess rhyming, blending, segmenting, and identifying sounds and syllables in words and sentences. The English version has a test-retest reliability of 0.82–0.86 and a Cronbach's alpha of 0.88. The Spanish version has a test-retest reliability of 0.81–0.93 and internal consistency of 0.82–0.88. Because the Spanish and English forms only have three subscales that match, we created a composite by summing scores on the syllabic blending, sentence segmentation, and syllabic segmentation tests.

### Early Math

The *WJIII/Bateria Woodcock-Munoz* (Woodcock et al., 2001) Applied Problems subtest measures the child's ability to analyze and solve math problems. Initial items involve counting and identifying the number of objects in a picture, eventually

progressing to more complex calculations. Cronbach's alpha ranges from 0.90 to 0.92 (Bradley-Johnson et al., 2004).

The *Test of Early Mathematics Ability* (TEMA-3; Ginsburg and Baroody, 2003) measures informal and formal concepts and skills in counting, number-comparison facility, number literacy, number facts, calculation skills, and understanding of number concepts. The TEMA-3 has been normed for children between the ages of 3 and 8 years. The Spanish version was provided to us by the developer of the TEMA-3. Internal consistency reliabilities have been reported all above 0.92 (Ginsburg and Baroody, 2003). Performance on the TEMA-3 is highly correlated with the WJ III Tests of Achievement (Woodcock et al., 2001).

### Self-Regulation

The *Head-Toes-Knees-Shoulders* (HTKS; McClelland et al., 2014) task measures behavioral self-regulation including aspects of executive function (Ponitz et al., 2009; McClelland and Cameron, 2012). This task has been used for children aged 4–8 years. The instructions are available in English and Spanish. Children first follow one of two commands naturally, and then are instructed to respond with a conflicting, non-automatic action. For example, if the administrator says, “Touch your head,” the correct response would be to touch one's toes. On each item, children score 2 points for responding correctly, 1 point for self-correcting, and 0 points for responding incorrectly. In previous research, children who perform better on the HTKS task receive higher teacher and parent ratings of behavioral competence, and fall prekindergarten scores predict achievement level and gains in the spring (McClelland et al., 2007; Ponitz et al., 2009). The HTKS task has demonstrated construct and predictive validity in preschool through first grade, in both English- and Spanish-speaking children (Ponitz et al., 2008; McClelland et al., 2014). It has an inter-rater reliability of 0.98 (Connor et al., 2010).

The *Preschool Self-Regulation Assessment* (PSRA; Smith-Donald et al., 2007) is a brief battery of tasks designed to assess self-regulation in preschool children. It is available in English and Spanish and has been used in both the Chicago School Readiness Project (Smith-Donald et al., 2007) and in the Head Start REDI Program (Bierman et al., 2008a,b). In the toy wrap task, the child is instructed not to peek for 1 min while the researcher noisily wraps a “surprise.” Scores reflect how many times the child peeks and how much time elapses before the child peeks.

### Social-Emotional Skills

The *Social Competence and Behavior Evaluation Short Form* (SCBE-30; LaFreniere and Dumas, 1996) is a well-validated, 30-item measure used by teachers to rate children using 6-point Likert scales. It contains the following three scales: Anger/Aggression, Anxiety/Withdrawal, and Social Competence. Scores at preschool-age predict later social competence (Denham et al., 2003). The SCBE-30 has an inter-rater reliability of 0.78–0.91, and Cronbach's alpha ranging from 0.80 to 0.92.

### Dosage of Classroom Activities

Teachers reported the activities they had completed at least once during a period of 2 weeks in their bi-weekly coaching meeting

(1 = *completed activity*, 0 = *didn't complete activity*). The bi-weekly dosage scores were summed across the entire year to create a measure of dosage fidelity that describes the total number of activities teachers have completed at least once. Dosage of classroom activities was used as a covariate in some analyses.

### Analytic Approach

To examine the rates of parental attendance, time spent doing activities, and usage of digital content, we computed descriptive statistics for each parent involvement measure. In addition, we examined differences by school and classroom in parent involvement measures. To examine associations between family characteristics and parent involvement, we used zero-order correlations, *t*-tests, and chi-square tests, as appropriate. To examine the associations between indices of parent involvement in GRS (independent variable) and gains in children's school readiness outcomes post-intervention (dependent variable) we conducted multilevel modeling analyses using linear mixed modeling in SAS (version 9.4; SAS Institute, 2014), given that child level data were nested within classrooms.

Separate regression models were conducted to examine associations of parental attendance and time spent on GRS activities with children's school readiness outcomes. Child post-intervention school readiness outcomes were modeled as a function of parent involvement, after adjusting for the baseline value of the same school readiness measure and the time between the baseline and post-intervention assessments. Child age, sex, race, and ethnicity, and indices of family SES (income-to-needs ratio, parental education) were included as additional covariates in these regression models. Covariates that were not significant were dropped from the final models.

Data on parent attendance was available for all parents ( $n = 133$ ). However, data on time spent doing GRS activities and usage of digital materials was only available for 58% of the total sample. In regard to this missing data, the mixed model approach used in this study has the advantage of using full information maximum likelihood (FIML) and thus including all available cases rather than making listwise deletions.

## RESULTS

### Descriptive Statistics

#### Parent Attendance at GRS Events

The majority of parents (69.20%) attended at least one GRS event (see **Table 4**). Out of the 92 parents that came to GRS events, 31% came to one event, 24% came to two events, 13% came to three events, 10% came to four events, and the remaining 14% came to five events or more. On average, parents attended 21.88% of total offered events ( $SD = 22.92$ , range 0–90%). There were significant differences in the percentage of events attended by school/center,  $F_{(3, 133)} = 3.20$ ,  $p = 0.03$ , and by classroom,  $F_{(6, 133)} = 2.77$ ,  $p = 0.01$ , ranging from 12.14% ( $SD = 8.95$ ) to 33.01% ( $SD = 26.96$ ). Attendance also differed by event. Across all schools, 37.40% parents came to parent orientation, 18.13% to parent workshops, and 31.5% to GRS parties (see **Table 3**).



**TABLE 4 |** Descriptive statistics for study variables.

|                                          | Time 1   |          |           |           | Time 2   |          |           |        |
|------------------------------------------|----------|----------|-----------|-----------|----------|----------|-----------|--------|
|                                          | <i>n</i> | <i>M</i> | <i>SD</i> | Range     | <i>n</i> | <i>M</i> | <i>SD</i> | Range  |
| % GRS events parents attended            | –        | –        | –         | –         | 133      | 21.88%   | 22.92%    | 0–90%  |
| Parental time spent doing GRS activities | –        | –        | –         | –         | 77       | 2.00     | 0.86      | 0–4    |
| # parents used videos                    | –        | –        | –         | –         | 78       | 43.6%    | 34        | –      |
| WJ Letter-word identification            | 97       | 96.73    | 23.48     | 0–130     | 97       | 100.75   | 11.36     | 71–135 |
| WJ Picture vocabulary                    | 98       | 95.36    | 13.37     | 49–114    | 98       | 94.25    | 12.31     | 49–121 |
| CELF: Phonological awareness             | 93       | 3.16     | 3.48      | 0–11      | 93       | 7.16     | 3.40      | 0–12   |
| WJ Applied problems                      | 96       | 98.68    | 13.78     | 61–129    | 96       | 102.82   | 13.26     | 58–127 |
| TEMA: Math skills                        | 78       | 89.71    | 14.70     | 68–132    | 78       | 94.01    | 15.04     | 55–127 |
| HTKS                                     | 103      | 5.55     | 10.53     | 0–54      | 103      | 16.62    | 17.18     | 0–54   |
| Toy wrap (number of peeks)               | 91       | 1.82     | 1.97      | 0–7       | 91       | 1.68     | 2.35      | 0–10   |
| SCBE-30: Social competence (T)           | 105      | 3.22     | 0.97      | 1.40–5.70 | 105      | 3.82     | 1.00      | 2–5.70 |
| SCBE-30: Anxiety (T)                     | 105      | 1.80     | 0.69      | 1–4.90    | 105      | 1.97     | 0.74      | 1–4.80 |
| SCBE-30: Anger/Aggression (T)            | 105      | 1.59     | 0.67      | 1–5.70    | 105      | 1.78     | 0.92      | 1–5.40 |

Descriptive statistics for child outcomes only for children who had pretest and posttest data. T, teacher questionnaire; WJ, Woodcock–Johnson Test of Academic Achievement; CELF, Clinical Evaluation of Language Fundamentals, Phonological Awareness Subtest; TEMA, Test of Early Mathematics Ability; HTKS, Head-Toes-Knees-Shoulders; SCBE30, Social Competence and Behavior Evaluation-Short Form.

Ratings of how helpful a workshop was, how prepared parents felt doing activities, and how clear a workshop topic was consistently averaged 4.4 or higher on a 5 point scale ( $SD = 0.69$ ). Overall, more than 90% of parents who participated in GRS workshops found them helpful and felt prepared to do the activities with their children, as indicated by ratings above of 4 out of 5.

### Parental Time Spent Doing GRS Activities at Home

Out of 77 parents who reported on time spent on GRS activities in a week, 6.5% reported they did not have time to do GRS activities, 9.1% reported they spent <10 min, 58.4% spent 10–30 min, 23.4% spent 30–60 min, and 2.6% spent > an hour. On average, parents spent between 10 and 30 min per week doing GRS activities. There were no significant differences in average time spent on activities by classroom,  $F_{(6, 133)} = 0.44$ ,  $p = 0.85$ , or school,  $F_{(3, 133)} = 0.47$ ,  $p = 0.76$ . In addition, most parents agreed that activities were easy to understand (76.6%) as well as to implement (80.35%).

### Parental Use of Digital Program Materials

Parental use of videos was slightly higher. Out of 78 parents who answered this question, 43.6% reported having seen videos from the tablet and/or the website. There were no significant differences in use of digital materials by classroom,  $\chi^2_{(1)} = 3.05$ ,  $p = 0.80$ , or by school,  $\chi^2_{(1)} = 2.98$ ,  $p = 0.56$ .

### Associations Among Parent Involvement Indices

The three parental involvement indices were not significantly inter-correlated. Time spent on GRS activities was not associated with attendance to GRS events,  $r = 0.08$ ,  $p = 0.52$ . Parents who used the digital materials were not significantly more likely to attend GRS events,  $t_{(77)} = 1.93$ ,  $p = 0.06$ , or spend more time doing GRS activities at home,  $t_{(73)} = 1.20$ ,  $p = 0.24$ . These results

were likely due to the smaller subset of parents who reported on time spent doing activities at home and use of digital materials being higher in parental attendance compared to parents who did not report on these variables. Thus, there was likely restricted variability in parental time spent doing activities and use of digital materials.

## Family Characteristics and Parent Involvement in GRS

### Parent Attendance at GRS Events

Out of a broad range of family characteristics, including income-to-needs ratio, maternal education, immigration history, race, language, and use of social services, only parental employment and food stamps receipt were significantly associated with parent attendance at GRS events. Working parents attended 41% of GRS events ( $SD = 26.56$ ) whereas non-working parents attended 25% of GRS events ( $SD = 23.19$ ),  $t_{(66)} = 2.59$ ,  $p = 0.02$ . Families receiving food stamps (Supplemental Nutrition Assistance Program or SNAP) attended 25% ( $SD = 23.09$ ) of events while families not receiving food stamps attended 40% of events ( $SD = 26.17$ ),  $t_{(66)} = 2.53$ ,  $p = 0.02$ .

### Parental Time Spent Doing GRS Activities at Home

Only family income-to-needs ratio was positively and significantly associated with parental time spent doing GRS activities per week,  $r = 0.25$ ,  $p = 0.04$ .

### Parental Use of Digital Program Materials

Having the father present in the child's life was significantly associated with use of digital content, with 54% of families with the father present and 13% with the father not present in the child's life having used the digital materials,  $\chi^2_{(1)} = 4.74$ ,  $p = 0.03$ .

**TABLE 5 |** Parent attendance effects on children's post-intervention school readiness.**(A) Parent attendance effects on post-intervention language, pre-literacy, and math outcomes.**

|                    | Letter-word identification |      |        | Picture vocabulary |      |        | Phonological awareness |      |      | Applied problems |      |        | Math skills |      |        |
|--------------------|----------------------------|------|--------|--------------------|------|--------|------------------------|------|------|------------------|------|--------|-------------|------|--------|
|                    | $\beta$                    | SE   | p      | $\beta$            | SE   | p      | $\beta$                | SE   | p    | $\beta$          | SE   | p      | $\beta$     | SE   | p      |
| Baseline           | 0.42                       | 0.08 | <0.001 | 0.83               | 0.07 | <0.001 | 0.41                   | 0.11 | 0.00 | 0.66             | 0.08 | <0.001 | 0.70        | 0.09 | <0.001 |
| Child race         | -0.25                      | 0.09 | 0.01   | —                  | —    | —      | —                      | —    | —    | -0.22            | 0.08 | 0.01   | 0.07        | 0.10 | 0.46   |
| Child sex          | —                          | —    | —      | —                  | —    | —      | —                      | —    | —    | 0.03             | 0.07 | 0.61   | —           | —    | —      |
| Child language     | 0.22                       | 0.14 | 0.11   | -0.55              | 0.10 | <0.001 | 0.05                   | 0.16 | 0.78 | -0.02            | 0.13 | 0.89   | -0.18       | 0.11 | 0.12   |
| Parental education | —                          | —    | —      | 0.01               | 0.08 | 0.93   | —                      | —    | —    | —                | —    | —      | —           | —    | —      |
| Attendance         | 0.16                       | 0.07 | 0.03   | 0.13               | 0.06 | 0.03   | 0.19                   | 0.08 | 0.03 | 0.00             | 0.07 | 1.00   | 0.04        | 0.07 | 0.56   |

**(B) Parent attendance effects on post-intervention self-regulation and social-emotional outcomes.**

|                    | HTKS    |      |        | Toy wrap (#peeks) |      |      | Social competence (T) |      |        | Anger (T) |      |        | Anxiety (T) |      |        |
|--------------------|---------|------|--------|-------------------|------|------|-----------------------|------|--------|-----------|------|--------|-------------|------|--------|
|                    | $\beta$ | SE   | p      | $\beta$           | SE   | p    | $\beta$               | SE   | p      | $\beta$   | SE   | p      | $\beta$     | SE   | p      |
| Baseline           | 0.48    | 0.11 | <0.001 | 0.45              | 0.11 | 0.00 | 0.54                  | 0.10 | <0.001 | 0.90      | 0.10 | <0.001 | 0.64        | 0.09 | <0.001 |
| Child race         | —       | —    | —      | —                 | —    | —    | —                     | —    | —      | —         | —    | —      | —           | —    | —      |
| Child sex          | —       | —    | —      | -0.19             | 0.10 | 0.08 | 0.19                  | 0.08 | 0.02   | —         | —    | —      | —           | —    | —      |
| Child language     | -0.07   | 0.12 | 0.56   | —                 | —    | —    | -0.04                 | 0.11 | 0.68   | —         | —    | —      | 0.02        | 0.10 | 0.88   |
| Parental education | —       | —    | —      | —                 | —    | —    | —                     | —    | —      | —         | —    | —      | —           | —    | —      |
| Attendance         | -0.05   | 0.09 | 0.58   | -0.21             | 0.09 | 0.02 | 0.18                  | 0.08 | 0.04   | -0.09     | 0.08 | 0.24   | -0.05       | 0.08 | 0.49   |

Models control for time between pre-test and post-test and child age with no difference in results. Therefore, child age and time between pre and posttest estimates are not included in the table. We did not control for time between assessments for SCBE subscales because there was no variation. To preserve power, we only include child and family demographic variables that showed a significant correlation with child outcome in bivariate analysis. (T) teacher-rated.

## Parent Involvement in GRS and Gains in Children's School Readiness Skills

We examined the associations between child/family characteristics and children's post-intervention math, literacy and self-regulation skills to determine which covariates should be included in subsequent regression models. Four of these characteristics (child ethnicity, sex, dominant language, and respondent education) were identified as predictors of some child outcomes. Children whose primary caregiver had at least a high school diploma scored higher on picture vocabulary [ $t_{(73)} = 2.10, p = 0.01$ ]. Hispanic/Latino children scored lower on letter word identification [ $t_{(73)} = 2.66, p = 0.002$ ], applied problems [ $t_{(73)} = 3.05, p = 0.001$ ], and math skills [ $t_{(69)} = 3.32, p = 0.001$ ]. Children whose dominant language was Spanish scored lower on letter word identification [ $t_{(109)} = 2.77, p = 0.03$ ] picture vocabulary [ $t_{(109)} = 4.37, p = 0.00$ ], phonological awareness [ $t_{(107)} = 2.87, p = 0.01$ ], applied problems [ $t_{(109)} = 4.96, p = 0.00$ ], math skills [ $t_{(99)} = 4.32, p = 0.003$ ], HTKS [ $t_{(111)} = 2.42, p = 0.02$ ], and showed lower levels of anger [ $t_{(100)} = -2.61, p = 0.01$ ]. Girls scored higher on applied problems [ $t_{(109)} = 2.16, p = 0.03$ ], social competence [ $t_{(115)} = 3.50, p = 0.001$ ], and scored lower on problem behavior [ $t_{(115)} = -2.41, p = 0.02$ ], and peeked less on the toy wrap task [ $t_{(90)} = -2.42, p = 0.04$ ]. Covariates that were found to be significant were included in the subsequent regression models.

### Regression Models

Results are presented in **Tables 5, 6**. Higher parental attendance at GRS events was significantly associated with higher early literacy (picture vocabulary, letter-word identification,

phonological awareness), self-regulatory skills (toy wrap task), and social competence even after controlling for the nesting of children within classrooms, baseline skill levels, and other relevant covariates (see **Table 5**). We also examined the association between parental attendance and child school readiness outcomes after including GRS dosage in the classroom as a covariate. Most associations remained the same (picture vocabulary,  $\beta = 0.11, p = 0.04$ ; phonological awareness,  $\beta = 0.17, p = 0.03$ ; toy wrap task,  $\beta = -0.54, p = 0.01$ ; and social competence,  $\beta = 0.14, p = 0.06$ ). The association between parental attendance and letter-word identification became non-significant ( $\beta = 0.13, p = 0.14$ ).

The more time parents spent on GRS activities in a given week, the more gains were observed in letter-word identification and applied problems controlling for baseline skill levels, relevant covariates, and nesting effects (see **Table 6**). Associations between time spent on GRS activities and child school readiness outcomes did not change when GRS classroom dosage was added as a covariate (letter-word identification,  $\beta = 0.24, p = 0.03$  and applied problems,  $\beta = 0.26, p = 0.01$ ). Effect sizes for these results were small for parental attendance ( $\eta_p^2: 0.02-0.08$ ) and medium for parental time spent doing activities ( $\eta_p^2: 0.10-0.15$ ). Parental use of digital program materials was not associated with gains in any child outcome.

## DISCUSSION

The goals of this study were to examine how parents engage in the GRS intervention, associations between family characteristics and parent involvement in GRS, and associations between parent

**TABLE 6 |** Parental time spent on GRS activities effects on children's post-intervention school readiness.**(A) Parental time spent on GRS activities effects on post-intervention language, pre-literacy, and math outcomes**

|                               | Letter-word identification |      |        | Picture vocabulary |      |        | Phonological awareness |      |      | Applied problems |      |        | Math skills |      |        |
|-------------------------------|----------------------------|------|--------|--------------------|------|--------|------------------------|------|------|------------------|------|--------|-------------|------|--------|
|                               | $\beta$                    | SE   | p      | $\beta$            | SE   | p      | $\beta$                | SE   | p    | $\beta$          | SE   | p      | $\beta$     | SE   | p      |
| Baseline                      | 0.51                       | 0.08 | <0.001 | 0.78               | 0.10 | <0.001 | 0.34                   | 0.12 | 0.01 | 0.71             | 0.10 | <0.001 | 0.80        | 0.11 | <0.001 |
| Child race                    | -0.24                      | 0.09 | 0.01   | —                  | —    | —      | —                      | —    | —    | -0.15            | 0.09 | 0.13   | 0.11        | 0.12 | 0.40   |
| Child sex                     | —                          | —    | —      | —                  | —    | —      | —                      | —    | —    | 0.21             | 0.08 | 0.01   | —           | —    | —      |
| Child language                | 0.15                       | 0.13 | 0.25   | -0.53              | 0.13 | <0.001 | 0.21                   | 0.18 | 0.25 | -0.11            | 0.14 | 0.45   | -0.11       | 0.14 | 0.42   |
| Parental education            | —                          | —    | —      | 0.02               | 0.09 | 0.80   | —                      | —    | —    | —                | —    | —      | —           | —    | —      |
| Times spent on GRS activities | 0.19                       | 0.08 | 0.03   | -0.01              | 0.10 | 0.93   | -0.02                  | 0.11 | 0.89 | 0.21             | 0.08 | 0.01   | 0.10        | 0.09 | 0.29   |

**(B) Parental time spent on GRS activities effects on post-intervention self-regulation and social-emotional outcomes**

|                               | HTKS    |      |      | Toy wrap (#peeks) |      |      | Social competence (T) |      |        | Anger (T) |      |        | Anxiety (T) |      |        |
|-------------------------------|---------|------|------|-------------------|------|------|-----------------------|------|--------|-----------|------|--------|-------------|------|--------|
|                               | $\beta$ | SE   | p    | $\beta$           | SE   | p    | $\beta$               | SE   | p      | $\beta$   | SE   | p      | $\beta$     | SE   | p      |
| Baseline                      | 0.49    | 0.12 | 0.00 | 0.31              | 0.12 | 0.02 | 0.59                  | 0.11 | <0.001 | 0.72      | 0.15 | <0.001 | 0.55        | 0.08 | <0.001 |
| Child race                    | —       | —    | —    | —                 | —    | —    | —                     | —    | —      | —         | —    | —      | —           | —    | —      |
| Child sex                     | —       | —    | —    | -0.21             | 0.14 | 0.13 | 0.26                  | 0.10 | 0.01   | —         | —    | —      | —           | —    | —      |
| Child language                | -0.02   | 0.13 | 0.88 | —                 | —    | —    | -0.05                 | 0.12 | 0.67   | —         | —    | —      | 0.10        | 0.11 | 0.37   |
| Parental education            | —       | —    | —    | —                 | —    | —    | —                     | —    | —      | —         | —    | —      | —           | —    | —      |
| Times spent on GRS activities | -0.14   | 0.10 | 0.15 | 0.02              | 0.14 | 0.90 | -0.13                 | 0.09 | 0.15   | 0.00      | 0.11 | 0.98   | 0.02        | 0.08 | 0.83   |

Models control for time between pre-test and post-test and child age with no difference in results. Therefore, child age and time between pre and post-test estimates are not included in the table. We did not control for time between assessments for SCBE subscales because there was no variation. To preserve power we only include child and family demographic variables that showed a significant correlation with child outcome in bivariate analysis. (T) teacher-rated.

involvement and gains in children's school readiness skills over the preschool year. On the whole, few family characteristics were significantly associated with parental involvement in GRS. However, there was a tendency for markers of relatively higher SES to be linked with greater parental involvement in GRS. Findings also indicated that greater parent involvement in GRS may lead to more positive gains in children's school readiness skills.

Two-thirds of parents attended at least one GRS event at the school, suggesting that family-oriented school readiness interventions like GRS may be feasible for low-income families. Nonetheless, parental attendance to events was inconsistent, with few parents repeatedly attending GRS events. Other prevention programs that offer services for Head Start families have found similar results (Gross et al., 2009). For example, Head Start parents were found to attend less than two workshops out of nine offered as part of *The Companion Curriculum* intervention (Mendez, 2010). Interestingly, we found differences in parental attendance based on the type of event. While parent workshops consistently had low attendance (average attendance to workshops was 18%), attendance at GRS parties in the classroom was higher (30%). We conducted 10 focus groups with 40 parents at the end of the intervention to understand the barriers to, and the facilitators of, program participation. Results indicated that for some parents the GRS activities were self-explanatory and given their limited time GRS program materials were enough for them to understand how to engage in learning activities with their children. This may explain the lack

of consistent attendance to workshops. In addition, differences in when events were scheduled may explain these differences in parental attendance to GRS events, with workshops taking place in the morning and parties in the afternoon. It may also be that an event described as a "party" is inherently more appealing than a "workshop." Focus group participants also pointed out that they liked the opportunity to engage and play with their children during the parties. Regardless, offering a variety of events at different times and in different formats may be an effective means of increasing parent involvement in early interventions.

Close to 26% of parents reported using GRS activities 30 min per week or more, and almost 60% of parents reported using GRS activities between 10 and 30 min per week. Thus, spending around 30 min per week engaging in simple and fun activities may be feasible for most families. However, results may be biased toward more engaged parents given that data were available for less than two thirds of the sample, and this subsample attended more GRS events. In addition, GRS activities are intended to be used repeatedly and integrated into daily routines. Thus, future research should explore more nuanced measures including whether parents incorporate program activities into their daily routines.

Almost 50% of parents reported having used the videos that were provided for each parent-child activity to support the implementation of the activity at home. However, this percentage may be lower if data were available for the whole sample. Nonetheless, these results suggest that offering digital program materials may be a practical, cost-effective way to

engage parents. However, more research is needed to understand parents' preferences in regard to using internet-based materials and whether those materials by themselves would be enough to produce intervention effects.

Findings from this study indicated a tendency for family characteristics associated with lower SES to be associated with reduced parental involvement in the GRS intervention. More specifically, unemployed parents attended fewer GRS events than employed parents. In addition, families receiving SNAP (food stamps) attended fewer GRS events compared to those not receiving SNAP. Similarly, lower family income-to-needs ratio was significantly associated with less time spent doing GRS activities at home. These findings suggest the importance of identifying families with the greatest economic need who may benefit from extra support to overcome any barriers to parental participation in early interventions (Cooper et al., 2010; Dawson-McClure et al., 2015). Previous research has suggested that parents with lower educational attainment tend to provide fewer opportunities for learning at home and spend less time engaging in learning activities (Fantuzzo et al., 2000; Kalil et al., 2012; see also Hayes et al., 2016). In the present study, parental education was not significantly associated with parental involvement in GRS, consistent with the notion that the simple and easy design of GRS activities may allow parents with a range of educational backgrounds to implement them at home. In addition, contrary to previous research (Hindman et al., 2012), we did not find differences in parental involvement by ethnicity. The use of parents' preferred language and having staff with similar ethnic background might have helped accommodate parents with different cultural backgrounds (Murry et al., 2004).

Another important finding that emerged was that greater parental involvement in GRS was significantly linked with more positive gains in children's early literacy, math, and self-regulatory skills across the preschool year, even after controlling for family characteristics. Children whose parents attended more GRS events showed more growth in pre-literacy, language, and delay of gratification skills across the preschool year. Similarly, greater parental time spent doing GRS activities at home was associated with greater gains in children's early literacy and math skills. However, it is important to note that these findings do not stem from a randomized experiment, but rather reveal differences among parents receiving the intervention.

These results highlight the importance of offering parents different opportunities to attend in-person events where they can learn strategies to support their children's school readiness skills. Attending GRS events may improve parents' knowledge of how to support school readiness as well as enhance parent-child interactions. Time spent at home doing GRS activities also appears to contribute to child outcomes, especially to gains in early math skills. It might be that parents reporting more time doing GRS activities are indeed spending more time doing math activities. Future research should explore the use of different types of activities at home and their impact on school readiness. These findings suggest that interventions aimed at improving school readiness should incorporate activities and materials that parents can use at home with their children. These strategies may be more cost-effective and scalable, and may offer parents who

cannot participate in school events the opportunity to engage in the intervention and promote their children's development and education.

Interestingly, despite parental attendance being associated with gains in children's language/literacy and delay of gratification skills, parental attendance was not significantly associated with children's early math skills. Attendance at math workshops was the lowest and could explain the lack of association with math gains. Previous research with low-income families has suggested that parents of preschool children are more driven to engage in literacy activities than math activities (Cannon and Ginsburg, 2008). This may be related to parents feeling uncertain about mathematics expectations for preschoolers, lacking confidence in their ability to teach math to their young children, or beliefs that the school has the primary responsibility of teaching math (Cannon and Ginsburg, 2008; Maloney et al., 2015).

Future research should explore strategies (e.g., text reminders) to support and increase the time parents spend at home engaged in learning activities with their children (Gennetian et al., 2017) and decrease barriers to attending program events that promote parent involvement. Future parent involvement research with a larger sample should explore the unique contributions of attending school-based workshops and using home-based learning activities.

## LIMITATIONS

The findings of this study must be considered in light of several limitations. First, measures of parental satisfaction with the GRS intervention and time spent doing GRS activities at home were based on parents who responded to surveys. Therefore, responses may have been affected by social desirability. In addition, given that 58% of families returned these surveys and that parents who responded to surveys had higher attendance to events than non-respondents, these results may be biased toward more engaged families. More objective measures might have resulted in different associations. Methods such as time-diaries should be considered in future studies as they might provide data that is more precise. This makes it important to take into account results for parent attendance, as this measure of parent involvement was not biased in this way; findings for this measure were similar to those for the other measures of parent involvement. Second, the smaller sample size for these survey-based measures may have reduced power to detect effects. Therefore, these associations should be viewed as exploratory in nature and cannot be generalized to other samples. Third, despite the longitudinal design of this study, we cannot make inferences about the direction of causality from these data. We did not account for general measures of home-based and school-based parental involvement and quality of parent-child interactions that may explain variability in parent involvement with GRS and child outcomes. Parents with higher levels of involvement at the beginning of the preschool year could be more inclined to engage with a school readiness intervention like GRS. In addition, rates of children's preschool attendance could partially explain differences in parental attendance to GRS events. Fourth, although we controlled for the potential



effects of children being nested within classrooms and for dosage of GRS in the classroom, we did not specifically examine the role of other variables related to GRS implementation in the classroom such as child engagement with GRS classroom activities.

## CONCLUSION

In this study, higher levels of parent involvement with the GRS intervention were found to be associated with greater gains in early literacy, math, and self-regulatory skills among preschoolers from socioeconomically disadvantaged families. Therefore, enhancing parent involvement in early school readiness interventions may lead to improved developmental gains for socioeconomically disadvantaged children. These results underscore the importance of offering parents various opportunities for involvement in school readiness interventions. GRS offers parents easy to understand materials and flexible options to promote child development using playful activities. By assessing and enhancing various aspects of parent involvement in early interventions, we may discover new ways of improving school readiness that are well-matched to the diverse population of families who participate in these interventions.

## REFERENCES

- Baker, C. N., Arnold, D. H., and Meagher, S. (2011). Enrollment and attendance in a parent training prevention program for conduct problems. *Prevent. Sci.* 12, 126–138. doi: 10.1007/s11121-010-0187-0
- Bierman, K. L., Domitrovich, C. E., Nix, R. L., Gest, S. D., Welsh, J. A., Greenberg, M. T., et al. (2008a). Promoting academic and social-emotional school readiness: the head start REDI program. *Child Dev.* 79, 1802–1817. doi: 10.1111/j.1467-8624.2008.01227.x
- Bierman, K. L., Morris, P. A., and Abenavoli, R. M. (2017). *Parent Engagement Practices Improve Outcomes for Preschool Children*. Edna Bennett Pierce Prevention Research Center, Pennsylvania State University.
- Bierman, K. L., Nix, R. L., Greenberg, M. T., Blair, C., and Domitrovich, C. E. (2008b). Executive functions and school readiness intervention: impact, moderation, and mediation in the Head Start REDI program. *Dev. Psychopathol.* 20, 821–843. doi: 10.1017/S0954579408000394
- Bierman, K. L., Welsh, J. A., Heinrichs, B. S., Nix, R. L., and Mathis, E. T. (2015). Helping head start parents promote their children's kindergarten adjustment: the research-based developmentally informed parent program. *Child Dev.* 86, 1877–1891. doi: 10.1111/cdev.12448
- Bradley, R. H., and Corwyn, R. F. (2002). Socioeconomic status and child development. *Annu. Rev. Psychol.* 53, 371–399. doi: 10.1146/annurev.psych.53.100901.135233
- Bradley-Johnson, S., Morgan, S. K., and Nutkins, C. (2004). Review of the Woodcock-Johnson tests of achievement: Third edition. *J. Psychoeduc. Assess.* 22, 261–274. doi: 10.1177/073428290402200305
- Breitenstein, S. M., Gross, D., Fogg, L., Ridge, A., Garvey, C., Julion, W., et al. (2012). The Chicago parent program: comparing 1-year outcomes for African American and Latino parents of young children. *Res. Nurs. Health* 35, 475–489. doi: 10.1002/nur.21489
- Brotman, L., Dawson-McClure, S., Kamboukos, D., Kamboukos, D., Huang, K. Y., Calzada E. J and Goldfeld K. (2016). Effects of parentcorps in prekindergarten on child mental health and academic performance: follow-up of a randomized clinical trial through 8 years of age. *JAMA Pediatr.* 170, 1149–1155. doi: 10.1001/jamapediatrics.2016.1891

## AUTHOR CONTRIBUTIONS

MM conceptualized the study, carried out the analyses, drafted the initial manuscript, and approved the final manuscript as submitted. EM reviewed the analyses, reviewed and revised the manuscript, and approved the final manuscript as submitted. KR edited the manuscript. CL, KN, and HD reviewed and revised the manuscript, and approved the final manuscript as submitted.

## FUNDING

This work was supported by the Institute of Education Sciences under the FY 2012 Early Learning Programs and Policies research program [Award#R305A120783] and the Heising-Simons Foundation.

## ACKNOWLEDGMENTS

The authors gratefully acknowledge the help of Karen Sanchez, Karen Xu, Samantha Melvin, and administrators, teachers, families, and children who participated in the study. The authors thank the Open Society Foundation and the Farber Foundation for their support in the development and implementation of the Getting Ready for School initiative.

- Brotman, L. M., Calzada, E., Huang, K. Y., Kingston, S., Dawson-McClure, S., Kamboukos, D., et al. (2011). Promoting effective parenting practices and preventing child behavior problems in school among ethnically diverse families from underserved, urban communities. *Child Dev.* 82, 258–276. doi: 10.1111/j.1467-8624.2010.01554.x
- Brotman, L. M., Dawson-McClure, S., Calzada, E. J., Huang, K. Y., Kamboukos, D., Palamar, J. J., et al. (2013). Cluster (school) RCT of ParentCorps: impact on kindergarten academic achievement. *Pediatrics* 131, e1521–e1529. doi: 10.1542/peds.2012-2632
- Cannon, J., and Ginsburg, H. P. (2008). “Doing the Math”: Maternal Beliefs About Early Mathematics Versus Language Learning. *Early Educ. Dev.* 19, 238–260. doi: 10.1080/10409280801963913
- Clarke, A. T., Marshall, S. A., Mautone, J. A., Soffer, S. L., Jones, H. A., Costigan, T. E., et al. (2015). Parent attendance and homework adherence predict response to a family–school intervention for children with ADHD. *J. Clin. Child Adolesc. Psychol.* 44, 58–67. doi: 10.1080/15374416.2013.794697
- Connor, C. M., Ponitz, C. C., Phillips, B. M., Travis, Q. M., Glasney, S., and Morrison, F. J. (2010). First graders' literacy and self-regulation gains: the effect of individualizing student instruction. *J. Sch. Psychol.* 48, 433–455. doi: 10.1016/j.jsp.2010.06.003
- Cooper, C. E., Crosnoe, R., Suizzo, M.-A., and Pituch, K. A. (2010). Poverty, race, and parental involvement during the transition to elementary school. *J. Fam. Issues* 31, 859–883. doi: 10.1177/0192513X09351515
- Dawson-McClure, S., Calzada, E., Huang, K.-Y., Kamboukos, D., Rhule, D., Kolawole, B., et al. (2015). A population-level approach to promoting healthy child development and school success in low-income, urban neighborhoods: impact on parenting and child conduct problems. *Prevent. Sci.* 16, 279–290. doi: 10.1007/s11121-014-0473-3
- Dearing, E., Kreider, H., Simpkins, S., and Weiss, H. B. (2006). Family involvement in school and low-income children's literacy: longitudinal associations between and within families. *J. Educ. Psychol.* 98, 653–664. doi: 10.1037/0022-0663.98.4.653
- Dearing, E., McCartney, K., Weiss, H. B., Kreider, H., and Simpkins, S. (2004). The promotive effects of family educational involvement for low-income children's literacy. *J. Sch. Psychol.* 42, 445–460. doi: 10.1016/j.jsp.2004.07.002

- Denham, S. A., Blair, K. A., DeMulder, E., Levitas, J., Sawyer, K., Auerbach-Major, S., et al. (2003). Preschool emotional competence: pathway to social competence? *Child Dev.* 74, 238–256. doi: 10.1111/1467-8624.00533
- Dodge, D. T., Colker, L., and Heroman, C. (2002). *The Creative Curriculum*. New York, NY: Teaching Strategies.
- Duncan, S., and De Avila, E. (1998). *Pre-School Language Assessment Scale (Pre-LAS 2000—English)*. Monterey, CA: CTB; McGraw-Hill.
- Epstein, J. L. (2001). *School, Family, and Community Partnerships: Preparing Educators and Improving Schools*. ERIC.
- Fan, X. T., and Chen, M. (2001). Parental involvement and students' academic achievement: a meta-analysis. *Educ. Psychol. Rev.* 13, 1–22. doi: 10.1023/A:1009048817385
- Fantuzzo, J., McWayne, C., Perry, M. A., and Childs, S. (2004). Multiple dimensions of family involvement and their relations to behavioral and learning competencies for Urban, low-income children. *Sch. Psych. Rev.* 33, 467–480.
- Fantuzzo, J., Tighe, E., and Childs, S. (2000). Family involvement questionnaire: a multivariate assessment of family participation in early childhood education. *J. Educ. Psychol.* 92:367. doi: 10.1037/0022-0663.92.2.367
- Fishel, M., and Ramirez, L. (2005). Evidence-based parent involvement interventions with school-aged children. *Sch. Psychol. Q.* 20, 371–402. doi: 10.1521/scpq.2005.20.4.371
- Garbacz, S. A., McDowall, P. S., Schaughency, E., Sheridan, S. M., and Welch, G. W. (2015). A multidimensional examination of parent involvement across child and parent characteristics. *Elem. Sch. J.* 115, 384–406. doi: 10.1086/680325
- Gardner, M. F. (1990). *Expressive One-Word Picture Vocabulary Test-Revised*. Novato, CA: Academic Therapy Publications.
- Garvey, C., Julion, W., Fogg, L., Kratovil, A., and Gross, D. (2006). Measuring participation in a prevention trial with parents of young children. *Res. Nurs. Health* 29, 212–222. doi: 10.1002/nur.20127
- Gennetian, L., Darling, M., and Aber, J. L. (2017). Behavioral economics and developmental science: a new framework to support early childhood interventions. *J. Appl. Res. Child* 7:2.
- Ginsburg, H., and Baroody, A. (2003). *TEMA-3 Examiners Manual*. Austin, TX: Pro-Ed.
- Gonzalez-DeHass, A. R., Willems, P. A., and Holbein, M. F. D. (2005). Examining the relationship between parental involvement and student motivation. *Educ. Psychol. Rev.* 17, 95–119. doi: 10.1007/s10648-005-3949-7
- Grolnick, W. S., Benjet, C., Kurowski, C. O., and Apostoleris, N. H. (1997). Predictors of parent involvement in children's schooling. *J. Educ. Psychol.* 89, 538–548. doi: 10.1037/0022-0663.89.3.538
- Gross, D., Breitenstein, S., Eisbach, S., Hoppe, E., and Harrison, J. (2014). Promoting mental health in early childhood programs: serving low-income ethnic minority families,” in *Handbook of School Mental Health: Research, Training, Practice, and Policy*, editor M. D. Weist, N. A. Lever, C. P. Bradshaw, and J. S. Owens (Boston, MA: Springer US), 119–130.
- Gross, D., Garvey, C., Julion, W., Fogg, L., Tucker, S., and Mokros, H. (2009). Efficacy of the Chicago parent program with low-income African American and Latino parents of young children. *Prevent. Sci.* 10, 54–65. doi: 10.1007/s11121-008-0116-7
- Guryan, J., Hurst, E., and Kearney, M. (2008). Parental education and parental time with children. *J. Econ. Perspect.* 22:23. doi: 10.1257/jep.22.3.23
- Halgunseith, L., Peterson, A., Stark, D., and Moodie, S. (2009). *Family Involvement, Diverse Families, and Early Childhood Programs: An Integrated Review of the Literature*. Washington, DC: The National Association for the Education of Young Children.
- Hayes, N., Berthelsen, D. C., Nicholson, J. M., and Walker, S. (2016). Trajectories of parental involvement in home learning activities across the early years: Associations with socio-demographic characteristics and children's learning outcomes. *Early Child Dev. Care* 1–14. doi: 10.1080/03004430.2016.1262362
- Heinrichs, N., Bertram, H., Kuschel, A., and Hahlweg, K. (2005). Parent recruitment and retention in a universal prevention program for child behavior and emotional problems: barriers to research and program participation. *Prevent. Sci.* 6, 275–286. doi: 10.1007/s11121-005-0006-1
- Hindman, A. H., Miller, A. L., Froyen, L. C., and Skibbe, L. E. (2012). A portrait of family involvement during head start: nature, extent, and predictors. *Early Child. Res. Q.* 27, 654–667. doi: 10.1016/j.ecresq.2011.11.002
- Jones, S. M., Bailey, R., and Jacob, R. (2014a). Social-emotional learning is essential to classroom management. *Phi Delta Kappan* 96, 19–24. doi: 10.1177/0031721714553405
- Jones, S. M., Kargman, M., Kargman, M., and Bailey, R. (2014b). *Preliminary Impacts of SECURE PreK on Child-and Classroom-Level Outcomes*. Society for Research on Educational Effectiveness.
- Kalil, A., Ryan, R., and Corey, M. (2012). Diverging destinies: maternal education and the developmental gradient in time with children. *Demography* 49, 1361–1383. doi: 10.1007/s13524-012-0129-5
- LaFreniere, P. J., and Dumas, J. E. (1996). Social competence and behavior evaluation in children ages 3 to 6 years: the short form (SCBE-30). *Psychol. Assess.* 8, 369–377.
- Landry, S. H., Smith, K. E., Swank, P. R., Zucker, T., Crawford, A. D., and Solari, E. F. (2012). The effects of a responsive parenting intervention on parent-child interactions during shared book reading. *Dev. Psychol.* 48, 969–986. doi: 10.1037/a0026400
- Maloney, E. A., Ramirez, G., Gunderson, E. A., Levine, S. C., and Beilock, S. L. (2015). Intergenerational effects of parents' math anxiety on children's math achievement and anxiety. *Psychol. Sci.* 26, 1480–1488. doi: 10.1177/0956797615592630
- Marti, M., Melvin, S., Noble, K. G., and Duch, H. (2018). Intervention fidelity of getting ready for school: associations with classroom and teacher characteristics and preschooler's school readiness skills. *Early Childh. Res. Q.* 44, 55–71. doi: 10.1016/j.ecresq.2018.02.010
- Matthews, J. M., and Hudson, A. M. (2001). Guidelines for evaluating parent training programs. *Fam. Relat.* 50, 77–86. doi: 10.1111/j.1741-3729.2001.00077.x
- McClelland, M. M., and Cameron, C. E. (2012). Self-regulation in early childhood: improving conceptual clarity and developing ecologically valid measures. *Child Dev. Perspect.* 6, 136–142. doi: 10.1111/j.1750-8606.2011.00191.x
- McClelland, M. M., Cameron, C. E., Connor, C. M., Farris, C. L., Jewkes, A. M., and Morrison, F. J. (2007). Links between behavioral regulation and preschoolers' literacy, vocabulary, and math skills. *Dev. Psychol.* 43:947. doi: 10.1037/0012-1649.43.4.947
- McClelland, M. M., Cameron, C. E., Duncan, R., Bowles, R. P., Acock, A. C., Miao, A., et al. (2014). Predictors of early growth in academic achievement: the head-toes-knees-shoulders task. *Front. Psychol.* 5:599. doi: 10.3389/fpsyg.2014.00599
- McWayne, C., Hampton, V., Fantuzzo, J., Cohen, H. L., and Sekino, Y. (2004). A multivariate examination of parent involvement and the social and academic competencies of urban kindergarten children. *Psychol. Sch.* 41, 363–377. doi: 10.1002/pits.10163
- McWayne, C. M., Manz, P. H., and Ginsburg-Block, M. D. (2015). Examination of the Family Involvement Questionnaire-Early Childhood (FIQ-EC) with low-income, Latino families of young children. *Int. J. Sch. Educ. Psychol.* 3, 117–134. doi: 10.1080/21683603.2014.950439
- Mendez, J. L. (2010). How can parents get involved in preschool? Barriers and involvement in education by ethnic minority parents of children attending Head Start. *Cult. Divers. Ethn. Minor. Psychol.* 16:26. doi: 10.1037/a0016258
- Miedel, W. T., and Reynolds, A. J. (1999). Parent involvement in early intervention for disadvantaged children: does it matter? *J. Sch. Psychol.* 37, 379–402. doi: 10.1016/S0022-4405(99)00023-0
- Murry, V. M., Kotchick, B. A., Wallace, S., Ketchen, B., Eddings, K., Heller, L., et al. (2004). Race, culture, and ethnicity: implications for a community intervention. *J. Child Fam. Stud.* 13, 81–99. doi: 10.1023/B:JCF5.0000010492.70526.7d
- Nix, R. L., Bierman, K. L., and McMahon, R. J. (2009). How attendance and quality of participation affect treatment response to parent management training. *J. Consult. Clin. Psychol.* 77:429. doi: 10.1037/a0015028
- Noble, K. G., Duch, H., Darvique, M. E., Grundler, A., Rodriguez, C., and Landers, C. (2012). “Getting ready for school:” a preliminary evaluation of a parent-focused school-readiness program. *Child Dev. Res.* 2012:14. doi: 10.1155/2012/259598
- Noble, K. G., Norman, M. F., and Farah, M. J. (2005). Neurocognitive correlates of socioeconomic status in kindergarten children. *Dev. Sci.* 8, 74–87. doi: 10.1111/j.1467-7687.2005.00394.x
- Orrell-Valente, J. K., Pinderhughes, E. E., Valente, E., Laird, R. D., Bierman, K. L., Coie, J. D., et al. (1999). If it's offered, will they come? influences on parents' participation in a community-based conduct problems prevention program. *Am. J. Commun. Psychol.* 27, 753–783. doi: 10.1023/A:1022258525075

- Patel, S., Corter, C., Pelletier, J., and Bertrand, J. (2016). 'Dose-response' relations between participation in integrated early childhood services and children's early development. *Early Child. Res. Q.* 35, 49–62. doi: 10.1016/j.ecresq.2015.12.006
- Patterson, G. R., and Chamberlain, P. (1994). A functional analysis of resistance during parent training therapy. *Clin. Psychol. Sci. Prac.* 1, 53–70. doi: 10.1111/j.1468-2850.1994.tb00006.x
- Ponitz, C. C., McClelland, M. M., Matthews, J., and Morrison, F. J. (2009). A structured observation of behavioral self-regulation and its contribution to kindergarten outcomes. *Dev. Psychol.* 45:605. doi: 10.1037/a0015365
- Ponitz, C. E. C., McClelland, M. M., Jewkes, A. M., Connor, C. M., Farris, C. L., and Morrison, F. J. (2008). Touch your toes! Developing a direct measure of behavioral regulation in early childhood. *Early Childh. Res. Q.* 23, 141–158. doi: 10.1016/j.ecresq.2007.01.004
- Reardon, S. F. (2011). "The widening academic achievement gap between the rich and the poor: new evidence and possible explanations," in *Whither Opportunity?: Rising Inequality, Schools, and Children's Life Chances*, eds R. Murnane and G. Duncan (Russell Sage Foundation), 91–116.
- Reyno, S. M., and McGrath, P. J. (2006). Predictors of parent training efficacy for child externalizing behavior problems—a meta-analytic review. *J. Child Psychol. Psychiatry* 47, 99–111. doi: 10.1111/j.1469-7610.2005.01544.x
- Reynolds, A. J., Mavrogenes, N. A., Bezruczko, N., and Hagemann, M. (1996). Cognitive and family-support mediators of preschool effectiveness: a confirmatory analysis. *Child Dev.* 67, 1119–1140. doi: 10.2307/1131883
- Reynolds, A. J., Ou, S.-R., Mondt, C. F., and Hayakawa, M. (2017). Processes of early childhood interventions to adult well-being. *Child Dev.* 88, 378–387. doi: 10.1111/cdev.12733
- SAS Institute (2014). *SAS 9.4: User's Guide*: SAS institute.
- Seginer, R. (2006). Parents' educational involvement: a developmental ecology perspective. *Parent. Sci. Pract.* 6, 1–48. doi: 10.1207/s15327922par0601\_1
- Semel, E., Wiig, E., and Secord, W. (2003). *CELF-3 Clinical Evaluation of Language Fundamentals-3*. The Psychological Corporation.
- Shaw, D. S., Dishion, T. J., Supplee, L., Gardner, F., and Arnds, K. (2006). Randomized trial of a family-centered approach to the prevention of early conduct problems: 2-year effects of the family check-up in early childhood. *J. Consult. Clin. Psychol.* 74, 1–9. doi: 10.1037/0022-006X.74.1.1
- Sheridan, S. M., Knoche, L. L., Kupzyk, K. A., Edwards, C. P., and Marvin, C. A. (2011). A randomized trial examining the effects of parent involvement on early language and literacy: the getting ready intervention. *J. Sch. Psychol.* 49, 361–383. doi: 10.1016/j.jsp.2011.03.001
- Smith-Donald, R., Raver, C. C., Hayes, T., and Richardson, B. (2007). Preliminary construct and concurrent validity of the Preschool Self-regulation Assessment (PSRA) for field-based research. *Early Child. Res. Q.* 22, 173–187. doi: 10.1016/j.ecresq.2007.01.002
- Van Voorhis, F. L., Maier, M. F., Epstein, J. L., and Lloyd, C. M. (2013). *The Impact of Family Involvement on the Education of Children Ages 3 to 8: A Focus on Literacy and Math Achievement Outcomes and Social-Emotional Skills*. MDRC.
- Webster-Stratton, C. (1998). Preventing conduct problems in Head Start children: strengthening parenting competencies. *J. Consult. Clin. Psychol.* 66:715. doi: 10.1037/0022-006X.66.5.715
- West, J., Denton, K., and Germino-Hausken, E. (2001). *American's Kindergarten: Findings From the Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999 (NDES 2001-070R)*. Washington, DC: US Department of Education. National Center for Education Statistics.
- Whitehurst, G. J., Arnold, D. S., Epstein, J. N., Angell, A. L., Smith, M., and Fischel, J. E. (1994). A picture book reading intervention in day care and home for children from low-income families. *Dev. Psychol.* 30:679. doi: 10.1037/0012-1649.30.5.679
- Woodcock, R. W., McGrew, K., and Mather, N. (2001). *Woodcock-Johnson Test of Achievement*. Rolling Meadows IL: Riverside Publishing.

**Conflict of Interest Statement:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Copyright © 2018 Marti, Merz, Repka, Landers, Noble and Duch. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

# The Need to Distinguish Between Quantity and Quality in Research on Parental Involvement: The Example of Parental Help With Homework

**SANDRA MORONI**

University of Teacher Education Bern, Switzerland

**HANNA DUMONT**

German Institute for International Educational Research,  
Germany

**ULRICH TRAUTWEIN**

University of Tübingen, Germany

**ALOIS NIGGLI**

University of Teacher Education Fribourg, Switzerland

**FRANZ BAERISWYL**

University of Fribourg, Switzerland

**ABSTRACT.** Parental involvement research has greatly expanded over the past decade, but findings are mixed, reflecting in part the conceptual and methodological limitations of many studies. On the basis of longitudinal questionnaire data from 1,685 sixth-grade students, the authors studied parental help with homework because it is the most common and most controversial type of parental involvement. Distinguishing between the quantity and quality of parental homework involvement, the research shows that completely different conclusions about the effectiveness of parental homework involvement will be reached if its quantity is assessed instead of its quality: How often parents helped with homework was negatively associated with the development of achievement, whereas homework help that was perceived as supportive had positive predictive effects, and homework help perceived as intrusive had negative effects. Moreover, the results show that effect sizes would be overestimated if students' prior achievement and family background were not controlled.

**Keywords:** academic achievement, family background, homework, parental involvement

In recent years, interest in parental involvement in both educational policy and educational research has increased. It is widely believed that parents' involvement in their children's academic life has positive effects on children's academic achievement. Therefore, it is not surprising that the promotion of parental involvement has featured prominently in educational policies in recent years (No Child Left Behind Act of 2001, 2002) and that a number of meta-analyses have been published in the last decade showing that parental involvement may indeed have positive effects on children's academic development

(Fan & Chen, 2001; Hill & Tyson, 2009; Jeynes, 2003, 2005, 2007, 2012). However, despite the number of studies on parental involvement, there is still no clear consensus of how strong its effects are and whether parental involvement is always a good thing (Pomerantz, Moorman, & Litwack, 2007).

In the present article, we argue that this lack of consensus is to a large degree due to conceptual weaknesses in the research on parental involvement. More specifically, some studies have used a global measure of parental involvement, combining different parental behaviors such as parents' attendance at school activities, parental help in preparing for tests, and parenting styles. Even more studies have focused on the quantity or frequency of parental involvement instead of studying the way in which parents become involved, that is, the quality of parental involvement. Moreover, in our view, many studies also suffer from methodological weaknesses. Only a small percentage of longitudinal studies have adequately controlled for students' prior academic performance when analyzing the effects of parental involvement. Similarly, the socioeconomic background of parents is oftentimes not taken into account, which may further bias the results.

The goal of the present study was thus to demonstrate how the conclusions about the effectiveness of parental involvement can be changed by the way in which parental involvement is measured and conceptualized as well as the

---

*Address correspondence to Sandra Moroni, University of Teacher Education Bern, Fabrikstrasse 8, 3012 Bern, Switzerland. (E-mail: sandra.moroni@phbern.ch)*



inclusion of control variables. We did so by focusing on the most common type of parental involvement: parental help with homework. Homework is an important part not only of students' but also of parents' daily lives, and it can be viewed as the setting in which home and school intersect most closely. Another reason for focusing on the example of parental help with homework is the fact that this is the most controversial type of parental involvement. That is, research has shown that homework help may have not only positive but also detrimental effects on students' academic development (H. Cooper, Lindsay, & Nye, 2000; Desimone, 1999; Pomerantz, Wang, & Ng, 2005; Xu, 2004). In line with these findings, Hill and Tyson (2009) reported in their meta-analysis that homework help was the only type of involvement that was not consistently related to academic achievement. Similarly, in a meta-analysis by Patall, Cooper, and Robinson (2008), focusing only on parental homework involvement, the authors concluded that it has "at best a slightly positive overall impact on achievement" (p. 1062). In our study, we made a fundamental distinction between the quantity and quality of parental involvement in homework and demonstrate the need to use multidimensional measures in order to come to consistent conclusions about the effectiveness of parental involvement. Moreover, we used students' prior academic achievement and several indicators of family background as control variables to demonstrate how neglecting these variables may bias the results.

#### *Parental Involvement as a Multidimensional Construct*

Even though the amount of empirical research on parental involvement has increased considerably over the last decade, there is still no uniform definition or conceptualization of the construct. More than 25 years ago, Fehrman, Keith, and Reimers (1987) pointed out that

parental involvement is by no means a unitary construct. Researchers have used the term "parental involvement" to refer to substantially different types of involvement by parents, and have likewise used different terms to refer to essentially the same type of parental involvement. (p. 330)

Surprisingly, not much has changed since then. Jaynes (2003) wrote that parental involvement is "a vague term that can mean countless different things to different people" (p. 204), and very recently, Karbach, Gottschling, Spengler, Hegewald, and Spinath (2013) stated that "the term has been loosely applied to a variety of activities and the parental behavior subsumed under the construct of PI [parental involvement] has been very heterogeneous" (p. 44). It can be assumed that this variability has contributed to many of the diverse and oftentimes inconsistent findings regarding the effectiveness of parental involvement in improving students' academic achievement.

Because of this heterogeneous conceptualization of parental involvement, several researchers have suggested

classifications of the different types of parental involvement. For instance, Grolnick and Slowiaczek (1994) distinguished between behavioral involvement, personal involvement, and cognitive/intellectual involvement. Epstein (1992), however, suggested six different dimensions: parenting, communicating, volunteering, learning at home, decision making, and collaborating within the community. The most common distinction is the classification of home-based and school-based involvement (Deslandes & Bertrand, 2005; Green & Walker, 2007; Hoover-Dempsey & Sandler, 1997; Pomerantz et al., 2007), with home-based involvement referring to parents' practices related to their child's school life taking place outside of school, and school-based involvement referring to practices involving direct contact between parents and schools. Whatever categorization researchers choose to use, the important thing is that they account for the multidimensional nature of parental involvement and measure each dimension separately. Although most studies have done so (Fan, 2001; Grolnick & Slowiaczek, 1994; Hill, 2008; Karbach et al., 2013; Shumow, 2010; Waanders, Mendez, & Downer, 2007; Wild & Remy, 2002; Xu, Kushner Benson, Mudrey-Camino, & Steiner, 2010), there are still studies that have collapsed very heterogeneous aspects of parental involvement into one global measure (e.g., Hawes & Plourde, 2005; Hill et al., 2004; Pelegrina, García-Linares, & Casanovam, 2003).

In addition to the multidimensional nature of parental involvement and based on the assumption that more involvement may not always be beneficial, several researchers have suggested that the quantity and quality of parental involvement be distinguished (Balli, Wedman, & Demo, 1997; Grolnick, 2003; Hoover-Dempsey et al., 2005; Hyde, Else-Quest, Alibali, Knuth, & Romberg, 2006; Pomerantz et al., 2007). This was nicely summarized by Pomerantz et al. (2007), who stated that "a focus on how parents become involved in children's schooling underscores the importance of studying the quality of parents' involvement rather than simply the extent of parents' involvement" (p. 398). Unfortunately, the majority of the studies on parental involvement have continued to use "a relatively crude measure of the quantity of involvement," as Hyde et al. (2006, p. 137) pointed out. However, it is possible to come to completely different evaluations of the effectiveness of parental involvement depending on whether the quantity or the quality is examined.

#### *Previous Studies on the Effectiveness of Parental Involvement*

On the basis of 25 studies, the first meta-analysis on parental involvement (Fan & Chen, 2001) found a small to moderate association with students' academic achievement of  $r = .25$ . The strongest associations were observed for studies that focused on parental aspirations, the weakest for studies that investigated home supervision. Jaynes (2003, 2005, 2007) also conducted three meta-analyses on

the effectiveness of parental involvement, with each meta-analysis focusing on a particular population. The first (Jeynes, 2003), which focused on minority students and analyzed 21 studies, found a positive effect of parental involvement of at least  $d = 0.20$ , which varied depending on the minority group as well as the parental involvement dimension. The target population of the other two meta-analyses was urban students. The 2005 meta-analysis focused on elementary school students across 41 studies, and the one published in 2007 analyzed secondary school children across 52 studies. For the elementary school children, Jeynes (2005) found an average effect of parental involvement on academic achievement of  $d = 0.74$ , and for the secondary school children of  $d = 0.46$  (Jeynes, 2007). In both meta-analyses, the highest associations were observed for parents' expectations and the lowest for homework supervision. The most recent meta-analysis on the effects of parental involvement was conducted by Hill and Tyson (2009). The authors focused on middle school students and investigated 50 different studies. They distinguished between home-based involvement, school-based involvement, and academic socialization. The strongest association with students' academic achievement—with a weighted correlation of  $r = .39$ —was observed for academic socialization, which included aspects such as parental aspirations and communication between parents and students. School-based involvement also served as a predictor of students' academic achievement (weighted correlation of  $r = .19$ ). No effect was found for home-based involvement; however, in-depth analyses that examined different types of home-based involvement revealed that parental homework involvement was the only aspect that showed a negative association and thus cancelled out the positive effects of other activities at home.

Based on these meta-analyses as well as on more recent studies (Fan & Williams, 2010; Karbach et al., 2013; Mägi, Lerkkanen, Poikkeus, Rasku-Puttonen, & Nurmi, 2011; Xu et al., 2010; You & Nguyen, 2011), it can be concluded that parental involvement has an effect on students' academic achievement. However, because the meta-analyses used different methods to combine the results and to calculate the effect sizes, it is hard to draw more specific conclusions. The strongest associations were revealed for parents' expectations and aspirations, whereas parental homework involvement—the focus of the present study—was shown to have only weak associations. Should we therefore conclude that parents' expectations matter more than their actual help in the homework process? We believe close attention needs to be paid to the conceptual and methodological implementation of a study to come to a valid conclusion about the effect of parental involvement.

Most of the studies included in the meta-analyses measured the quantity or frequency of parental involvement, but only a few studies looked at how parents became involved. Moreover, as far as we can determine, most of the studies were cross-sectional and did not control for

students' prior achievement or their family background. However, if wanting to study the incremental effect of parental involvement on students' academic achievement, which is what policy makers are usually interested in, it is necessary to account for students' prior achievement. Previous studies have shown that parental involvement does not only affect students' achievement, but is also affected by it. For instance, when children are not doing well at school, parents' involvement at home tends to be intrusive and controlling (Ng, Kenney-Benson, & Pomerantz, 2004; Niggli, Trautwein, Schnyder, Lüdtke, & Neumann, 2007). Therefore, cross-sectional studies with only one measure of academic achievement cannot disentangle the effect that parental involvement has on students' achievement and the effect that students' achievement has on parental involvement. Similarly, it is also important to control for students' family background to get an accurate estimate of the effectiveness of parental involvement on students' achievement, as previous research has shown that family background variables have a major influence on students' achievement (McLoyd, 1998) and that family background variables are also associated with parents' involvement (e.g., C. E. Cooper, Crosnoe, Suizzo, & Pituch, 2010; Englund, Luckner, Whaley, & Egeland, 2004; Turney & Kao, 2009). For instance, it is well known that parental aspirations are strongly associated with parents' socioeconomic background (Davis-Kean, 2005; Englund et al., 2004; Suizzo & Stapleton, 2007). Thus, it could be the case that the strong associations that were observed for this dimension of parental involvement are driven mainly by a confounding third variable—parents' socioeconomic background. Similarly, the conclusions that could be drawn about the usefulness of parental homework involvement on the basis of the meta-analyses may not be accurate because many studies did not include prior achievement and family background as control variables.

### *Parental Involvement in Homework*

As mentioned above, parental involvement in homework is the most common but also the most controversial type of parental involvement. This became evident when we summarized the findings from the meta-analyses on parental involvement. The following section provides an overview of the empirical evidence on the effectiveness of parental homework involvement.

Not surprisingly, with regard to the quantity of parental involvement in homework, the results of empirical studies vary greatly. Xu (2004), for example, reported a positive association between parental homework involvement and students' homework behavior. However, researchers including H. Cooper et al. (2000), Desimone (1999), Hill and Tyson (2009), Pomerantz et al. (2005), and Singh, Bickley, Trivette, and Keith (1995), to mention a few, found negative associations. Other authors, again, have suggested that parental homework involvement has no effect at all on

students' academic achievement (Levin et al., 1997). In their synthesis of previous research on parental homework involvement, Patall et al. (2008) concluded that parental involvement in homework was only weakly associated with students' academic achievement. However, as already pointed out previously for parental involvement in general, the majority of previous studies on parental homework involvement have also considered only its quantity. There is reason to believe that the use of the quantity of parental homework involvement has contributed to the conclusion that parental help with homework does not make a difference in students' academic achievement.

When the quality of parental involvement in homework is considered, a much more consistent pattern of its relation to academic achievement emerges. When parents' homework involvement has been characterized by support of autonomy, a good structure, positive affect, positive beliefs, and emotional support, positive associations with academic achievement have been revealed (H. Cooper et al., 2000; Dumont, Trautwein, Lüdtke, Neumann, Niggli, & Schnyder, 2012; Grolnick & Ryan, 1989; Knollmann & Wild, 2007; Pomerantz et al., 2007; Pomerantz et al., 2005). Negative associations with academic achievement have been found when parents are not well versed in a subject; when their homework involvement is developmentally inappropriate, confusing to the child, inconsistent with school expectations, controlling, or intrusive; or when there are negative parental emotions (Balli, 1998; Christenson, 2004; H. Cooper et al., 2000; Desimone, 1999; Dumont, Trautwein, & Lüdtke, 2012; Hoover-Dempsey & Sandler, 1997; Ng et al., 2004; Pomerantz et al., 2005). Many of these studies were conducted on the bases of the self-determination theory by Deci and Ryan (1985, 1987), which postulates three basic human needs: the need for competence, the need for autonomy, and the need for psychological relatedness. These innate needs are facilitated, when parental behavior is characterized by autonomy support, interpersonal involvement and structure and undermined when parental behavior is controlling, that is characterized by pressure, intrusiveness and dominance (Grolnick, 2003, 2009; Grolnick, Deci, & Ryan, 1997).

Taken together, there is reason to believe that it is necessary to look at how parents help with homework instead of how often they get involved in the homework process. However, to our knowledge, the effects of the quantity versus the quality of parental homework involvement have not been investigated together in one single study.

### *The Present Study*

Although a large number of authors have criticized the heterogeneous conceptualization and poor measurement of parental involvement (e.g., Fan & Chen, 2001; Gerber & Wild, 2009; Harris & Goodall, 2008; Hill & Tyson, 2009;

Jeynes, 2003), the field still has not overcome some of its conceptual and methodological limitations. With the present study, we wanted to advance research on parental involvement by showing how the results differ depending on the measures and control variables used. To do so, we focused on parental involvement in homework as this has been shown to be the most common and, at the same time, the most controversial type of involvement.

We investigated the effects of parental help with homework on students' academic achievement, distinguishing between its quantity and quality. The quantity measure indicated how often parents helped their children with homework across a time period of 1 week. The quality of parental involvement in homework was measured by two different dimensions informed by self-determination theory (Deci & Ryan, 1985, 1987) differentiating positive and negative forms of parental involvement with homework, with involvement characterized by autonomy and emotional support on the one hand (hereafter called supportive involvement) and involvement characterized by intrusiveness and control on the other hand (hereafter called intrusive involvement). Given that parental behavior, such as checking children's homework, may be perceived by the child as either supportive or intrusive, we considered the students' response instead of the parents' response or any other objective measure. In fact, previous research has shown that children's interpretations of parental behavior are more strongly related to their development than are parents' actual behaviors (Grolnick, Ryan, & Deci, 1991; Grolnick & Slowiaczek, 1994; Hoover-Dempsey et al., 2005; Schaefer, 1965). Hence, children's reports have been commonly used as indicators of parenting quality (Schaefer, 1965).

We hypothesized that the quantity of parental help with homework would not improve students' achievement. Instead, we expected the way parents become involved to matter for students' academic development. In addition, we hypothesized that the effects of parental homework involvement would be larger when prior achievement and students' family background were not controlled for. Using a large and representative sample of students at the beginning of secondary school, these hypotheses were analyzed in a longitudinal structural equation modeling framework (Byrne, 2011) in which we regressed students' academic achievement in Grade 6 on students' prior achievement, their family background and the quantity or the quality of parental homework involvement.

## **Method**

### *Sample*

The sample used in the present study came from a representative longitudinal multicohort study on the transition process from primary school to secondary school in the German speaking part of the canton of Fribourg,

Switzerland. This study is currently being conducted at the University of Fribourg in cooperation with the University of Teacher Education Fribourg, Switzerland. Data were collected in Grades 4 and 5 by the University of Teacher Education and in Grades 6 and 9 by the University of Fribourg. The first two measurement points placed special emphasis on reading skills, the last two measurement point focus on the transition process from primary school to secondary school. For the present study, we used data from Grades 5 and 6. Hence, we had data from 1,685 students (48.9% male) and their parents (1,498 parents responded, indicating a remarkably high participation rate of 88.8%). In the school system of Fribourg students attend primary school for 6 years. After the sixth year there is a transition to secondary school, which contains three different tracks. Usually students are 6 years old when entering primary school and 12 years old when entering secondary school. At the first measurement point, the mean age for students was 9.76 years old ( $SD = 0.54$  years). Regarding immigration, 13.2% of the students were from immigrant families (defined as both parents born outside of Switzerland), and 14.8% indicated that they did not speak German at home. Regarding the educational background of parents, 25.3% of the parents reported having a college degree or a doctorate, 27.4% reported having a higher professional education, and 47.3% reported having a professional education, a degree from an upper secondary specialized school, or a degree from a lower secondary school.

### Procedure

With the exception of the Ein Leseverständnistest für Erst- und Sechstklässler (ELFE) test (prior achievement), which was administered in November of Grade 5 (first measurement point), student data were collected in February and March of Grade 6 (second measurement point). Student questionnaires and the standardized achievement test were administered during regular school hours in intact classrooms by trained research assistants in a morning session. Parent questionnaires were sent home with the children at the first measurement point. The participation was voluntary and parents were asked to give their consent for their children's participation. All participating students and parents were informed about the study's objectives and assured that their data would be used anonymously and for scientific purposes only.

### Instruments

*Family background variables.* We measured students' family background through multiple indicators in order to account for its multidimensional nature (Murdock, 2000; Sirin, 2005). Students' immigration background was measured using students' and parents' responses regarding which country parents were born in. The information was transformed into a dummy variable, which indicated

whether both parents were born in a foreign country (0 = no immigration background, 1 = immigration background). Parents' occupational status was measured with the widely used International Socio-Economic Index of Occupational Status (ISEI; Ganzeboom, De Graaf, Treiman, & De Leeuw, 1992) with occupational data provided by both students and parents. The higher a person's ISEI score, the higher his or her status. For cases in which scores were available for both the father's and the mother's occupations, the higher score was included in the analyses. The parents' highest educational level was examined separately for the mother and the father. We used the higher education level of the two parents in the analyses. As there were three educational levels, the variable was transformed into two dummy variables representing the lower and the higher educational level, using the intermediate educational level. Number of books possessed by the family, as a proxy for parents' cultural capital (Organization for Economic Cooperation and Development, 2002), was measured via a 7-point Likert-type scale ranging from 0 (*no books*) to 7 (*more than 500 books*).

*Parental homework involvement.* With the student questionnaire, we measured two dimensions of perceived quality of parental homework involvement, that is, supportive involvement (e.g., "If I struggle with my German homework, my parents try to find out what exactly it is I didn't understand"; five items; Cronbach's  $\alpha = .77$ ) and intrusive involvement (e.g., "My parents always interfere when I'm doing my homework"; four items; Cronbach's  $\alpha = .73$ ). Responses were given on a 5-point Likert-type scale ranging from 1 (*completely disagree*) to 5 (*completely agree*). All items on the quality of parental homework involvement were adapted from Wild (1999) and are reported in the Appendix. The two dimensions of parental involvement were specified as latent variables in the analyses. The confirmatory factor analysis showed a satisfactory fit to the data,  $\chi^2$  (26,  $N = 1,660$ ) = 91.344, comparative fit index = .974, root mean square error of approximation  $\leq .039$  (.30; .48), standardized root mean square residual = .027.

The quantity of parental involvement in homework was measured by the question "In general, how often do your parents help you with your homework?" Responses were given on a 6-point Likert-type scale including 0 (*never*), 1 (*less than once a week*), 2 (*about once a week*), 3 (*about twice, three times a week*), 4 (*about four, five times a week*), and 5 (*always*).

*Academic achievement.* We used two different indicators for students' academic achievement, our outcome variable: a standardized achievement test in the reading domain as an objective measure of students' achievement and students' grades in German as an achievement measure that has actual relevance for students' school careers. The reading achievement test was part of a school transition exam at the end of elementary school. The content of the



exam was based on the fifth-and sixth-grade school curriculum. All exam questions were created by secondary school teachers in collaboration with primary school teachers who were not directly involved in the actual school transition. In addition, the exams were validated in different cantons that followed the same curriculum. A secondary school teacher supervised the entire exam. The exams were corrected by two secondary school teachers; when there was disagreement, a third secondary school teacher was consulted. Cronbach's alpha for the test was .62. Students' grades in German were collected at the end of the first semester in the sixth grade via teacher reports. In order to control for students' prior achievement for both reading achievement and grades in German, we used a German achievement test that students took in the fifth grade. The test was based on three subtests (word comprehension, sentence comprehension, and text comprehension) of the battery ELFE 1–6 test (Lenhard & Schneider, 2006); the subtests were then combined into a single score.

All intercorrelations among the variables used in the present study are presented in Table 1, along with the means and standard deviations.

### *Statistical Analyses*

In order to address our hypotheses, we specified structural equations models in Mplus 5 (Muthén & Muthén, 2010). Separate but equivalent models were specified for the two indicators of students' academic achievement, standardized reading achievement test, and German grades. Moreover, we specified equivalent models for the quality of parental involvement (Models a) and the quantity of parental involvement (Models b). In Model 1, students' achievement was regressed on prior achievement, family background, and the quality (Model 1a) and quantity of parental involvement (Model 1b). In Model 2, students' achievement was regressed on family background and quality/quantity of parental involvement without controlling for students' prior achievement. In Model 3, students' achievement was regressed on prior achievement and quality/quantity of parental involvement without controlling for family background. Finally, in Model 4, students' achievement was regressed on quality/quantity of parental involvement without controlling for either prior achievement or family background. In all models, we controlled for sex because studies have reported that parents' involvement in boys' homework is more controlling and intrusive (Bhanot & Jovanovic, 2005; Niggli et al., 2007). The majority of previous studies have resembled our Model 4b: an estimate of the effect of the quantity of parental help in homework on achievement without controlling for students' prior achievement or family background. In our view, Model 1a represents a conceptually and methodologically sound model to test the effectiveness of parental homework involvement. Due to the nature of our models we were not

successful in formally testing the differences of the coefficients between these models, which is why we decided to compare the coefficients descriptively and emphasize the conceptual differences between the models.

As in most studies that have examined students in school settings, students were nested within classes in the present study. Because our research questions targeted the individual level and we were not interested in classroom effects, the multilevel structure (Raudenbush & Bryk, 2002) was treated as a nuisance factor. To this end, we used the Mplus 5 (Muthén & Muthén, 2010) type = complex procedure, which automatically adjusts the standard errors of the regression coefficients (for more information, see Muthén & Satorra, 1995). Due to longitudinal drop out, the percentage of missing values for the questionnaire items ranged from 0.9% to 14.5%. One exception was the battery ELFE 1–6 test, with 46.6% missing values. The large amount of missing data was due to the fact that the longitudinal study began with a smaller sample in Grade 5 when the ELFE 1–6 test was administered but was enriched in Grade 6. Therefore, the students who did not participate in the test were a random sample of the overall sample. Multiple imputation was used to deal with missing data, as this—together with the full information maximum likelihood approach—represents the present state of the art in dealing with missing data (Graham, 2009; Schafer & Graham, 2002). In doing so, five complete data sets were created using the statistical package IBM SPSS statistics 19. Mplus 5 automatically integrates the five imputed data sets when running the models.

### **Results**

Descriptive statistics and intercorrelations of all variables considered in the analyses are presented in Table 1. Inspection of the intercorrelations between the dimensions of parental homework involvement showed that there was no statistically significant correlation between parental support and parental interference ( $r = -.04$ , *ns*), thus confirming that these are two distinct dimensions. With respect to the relation between the quality and the quantity of parental homework involvement, there was a weak positive correlation between parental support and the quantity of parental help ( $r = .13$ ,  $p < .001$ ). The correlation between parental interference and the quantity of parental homework involvement was higher ( $r = .41$ ,  $p < .001$ ).

We hypothesized that depending on the way parental homework involvement was conceptualized and measured—either the quantity or the quality of parents' involvement—the results regarding the effectiveness of parental homework involvement in improving students' academic achievement would differ. This hypothesis was strongly supported by our data, both for the standardized reading achievement test (Table 2) and for German grades (Table 3). Looking at the quality of parental homework

TABLE 1. Intercorrelations, Means, and Standard Deviations of All Study Variables

| Variable                                     | 1       | 2       | 3       | 4       | 5      | 6       | 7       | 8       | 9       | 10     | 11     | 12    |
|----------------------------------------------|---------|---------|---------|---------|--------|---------|---------|---------|---------|--------|--------|-------|
| 1 Immigration background (1=yes)             | -.26*** |         |         |         |        |         |         |         |         |        |        |       |
| 2 Number of books                            | .02     | .43***  |         |         |        |         |         |         |         |        |        |       |
| 3 Highest educational level (1=higher level) | .05     | -.39*** | -.48*** |         |        |         |         |         |         |        |        |       |
| 4 Highest educational level (1=lower level)  | -.22    | .50***  | .64***  | -.46*** |        |         |         |         |         |        |        |       |
| 5 Occupational status                        | .01     | -.06*   | -.00    | .02     | -.07*  |         |         |         |         |        |        |       |
| 6 Sex (1=female)                             | -.36*** | .20***  | .06*    | -.14*** | .21*** | -.10**  |         |         |         |        |        |       |
| 7 Parental support                           | .12**   | -.09**  | -.03    | .07*    | -.09** | .19***  | -.04*** |         |         |        |        |       |
| 8 Parental interference                      | -.07    | -.06    | -.04    | .06*    | -.06*  | .02     | .13***  | .41***  |         |        |        |       |
| 9 Quantity of parental homework involvement  | -.07    | .25***  | .17***  | -.21*** | .23*** | -.16*** | .14***  | -.25*** | -.26*** |        |        |       |
| 10 ELFE test in Grade 5                      | -.22*** | .15***  | .15***  | -.22*** | .24*** | -.14*** | .25***  | -.35*** | -.24*** | .52*** |        |       |
| 11 Grade in German                           | -.21*** | .33***  | .19***  | -.25*** | .30*** | -.23*** | .28***  | -.38*** | -.24*** | .64*** | .70*** |       |
| 12 Achievement test in German                | .013    | 4.60    | 0.26    | 0.49    | 48.13  | 0.49    | 3.37    | 1.44    | 2.26    | 95.98  | 4.82   | 33.79 |
| M                                            | 0.34    | 1.61    | 0.44    | 0.50    | 16.90  | 0.34    | 0.64    | 0.78    | 1.25    | 17.28  | 0.66   | 8.12  |
| SD                                           |         |         |         |         |        |         |         |         |         |        |        |       |

Note. ELFE = Ein Leseverständnistest für Erst- und Sechstklässler.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

involvement (Model 1a), students who reported more supportive involvement showed higher reading achievement test scores ( $\beta = .13, p < .001$ ) and higher German grades ( $\beta = .12, p < .01$ ), whereas students who reported more intrusive involvement showed lower reading achievement test scores ( $\beta = -.21, p < .001$ ) and lower German grades ( $\beta = -.21, p < .001$ ) even after controlling for prior achievement and family background variables.

On the other hand, we hypothesized that how often parents helped their children with homework (quantity of parental involvement) would not improve students' achievement. This assumption was supported by the data (see Model 1b). In fact, we even observed a negative association between the quantity of parental homework involvement and students' reading achievement ( $\beta = -.10, p < .001$ ) and their German grades ( $\beta = -.12, p < .001$ ): Students who reported a higher degree of parental involvement in homework showed lower reading performance and lower German grades when controlling for their prior achievement and family background variables. Therefore, if parental homework involvement was measured only by how often parents helped their children with homework, the conclusion would be that parental homework involvement is negatively associated with students' achievement.

Inspection of the variance explained by all predictors revealed that slightly more variance was explained by the quality of parental homework involvement (reading achievement:  $R^2 = .53$ ; German grades:  $R^2 = .38$ ) than by the quantity of parental homework involvement (reading achievement:  $R^2 = .49$ ; German grades:  $R^2 = .34$ ).

We also hypothesized that the effects of parental homework involvement would differ depending on the control variables that were included in the models. We expected the effects to be larger when prior achievement was not controlled for. This was confirmed by our analyses (see Models 2a and 2b). As for the quality of parental homework involvement, after controlling only for family background variables and not for students' prior achievement, the effect size of supportive involvement increased from Model 1a to Model 2a from  $+.13$  ( $p < .001$ ) to  $+.17$  ( $p < .001$ ) for reading achievement and from  $+.12$  ( $p < .01$ ) to  $+.14$  ( $p < .001$ ) for German grades. The effect size of intrusive involvement even increased from  $-.21$  ( $p < .001$ ) to  $-.31$  ( $p < .001$ ) for reading achievement and from  $-.21$  ( $p < .001$ ) to  $-.30$  ( $p < .001$ ) for German grades. We found the largest change in effect size when considering quantity of parental homework involvement: It increased from  $-.10$  ( $p < .001$ ) to  $-.22$  ( $p < .001$ ) for reading achievement and from  $-.12$  ( $p < .001$ ) to  $-.23$  ( $p < .001$ ) for German grades. These results suggest that the effect sizes of parental homework involvement would be overestimated if we did not control for prior achievement.

A similar finding was observed for family background as a control variable. We hypothesized that the effects of parental homework involvement would be larger when family background variables were not controlled for. Regarding the

quality of parental homework involvement, this assumption was confirmed (see Model 3a). After controlling only for prior achievement and not for family background, the effect size of supportive involvement increased from Model 1a to Model 3a from  $+.13$  ( $p < .001$ ) to  $+.19$  ( $p < .001$ ) regarding reading achievement and from  $-.21$  ( $p < .001$ ) to  $-.22$  ( $p < .001$ ) regarding German grades. Regarding intrusive involvement, the effect size slightly increased from  $-.21$  ( $p < .001$ ) to  $-.22$  ( $p < .001$ ) for reading achievement and from  $-.21$  ( $p < .001$ ) to  $-.23$  ( $p < .001$ ) for German grades. However, regarding the quantity of parental homework involvement (see Model 3b), the effect size slightly decreased from  $-.10$  ( $p < .001$ ) to  $-.08$  ( $p < .001$ ) for reading achievement and from  $-.12$  ( $p < .001$ ) to  $-.11$  ( $p < .01$ ) for German grades.

In the final models (Models 4a and 4b), we examined the estimates of the effects of parental homework involvement on children's academic achievement when neither prior achievement nor family background was controlled for.

Regarding the quality of parental homework involvement (see Model 4a), the effect size of supportive involvement increased from Model 1a to Model 4a from  $+.13$  ( $p < .001$ ) to  $+.25$  ( $p < .001$ ) for reading achievement and from  $+.12$  ( $p < .001$ ) to  $+.23$  ( $p < .001$ ) for German grades. Regarding intrusive involvement, the effect size increased from  $-.21$  ( $p < .001$ ) to  $-.34$  ( $p < .001$ ) for reading achievement and from  $-.21$  ( $p < .001$ ) to  $-.33$  ( $p < .001$ ) for German grades. Regarding the quantity of parental homework involvement, the effect size increased from  $-.10$  ( $p < .001$ ) to  $-.24$  ( $p < .001$ ) for reading achievement and from  $-.12$  ( $p < .001$ ) to  $-.23$  ( $p < .001$ ) for German grades. These results suggest that effect sizes are heavily overestimated when prior achievement and family background variables are not controlled for, as has been the case in the majority of studies on the effectiveness of parental involvement. As we already pointed out, the majority of previous studies have resembled our Model 4b: an estimate of the effect of the quantity of parental help in homework on achievement without controlling for students' prior achievement or family background. The use of such model tests would come to the conclusion that parental involvement in homework has a relatively large negative effect on students' achievement. By contrast, a conceptually and methodologically sound study investigating the quality of parental help and controlling for prior achievement and family background would come to the conclusion that parental homework involvement can be beneficial when it is perceived as supportive, but that it can also be detrimental when children feel that their parents are intruding in the homework process (Model 1a). These two models can be seen as the two ends of a continuum of the findings usually reported in research on parental involvement.

Because it would be likely that there would be an interaction between the quality and the quantity of parental homework involvement—in the sense that frequent parental help may be beneficial only when it is supportive and

TABLE 2. Predicting Reading Achievement

|                                            | Model 1a      |     | Model 1b      |     | Model 2a      |     | Model 2b      |     | Model 3a      |     | Model 3b      |     | Model 4a      |     | Model 4b      |     |
|--------------------------------------------|---------------|-----|---------------|-----|---------------|-----|---------------|-----|---------------|-----|---------------|-----|---------------|-----|---------------|-----|
|                                            | $\beta$       | SE  | $\beta$       | SE  | $\beta$       | SE  | $\beta$       | SE  | $\beta$       | SE  | $\beta$       | SE  | $\beta$       | SE  | $\beta$       | SE  |
| Control variables                          |               |     |               |     |               |     |               |     |               |     |               |     |               |     |               |     |
| Sex (1=female)                             | -.16***       | .04 | -.25***       | .04 | -.26***       | .04 | -.40***       | .04 | -.16***       | .04 | -.26***       | .05 | -.28***       | .05 | -.45***       | .05 |
| ELFE test in Grade 5                       | .50***        | .04 | .53***        | .04 |               |     |               |     | .54***        | .04 | .59***        | .04 |               |     |               |     |
| Family background                          |               |     |               |     |               |     |               |     |               |     |               |     |               |     |               |     |
| Immigration background (1=yes)             | -.18*         | .07 | -.39***       | .08 | -.12          | .08 | -.44***       | .07 |               |     |               |     |               |     |               |     |
| Occupational status                        | .06*          | .03 | .08*          | .03 | .10**         | .04 | .12**         | .04 |               |     |               |     |               |     |               |     |
| Highest educational level (1=higher level) | -.04          | .07 | -.08          | .07 | -.04          | .09 | -.07          | .10 |               |     |               |     |               |     |               |     |
| Highest educational level (1=lower level)  | -.10*         | .05 | -.13**        | .05 | -.19**        | .06 | -.23**        | .07 |               |     |               |     |               |     |               |     |
| Number of books                            | .10***        | .03 | .11***        | .03 | .17***        | .03 | .18***        | .03 |               |     |               |     |               |     |               |     |
| Parental homework involvement              |               |     |               |     |               |     |               |     |               |     |               |     |               |     |               |     |
| Supportive involvement                     | .13***        | .03 |               |     | .17***        | .03 |               |     | .19***        | .03 |               |     | .25***        | .03 |               |     |
| Intrusive involvement                      | -.21***       | .03 |               |     | -.31***       | .03 |               |     | -.22***       | .04 |               |     | -.34***       | .03 |               |     |
| Quantity of parental homework involvement  |               |     | -.10***       | .03 |               |     | -.22***       | .03 |               |     | -.08***       | .03 |               |     | -.24***       | .03 |
| $R^2$                                      | .53           |     | .49           |     | .31           |     | .25           |     | .50           |     | .43           |     | .23           |     | .11           |     |
|                                            | CFI = .965;   |     | CFI = .962;   |     | CFI = .962;   |     | CFI = .969;   |     | CFI = .965;   |     | CFI = .965;   |     | CFI = .965;   |     | CFI = .965;   |     |
|                                            | RMSEA = .033; |     | RMSEA = .033; |     | RMSEA = .033; |     | RMSEA = .033; |     | RMSEA = .038; |     | RMSEA = .038; |     | RMSEA = .039; |     | RMSEA = .039; |     |
|                                            | SRMR = .025   |     | SRMR = .025   |     | SRMR = .025   |     | SRMR = .025   |     | SRMR = .030   |     | SRMR = .030   |     | SRMR = .030   |     | SRMR = .030   |     |

Note. ELFE = Ein Leseverständnistest für Erst- und Sechstklässler; CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual.  
 \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

TABLE 3. Predicting Grades in German

|                                            | Model 1a                                    |     | Model 1b |     | Model 2a                                    |     | Model 2b |     | Model 3a                                    |     | Model 3b |     | Model 4a                                    |     | Model 4b |     |
|--------------------------------------------|---------------------------------------------|-----|----------|-----|---------------------------------------------|-----|----------|-----|---------------------------------------------|-----|----------|-----|---------------------------------------------|-----|----------|-----|
|                                            | $\beta$                                     | SE  | $\beta$  | SE  | $\beta$                                     | SE  | $\beta$  | SE  | $\beta$                                     | SE  | $\beta$  | SE  | $\beta$                                     | SE  | $\beta$  | SE  |
| Control variables                          |                                             |     |          |     |                                             |     |          |     |                                             |     |          |     |                                             |     |          |     |
| Sex (1=female)                             | -.03                                        | .05 | -.12**   | .05 | -.11*                                       | .05 | -.24***  | .05 | -.02                                        | .05 | -.13*    | .05 | -.12*                                       | .06 | -.28***  | .06 |
| ELFE test in Grade 5                       | .40***                                      | .06 | .42***   | .06 |                                             |     |          |     | .44***                                      | .06 | .48***   | .06 |                                             |     |          |     |
| Family background                          |                                             |     |          |     |                                             |     |          |     |                                             |     |          |     |                                             |     |          |     |
| Immigration background (1=yes)             | -.27*                                       | .10 | -.48***  | .12 | -.21*                                       | .09 | -.51***  | .09 |                                             |     |          |     |                                             |     |          |     |
| Occupational status                        | .02                                         | .04 | .04      | .04 | .06                                         | .03 | .07*     | .03 |                                             |     |          |     |                                             |     |          |     |
| Highest educational level (1=higher level) | -.03                                        | .09 | -.06     | .10 | -.03                                        | .08 | -.06     | .08 |                                             |     |          |     |                                             |     |          |     |
| Highest educational level (1=lower level)  | -.11                                        | .06 | -.14*    | .06 | -.19**                                      | .06 | -.22**   | .06 |                                             |     |          |     |                                             |     |          |     |
| Number of books                            | .09**                                       | .03 | .10***   | .03 | .15***                                      | .04 | .15***   | .03 |                                             |     |          |     |                                             |     |          |     |
| Parental homework involvement              |                                             |     |          |     |                                             |     |          |     |                                             |     |          |     |                                             |     |          |     |
| Supportive involvement                     | .12**                                       | .04 |          |     | .14***                                      | .04 |          |     | .18***                                      | .04 |          |     | .23***                                      | .04 |          |     |
| Intrusive involvement                      | -.21***                                     | .03 |          |     | -.30***                                     | .04 |          |     | -.23***                                     | .04 |          |     | -.33***                                     | .04 |          |     |
| Quantity of parental homework involvement  |                                             |     | -.12***  | .03 |                                             |     | -.23***  | .03 |                                             |     | -.11**   | .03 |                                             |     | -.23***  | .04 |
| $R^2$                                      | .38                                         |     | .34      |     | .24                                         |     | .19      |     | .35                                         |     | .29      |     | .18                                         |     | .08      |     |
|                                            | CFI = .962;<br>RMSEA = .032;<br>SRMR = .025 |     |          |     | CFI = .961;<br>RMSEA = .032;<br>SRMR = .025 |     |          |     | CFI = .966;<br>RMSEA = .037;<br>SRMR = .030 |     |          |     | CFI = .966;<br>RMSEA = .038;<br>SRMR = .030 |     |          |     |

Note. ELFE = Ein Leseverständnistest für Erst- und Sechsklässler; CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual.  
\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .



not intrusive—we tested for interaction effects in a further step. However, no significant interaction effects were found in any of the models.

## Discussion

In the present study, we investigated how the results regarding the effectiveness of parental involvement in improving students' academic achievement differ depending on how parental involvement is measured. We did so by focusing on the most common and controversial type of parental involvement—parental help with homework—and made the fundamental distinction between the quantity and the quality of parental homework involvement. In line with our predictions, we were able to demonstrate that different conclusions about the effectiveness of parental homework involvement would be reached by looking at how often parents help their children with homework instead of how they help with homework. We found that the frequency of parental homework help was negatively associated with students' academic achievement even after controlling for their prior achievement. On the other hand, when investigating the quality of parental homework help as perceived by children, a much more differentiated pattern was revealed: When homework involvement was perceived as supportive, it was positively associated with students' achievement, but when parents were perceived as intrusive and controlling in the homework process, their help was negatively associated with students' achievement.

These findings also provide a possible explanation for why the quantity of parental homework involvement has been found to be negatively associated with students' achievement in many previous studies: We observed a high correlation between intrusive involvement and the quantity of parental help, indicating that greater amounts of parental help may be perceived as more intrusive by children. Moreover, our findings are in line with the theoretical predictions of self-determination theory (Deci & Ryan, 1985, 1987), which states that children's innate needs for competence, autonomy, and psychological relatedness are undermined when parents are controlling and intrusive.

In addition to testing the quantity and quality of parental homework involvement against each other, we also demonstrated how neglecting important control variables can bias the results and thus the conclusions that can be drawn about the effectiveness of parental homework involvement. When students' prior achievement and family background were not controlled for, we found substantially higher beta coefficients for the effects of parental homework involvement.

### *The Need to Use Multidimensional Measures in Research on Parental Involvement*

What we were able to demonstrate for the case of parental help with homework applies to all research on parental

involvement. Although poorly measured parental involvement has been criticized by many researchers, and the need to use multidimensional measures is frequently called for (Fan & Chen, 2001; Jeynes, 2003; Wild & Lorenz, 2010), many studies have continued to use global measures of parental involvement (e.g., Hawes & Plourde, 2005; Hill et al., 2004; Pelegrina et al., 2003), and most studies have continued to focus on how often parents are involved instead of how parents are involved (see meta-analyses by Fan & Chen, 2001; Hill & Tyson, 2009; Jeynes, 2003, 2005, 2007). We believe that our study can advance research on parental involvement by showing the importance of using multidimensional measures and carefully disentangling the different effects that parental involvement can have on children's academic development. Several more recent studies have already moved in this direction (e.g., Karbach et al., 2013; You & Nguyen, 2011), and it would be valuable to have more studies of this nature in educational research on parental involvement.

Our focus was on parental homework involvement, but how could the quality of parental involvement be measured for other types of parental involvement? Using communication between parents and teachers as an example, in addition to asking whether communication exists, researchers could focus on, for example, what parents and teachers talk about or how parents interact with teachers. Different effects may be found depending on whether parents simply ask the teacher for a report of their child's progress in school or whether the parents intervene by challenging the teacher with regard to the child's grades or by discussing potential future paths for the child. Similarly, in addition to assessing whether children regularly discuss school matters with their parents, researchers could try to get at the contents of parent-child communications. It is possible to measure, for example, how parents communicate their beliefs, their values, and their expectations for children's educational attainment or how they communicate the value of education. For each type of parental involvement, researchers should think carefully about how to operationalize the aspect of quality. In doing so, the data collection method may also make a fundamental difference. For instance, instead of asking students about their parents' involvement as we did in the present study, it is possible also to ask the parents themselves through the use of either questionnaires or interviews. Another possibility would be to observe parent-child interactions and rate the quality of the interaction as has already been done in some studies (e.g., Hyde et al., 2006). However researchers decide to measure the quality of parental involvement, we believe that it is important to disentangle the different dimensions in order to obtain an accurate estimate of the effects of parental involvement on children's academic achievement and to understand the underlying processes and mechanisms of these effects. By looking only at the quantity of parental involvement, one may not fully

understand how parents influence a child's academic development.

*The Need to Control for Prior Achievement and Family Background in Research on Parental Involvement*

In our study, the effects we found for the supportive and intrusive involvement of parents in the homework process after controlling for students' prior achievement and family background may be considered small, and one may argue that these effect sizes are too small to be of practical relevance. Would our findings be considered more relevant if we had found larger effects and had not controlled for students' prior achievement and their family background? There is reason to believe that many policy makers, but also researchers, do not take a study's design into account carefully enough when evaluating its findings. However, in our opinion, given the growing interest and policy relevance of parental involvement, the estimates of its effectiveness should be as accurate as possible. If wanting to study the incremental effect of parental involvement on students' academic achievement, it is necessary to control for students' prior achievement. Moreover, it is crucial to control for family background variables when studying the effects of parental involvement on students' achievement. Hence, in favor of sound methodologies, we may have to accept smaller effect sizes even if this may not be what policy makers want to hear. It is also important to remember that studies on parental involvement are conducted in naturally occurring settings, where a number of nuisance factors are at play (Swann, Chang-Schneider, & McClarty, 2007). Finally, it is necessary to keep in mind that psychological constructs such as academic achievement are multi-determined (Ahadi & Diener, 1989). In other words, parental involvement in homework can be assumed to be just one of many factors that influence how students perform in school.

*Limitations*

Even though our study had many strengths—most notably, differentiated instruments, a large sample, and a longitudinal framework with a measure of prior achievement—several limitations need to be noted. First, our findings are restricted to the age group of fifth- and sixth-grade students. Therefore, only conclusions for middle school children can be drawn from our study, and different findings for other developmental levels may be expected. For instance, it has been suggested that parental involvement has a stronger influence on students' achievement for younger children than for middle school students (Englund et al., 2004). Also, school context (e.g., size and complexity of schools), which may be different for elementary and secondary schools, can have an influence on the ways in which parents get involved in their children's academic life (Hill & Tyson, 2009). Studies therefore need to be transparent

and explicit about which developmental level they are focusing on, and future studies should investigate how developmental level influences parental involvement. Second, we had a large number of missing data points for our prior achievement measure. Although the students who did not participate in the test that served as our prior achievement measure were a random sample of the overall sample, and we dealt with this issue using multiple imputation, it would have been more favorable to have a smaller amount of missing data. At the same time, we believe that it is better to use any kind of measure for prior achievement than none. Third, the present study focused on reading achievement and German grades. Although we expect our findings to be similar for other subjects, studies investigating the effects of parental involvement should ideally consider multiple domains. Despite these limitations, we believe that our study has the potential to advance future research on the effectiveness of parental involvement in improving students' academic achievement by having demonstrated how important it is to differentiate between the quantity and quality of parental involvement and by controlling for important variables such as students' prior achievement and family background.

## FUNDING

This research was supported by a grant from the Swiss National Science Foundation (SNSF) to Alois Niggli (Nr. 13DPD3-114174) and a grant from the Ministry of Science, Research, and the Arts Baden-Württemberg to Ulrich Trautwein.

## REFERENCES

- Ahadi, S., & Diener, S. (1989). Multiple determinants and effect size. *Journal of Personality and Social Psychology*, 56, 398–406. doi:10.1037/0022-3514.56.3.398
- Balli, S. J. (1998). When mom and dad help: Student reflections on parent involvement with homework. *Journal of Research and Development in Education*, 31, 142–146.
- Balli, S. J., Wedman, J., & Demo, D. (1997). Family involvement with middle-grades homework: Effects of differential promoting. *Journal of Experimental Education*, 66, 31–49.
- Bhanot, R., & Jovanovic, J. (2005). Do parents' academic gender stereotypes influence whether they intrude on their children's homework? *Sex Roles*, 52, 597–607. doi:10.1007/s11199-005-3728-4
- Byrne, B. (2011). *Structural equation modeling with Mplus: Basic concepts, applications, and programming*. Hoboken, NJ: Taylor & Francis.
- Christenson, S. L. (2004). The family-school partnership: An opportunity to promote the learning competence of all students. *School Psychology Review*, 33, 83–104.
- Cooper, C. E., Crosnoe, R., Suizzo, M., & Pituch, K. A. (2010). Poverty, race, and parental involvement during the transition to elementary school. *Journal of Family Issues*, 31, 859–883.
- Cooper, H., Lindsay, J. J., & Nye, B. (2000). Homework in the home: How student, family, and parenting-style differences relate to the homework process. *Contemporary Educational Psychology*, 25, 464–487. doi:10.1006/ceps.1999.1036
- Davis-Kean, P. E. (2005). The influence of parent education and family income on child achievement: The indirect role of parental expectations and the home environment. *Journal of Family Psychology*, 19, 294–304.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York, NY: Plenum Press.

- Deci, E. L., & Ryan, R. M. (1987). The support of autonomy and the control of behavior. *Journal of Personality and Social Psychology*, 53, 1024–1037. doi:10.1037/0022-3514.53.6.1024
- Desimone, L. (1999). Linking parental involvement with student achievement: Do race and income matter? *The Journal of Educational Research*, 93, 11–30. doi:10.1080/00220679909597625
- Deslandes, R., & Bertrand, R. (2005). Motivation of parental involvement in secondary-level schooling. *The Journal of Educational Research*, 98, 164–175.
- Dumont, H., Trautwein, U., & Lüdtke, O. (2012). Familiärer Hintergrund und die Qualität elterlicher Hausaufgabenhilfe [Family background and the quality of parental homework involvement]. *Psychologie in Erziehung und Unterricht*, 59, 109–121.
- Dumont, H., Trautwein, U., Lüdtke, O., Neumann, M., Niggli, A., & Schnyder, I. (2012). Does parental homework involvement mediate the relationship between family background and educational outcomes? *Contemporary Educational Psychology*, 37, 55–69.
- Englund, M. M., Luckner, A. E., Whaley, G. J. L., & Egeland, B. (2004). Children's achievement in early elementary school: Longitudinal effects of parental involvement, expectations, and quality of assistance. *Journal of Educational Psychology*, 96, 723–730. doi:10.1037/0022-0663.96.4.723
- Epstein, J. L. (1992). School and family partnerships. In M. Adkin (Ed.), *Encyclopedia of educational research* (pp. 1139–1151). New York, NY: Macmillan.
- Fan, X. (2001). Parental involvement and students' academic achievement: A growth modeling analysis. *The Journal of Experimental Education*, 70, 27–61.
- Fan, X., & Chen, M. (2001). Parental involvement and students' academic achievement: A meta-analysis. *Educational Psychology Review*, 13, 1–22.
- Fan, X., & Williams, C. M. (2010). The effects of parental involvement on students' academic self-efficacy, engagement and intrinsic motivation. *Educational Psychology*, 30, 53–74.
- Fehrmann, P. G., Keith, T. Z., & Reimers, T. M. (1987). Home influence on school learning: Direct and indirect effects of parental involvement in high school grades. *Journal of Educational Research*, 80, 330–337.
- Ganzeboom, H. B. G., De Graaf, P. M., Treiman, D. J., & De Leeuw, J. (1992). A standard international socio-economic index of occupational status. *Social Science Research*, 21, 1–56. doi:10.1016/0049-089X(92)90017-B
- Gerber, J., & Wild, E. (2009). Mit wem wird wie zuhause gelernt? Die Hausaufgabenpraxis im Fach Deutsch [With whom students learn at home? Homework practice in German]. *Unterrichtswissenschaft*, 37, 216–233.
- Graham, J. W. (2009). Missing data analysis: Making it work in the real world. *Annual Review of Psychology*, 60, 549–576.
- Green, C. L., & Walker, J. M. T. (2007). Parents' motivations for involvement in children's education: An empirical test of a theoretical model of parental involvement. *Journal of Educational Psychology*, 99, 532–544. doi:10.1037/0022-0663.99.3.532
- Grolnick, W. S. (2003). *The psychology of parental control: How well-meant parenting backfires*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Grolnick, W. S. (2009). The role of parents in facilitating autonomous self-regulation for education. *Theory and Research in Education*, 7, 164–173. doi:10.1177/1477878509104321
- Grolnick, W. S., Deci, E. L., & Ryan, R. M. (1997). Internalization within the family: The self-determination theory perspective. In J. E. Grusec & L. Kuczynski (Eds.), *Parenting and children's internalization of values* (pp. 135–161). New York, NY: Wiley.
- Grolnick, W. S., & Ryan, R. M. (1989). Parent styles associated with children's self-regulation and competence in school. *Journal of Educational Psychology*, 81, 143–154. doi:10.1037/0022-0663.81.2.143
- Grolnick, W. S., Ryan, R. M., & Deci, E. L. (1991). Inner resources for school achievement: Motivational mediators of children's perceptions of their parents. *Journal of Educational Psychology*, 83, 508–517. doi:10.1037/0022-0663.83.4.508
- Grolnick, W. S., & Slowiaczek, M. L. (1994). Parents' involvement in children's schooling: A multidimensional conceptualization and motivational model. *Child Development*, 65, 237–252.
- Harris, A., & Goodall, J. (2008). Do parents know they matter? Engaging all parents in learning. *Educational Research* 50, 277–289. doi:10.1080/00131880802309424
- Hawes, C. A., & Plourde, L. A. (2005). Parental involvement and its influence on the reading achievement of 6th grade students. *Reading Improvement*, 42, 47–57.
- Hill, N. E. (2008). Parent involvement. In E. M. Anderman & L. H. Anderman (Eds.), *Psychology of classroom learning* (Vol. 2, pp. 669–671). Detroit, MI: GALE.
- Hill, N. E., Castellino, D. R., Lansford, J. E., Nowlin, P., Dodge, K. A., Bates, J. E., & Pettit, G. S. (2004). Parent academic involvement as related to school behavior, achievement, and aspirations: Demographic variations across adolescence. *Child Development*, 75, 1491–1509.
- Hill, N. E., & Tyson, D. F. (2009). Parental involvement in middle school: A meta-analytic assessment of the strategies that promote achievement. *Developmental Psychology*, 45, 740–763. doi:10.1037/a0015362
- Hoover-Dempsey, K. V., & Sandler, H. M. (1997). Why do parents become involved in their children's education? *Review of Educational Research*, 67, 3–42. doi:10.3102/00346543067001003
- Hoover-Dempsey, K. V., Walker, J. M. T., Sandler, H. M., Whetsel, D., Green, C. L., Wilkins, A. S., & Closson, K. (2005). Why do parents become involved? Research findings and implications. *The Elementary School Journal*, 106, 105–130. doi:10.1086/499194
- Hyde, J. S., Else-Quest, N. M., Alibali, M. W., Knuth, E., & Romberg, T. (2006). Mathematics in the home: Homework practices and mother-child interactions doing mathematics. *Journal of Mathematical Behavior*, 25, 136–152. doi:10.1016/j.jmathb.2006.02.003
- Jeynes, W. H. (2003). A meta-analysis: The effects of parental involvement on minority children's academic achievement. *Education and Urban Society*, 35, 202–218. doi:10.1177/0013124502239392
- Jeynes, W. H. (2005). A meta-analysis of the relation of parental involvement to urban elementary school student academic achievement. *Urban Education*, 40, 237–269. doi:10.1177/0042085905274540
- Jeynes, W. H. (2007). The relationship between parental involvement and urban secondary school student academic achievement: A meta-analysis. *Urban Education*, 42, 82–110. doi:10.1177/004208506293818
- Jeynes, W. H. (2012). A meta-analysis of the efficacy of different types of parental involvement programs for urban students. *Urban Education*, 47, 706–742.
- Karbach, J., Gottschling, J., Spengler, M., Hegewald, K., & Spinath, F. M. (2013). Parental involvement and general cognitive ability as predictors of domain-specific academic achievement in early adolescence. *Learning and Instruction*, 23, 43–51.
- Knollmann, M., & Wild, E. (2007). Quality of parental support and students' emotions during homework: Moderating effects of students' motivational orientations. *European Journal of Psychology of Education*, 22, 63–76. doi:10.1007/BF03173689
- Lenhard, W., & Schneider, W. (2006). *ELFE 1–6: Ein Leseverständnistest für Erstbis Sechstklässler* [ELFE 1–6: A reading comprehension test for students in Grades 1 through 6]. Göttingen, Germany: Hogrefe.
- Levin, I., Levy-Shiff, R., Appelbaum-Peled, T., Katz, I., Komar, M., & Meiran, N. (1997). Antecedents and consequences of maternal involvement in children's homework: A longitudinal analysis. *Journal of Applied Developmental Psychology*, 18, 207–227. doi:10.1016/S0193-3973(97)90036-8
- Mägi, K., Lerkkanen, M.-K., Poikkeus, A.-M., Rasku-Puttonen, H., & Nurmi, J.-E. (2011). The cross-lagged relations between children's academic skill development, task-avoidance, and parental beliefs about success. *Learning and Instruction*, 21, 664–675.
- McLoyd, V. C. (1998). Socioeconomic disadvantage and child development. *American Psychologist*, 53, 185–204.
- Murdock, T. B. (2000). Incorporating economic context into educational psychology: Methodological and conceptual challenges. *Educational Psychologist*, 35, 113–124. doi:10.1207/S15326985EP3502\_5
- Muthén, B. O., & Muthén, L. K. (2010). *Mplus user's guide*. Los Angeles, CA: Author.
- Muthén, B. O., & Satorra, A. (1995). Complex sample data instructional equation modeling. In P. V. Marsden (Ed.), *Sociological Methodology* (pp. 267–316). Washington, DC: American Sociological Association.
- Ng, F. F.-Y., Kenney-Benson, G. A., & Pomerantz, E. M. (2004). Children's achievement moderates the effects of mothers' use of control and autonomy support. *Child Development*, 75, 764–780. doi:10.1111/j.1467-8624.2004.00705.x
- Niggli, A., Trautwein, U., Schnyder, I., Lüdtke, O., & Neumann, M. (2007). Elterliche Unterstützung kann hilfreich sein, aber Einmischung

- schadet: Familiärer Hintergrund, elterliches Hausaufgabenengagement und Leistungsentwicklung [Parental homework support can be beneficial, but parental intrusion is detrimental: Family background, parental homework supervision, and performance gains]. *Psychologie in Erziehung und Unterricht*, 54, 1–14.
- No Child Left Behind Act of 2001, Pub. L. No. 107–110, § 115, Stat. 1425 (2002).
- Organization for Economic Co-operation and Development. (2002). *PISA 2000* [Technical report]. Paris, France: Author.
- Patal, E. A., Cooper, H., & Robinson, J. C. (2008). Parent involvement in homework: A research synthesis. *Review of Educational Research*, 78, 1039–1101. doi:10.3102/0034654308325185
- Pelegrina, S., García-Linares, M., & Casanovam, P. F. (2003). Adolescents and their parents' perceptions about parenting characteristics. Who can better predict the adolescents' academic competence? *Journal of Adolescence*, 26, 651–665.
- Pomerantz, E. M., Moorman, E. A., & Litwack, S. D. (2007). The how, whom and why of parents' involvement in children's academic lives: More is not always better. *Review of Educational Research*, 77, 373–410. doi:10.3102/003465430305567
- Pomerantz, E. M., Wang, Q., & Ng, F. F.-Y. (2005). Mothers' affect in the homework context: The importance of staying positive. *Developmental Psychology*, 41, 414–427. doi:10.1037/0012-1649.41.2.414
- Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models* (2nd ed.). Thousand Oaks, CA: Sage.
- Schaefer, E. S. (1965). Children's reports of parental behavior: An inventory. *Child Development*, 36, 413–424. doi:10.2307/1126465
- Schafer, J. L., & Graham, J. W. (2002). Missing data: Our view of the state of the art. *Psychological Methods*, 7, 147–177. doi:10.1037/1082-989X.7.2.147
- Shumow, L. (2010). Parental involvement at home. In D. B. Hiatt-Michael (Ed.), *Promising practices to support family involvement in schools* (pp. 57–74). Charlotte, N. C.: Information Age.
- Singh, K., Bickley, P. G., Trivette, P., & Keith, T. Z. (1995). The effects of four components of parental involvement on eighth-grade student achievement: Structural analysis of NELS-88 data. *School Psychology Review*, 24, 299–317.
- Sirin, S. R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research*, 75, 417–453. doi:10.3102/00346543075003417
- Suizzo, M.-A., & Stapleton, L. M. (2007). Home-based parental involvement in young children's education: Examining the effects of parental education across U.S. ethnic groups. *Educational Psychology*, 27, 533–556.
- Swann, W. B., Chang-Schneider, C., & McClarty, K. (2007). Do our self-views matter? Self-concept and self-esteem in everyday life. *American Psychologist*, 62, 84–94.
- Turney, K., & Kao, G. (2009). Barriers to school involvement: Are immigrant parents disadvantaged? *The Journal of Educational Research*, 102, 257–271.
- Waanders, C., Mendez, J. L., & Downer, J. T. (2007). Parent characteristics, economic stress and neighborhood context as predictors of parent involvement in preschool children's education. *Journal of School Psychology*, 45, 619–636.
- Wild, E. (1999). *Elterliche Erziehung und schulische Lernmotivation* [Parenting and students' motivation to learn] (Unpublished habilitation thesis). University of Mannheim, Germany.
- Wild, E., & Lorenz, F. (2010). *Elternhaus und Schule* [Home and school]. Paderborn, Germany: Schöningh/UTB.
- Wild, E., & Remy, K. (2002). Quantität und Qualität der elterlichen Hausaufgabenbetreuung von Drittklässlern in Mathematik [The quantity and quality of parental help with third graders' mathematics homework]. *Zeitschrift für Pädagogik*, 45(Suppl.), 276–290.
- Xu, J. (2004). Family help and homework management in urban and rural secondary schools. *Teachers College Record*, 106, 1786–1803. doi:10.1111/j.1467-9620.2004.00405.x
- Xu, J., Kushner Benson, S., Mudrey-Camino, R., & Steiner, R. (2010). The relationship between parent involvement, self-regulated learning, and reading achievement of fifth graders: A path analysis using the ECLS-K database. *Social Psychology of Education*, 13, 237–269.
- You, S., & Nguyen, J. (2011). Parents' involvement in adolescents' schooling: A multidimensional conceptualisation and meditational model. *Educational Psychology*, 31, 547–558.

## AUTHORS NOTE

Sandra Moroni is a Lecturer at the University of Teacher Education Bern, Switzerland. Her research interests include parental involvement, homework, and mentoring in teacher education.

Hanna Dumont is a postdoctoral research scientist at the German Institute for International Educational Research (DIPF), Berlin, Germany. Her research interests include the effects of schools' social and ethnic composition, tracking and ability grouping, parental involvement, and individualized instruction.

Ulrich Trautwein is Professor of Education Sciences at the Hector Research Institute of Education Sciences and Psychology and Director of the LEAD Graduate School. His main research interests include educational transitions, the effects of different learning environments on self-concept, interest, and personality development, and the role of self-related cognitions in students' homework behavior.

Alois Niggli is Professor of Didactics at the University of Teacher Education Fribourg, Switzerland. His research interests include mentoring in teacher education, homework, inner differentiation, and reading enhancement in schools and at home.

Franz Baeriswyl is Emeritus Honorary Professor of Didactics and Educational Psychology at the University of Fribourg, Switzerland. His main research topics are transitions in the school system and social inequality, the composition of school grades, and the transition from the vocational education to the professional life.

**APPENDIX**  
**Means and Standard Deviations of Parental Homework Involvement**

| Item                                                                                                             | M    | SD   |
|------------------------------------------------------------------------------------------------------------------|------|------|
| Support ( $\alpha = .77$ )                                                                                       |      |      |
| My parents help me with German if I ask them.                                                                    | 4.35 | 1.10 |
| I can ask my parents any time if I don't understand my German homework.                                          | 4.51 | 0.94 |
| If I struggle with my German homework, my parents try to find out what exactly it is that I didn't understand.   | 3.93 | 1.22 |
| When my parents help me with my homework, they always encourage me first to find the correct answers for myself. | 4.11 | 1.14 |
| If I don't understand something in my German classes, I can always talk about it with my parents.                | 4.17 | 1.17 |
| Interference ( $\alpha = .73$ )                                                                                  |      |      |
| My parents sometimes help me with my German homework, even if I don't need any help.                             | 1.56 | 1.05 |
| My parents always interfere when I'm doing my homework.                                                          | 1.77 | 1.14 |
| If I'm reading a text, my parents always interrupt me by asking questions.                                       | 1.60 | 1.05 |
| Usually my parents sit next to me when I'm doing my homework and tell me how my homework needs to be done.       | 1.65 | 1.05 |

Copyright of Journal of Educational Research is the property of Taylor & Francis Ltd and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.





## Parents, Their Children, And Schools

(/books/e/9780429967047/chapters/10.4324%2F9780429498497-4)

*By James S. Coleman*

< [Back to book](#)

(/books/9780429967047).

Chapter 4

Parent Involvement and Academic Achievement

An Analysis of Family Resources Available to the Child

*By Chandra Muller*

Pages 38

The eBook version of this book has not been published yet.

We have seen in Chapter Two that there is a broad range of parental action which describes involvement in education. Chapter Three demonstrated analytically that involvement of parents can either enhance an already positive family structure or mitigate a potentially negative situation. Parent involvement has been treated as an intervening variable in the process by which family background affects academic performance. This chapter considers, analytically, a range of forms of involvement, how they are related to two measures of academic performance—achievement test scores and grades—and how they are constrained by available resources like income, education, and time. We consider involvement in three contexts: the home, community and school. The purpose of this chapter is to develop a broader understanding of the concept of parent involvement, both what constrains action and its impact on achievement test scores and grades. Thus, the central questions I address are two-fold. First, what are the similarities and differences in the associations between the forms of involvement and achievement test scores and the forms of involvement and grades? Second, are there discernible patterns in the associations of involvement with student background measures that might enhance our understanding of the important factors

constraining involvement?

Close this message to accept cookies and our Terms and Conditions. (/terms-and-conditions) We use cookies to distinguish you from other users and to provide you with a better experience on our websites. Find out how to manage your cookie settings [here](#). (/cookie-policy)





(<https://www.taylorfrancis.com/>)

**Help & Info**



**Journals**



**Corporate**



**FAQs**



Connect with us



(<https://www.facebook.com/TaylorandFrancisGroup/>)



(<https://twitter.com/tandfnewsroom?lang=en>)



(<https://www.youtube.com/user/TaylorandFrancis>)



(<https://uk.pinterest.com/tandfpins/>)

Registered in England & Wales No. 3099067

5 Howick Place | London | SW1P 1WG

© 2018 Informa UK Limited

Close this message to accept cookies and our [Terms and Conditions. \(/terms-and-conditions\)](#) We use cookies to distinguish you from other users and to provide you with a better experience on our websites. Find out how to manage your cookie settings [here. \(/cookie-policy\)](#)



See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/276887023>

# Is Hovering Smothering or Loving? An Examination of Parental Warmth as a Moderator of Relations Between Helicopter Parenting and Emerging Adults' Indices of Adjustment

Article in *Emerging Adulthood* · August 2015

DOI: 10.1177/2167696815576458

CITATIONS

26

READS

1,364

3 authors, including:



Laura M. Padilla-Walker

Brigham Young University - Provo Main Campus

99 PUBLICATIONS 2,758 CITATIONS

[SEE PROFILE](#)



Matthew Nielson

Arizona State University

11 PUBLICATIONS 91 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Validation of a Multidimensional Measure of Prosocial Behavior [View project](#)



Children's communicative responsiveness and peer relations [View project](#)

# Is Hovering Smothering or Loving? An Examination of Parental Warmth as a Moderator of Relations Between Helicopter Parenting and Emerging Adults' Indices of Adjustment

Larry J. Nelson<sup>1</sup>, Laura M. Padilla-Walker<sup>1</sup>,  
and Matthew G. Nielson<sup>1</sup>

Emerging Adulthood

1-4

© 2015 Society for the  
Study of Emerging Adulthood  
and SAGE Publications

Reprints and permission:

sagepub.com/journalsPermissions.nav

DOI: 10.1177/2167696815576458

ea.sagepub.com



## Abstract

The purpose of this study was to examine the moderating role of parental warmth in the relation between helicopter parenting and indices of child adjustment (i.e., self-worth and school engagement) and maladjustment (i.e., risk behaviors) in emerging adulthood. Participants included 438 undergraduate students from four universities in the United States ( $M_{\text{age}} = 19.65$ ,  $SD = 2.00$ , range = 18–29; 320 women). Regression analyses established that increased helicopter parenting was associated with lower levels of self-worth and higher levels of risk behaviors for those emerging adults who reported low levels of maternal warmth from their parents (especially their mothers), but not for those with high levels of warmth. The discussion focuses on the moderating role of parental warmth and the importance of emerging adult perceptions of the parent–child relationship.

## Keywords

helicopter parenting, emerging adulthood, warmth, parental involvement, parental control

Research shows that positive parenting during emerging adulthood has been linked to numerous indices of positive adjustment in young people (e.g., Nelson, Padilla-Walker, Christensen, Evans, & Carroll, 2011). However, parenting that includes higher levels of control is associated with indices of maladjustment (e.g., Nelson et al., 2011). One type of overinvolved, or overcontrolling, parenting that has received a growing amount of scholarly attention is helicopter parenting.

## Helicopter Parenting in Emerging Adulthood

Helicopter parenting in emerging adulthood is characterized by parents' overinvolvement in the lives of their children including such behaviors as solving problems and crises for children (Cullaty, 2011) and intervening in issues with roommates, friends, professors, or employers (Kennedy, 2009; Padilla-Walker & Nelson, 2012). Despite the fact that helicopter parenting can be distinguished from behavioral control and psychological control (Padilla-Walker & Nelson, 2012), emerging research has found that not all outcomes of helicopter parenting are negative (Donnelly, Renk, & McKinney, 2013; Padilla-Walker & Nelson, 2012). Hence, its link to indices of adjustment/maladjustment may be rather complex. For example, it has been found that helicopter parenting

is associated with negative aspects of emerging adults' development including more pessimistic views of marriage, indices of anxiety, depression, and lower life satisfaction and psychological well-being (LeMoyne & Buchanan, 2011; Schiffrin et al., 2014; Segrin, Woszidlo, Givertz, Bauer, & Murphy, 2012; Willoughby, Hersh, Padilla-Walker, & Nelson, 2013). On the other hand, helicopter parenting has been found to be related to several positive aspects of the parent–child relationship (i.e., guidance and involvement) in emerging adulthood (e.g., Padilla-Walker & Nelson, 2012).

One of the important factors that might determine whether helicopter parenting plays a facilitative versus debilitative role in the development of emerging adults is the role that parental warmth may play as a context for parental helicoptering. Despite media stereotypes of overly warm, caring (albeit hovering) parents, Padilla-Walker and Nelson (2012) did not find parental warmth to be associated with helicopter parenting. This suggests that helicopter parenting in the

<sup>1</sup>Brigham Young University, Provo, UT, USA

## Corresponding Author:

Larry J. Nelson, PhD, School of Family Life, Brigham Young University, 2091 JFSB, Provo, UT 84602, USA.

Email: larry\_nelson@byu.edu

**Table 1.** Descriptive Statistics and Correlations Between Parenting and Emerging Adults' Indices of Adjustment.

|                        | 1            | 2          | 3          | 4           | 5           | 6          | 7          | 8          |
|------------------------|--------------|------------|------------|-------------|-------------|------------|------------|------------|
| 1. Age                 | —            |            |            |             |             |            |            |            |
| 2. Maternal helicopter | -.08         | —          |            |             |             |            |            |            |
| 3. Paternal helicopter | -.05         | .81***     | —          |             |             |            |            |            |
| 4. Maternal warmth     | .01          | -.02       | .01        | —           |             |            |            |            |
| 5. Paternal warmth     | .01          | -.03       | .08        | .61***      | —           |            |            |            |
| 6. Self-worth          | .09          | -.08       | -.05       | .39***      | .42***      | —          |            |            |
| 7. Risk behaviors      | .07          | .06        | .04        | -.23***     | -.20***     | -.21***    | —          |            |
| 8. School engagement   | .06          | -.19***    | -.17***    | .17***      | .13**       | .22***     | -.16***    | —          |
| M (SD)                 | 19.65 (2.00) | 2.01 (.81) | 1.84 (.76) | 6.19 (1.01) | 5.93 (1.22) | 3.32 (.60) | 1.16 (.27) | 4.29 (.63) |
| Range                  | 18–29        | 1–5        | 1–5        | 1–7         | 1–7         | 1–4        | 0–5        | 1–5        |

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

context of a warm and supportive parent–child relationship may be quite different than the same approach in a relationship that lacks warmth. Therefore, the purpose of this study was to examine the moderating role of parental warmth in the relation between helicopter parenting and indices of child adjustment (i.e., self-worth and school engagement) and maladjustment (i.e., risk behaviors) in emerging adulthood. Given that emerging adulthood is a period of development in which young people should be granted greater autonomy in an attempt to foster self-reliance and independence (e.g., Aquilino, 2006), we did not believe that helicopter parenting would be linked to indices of adjustment even in the presence of warmth. Instead, it was hypothesized that helicopter parenting in the context of low warmth would be associated with higher levels of both internalizing and externalizing problems.

## Method

### Participants and Procedures

The participants for the current study ( $M_{\text{age}} = 19.65$ ,  $SD = 2.00$ ,  $\text{range} = 18\text{--}29$ ) consisted of 438 undergraduate students (320 women). We refer the reader to Padilla-Walker and Nelson (2012) for a detailed description of the participants, procedures, and instruments. We measured the following variables: (1) *helicopter parenting* (Padilla-Walker & Nelson, 2012; “My parent makes important decisions for me, e.g., where I live, where I work, what classes I take,”  $\alpha = .87$  for maternal and  $\alpha = .84$  for paternal helicopter parenting), (2) *parental warmth* (Grolnick, Ryan, & Deci, 1991; Robbins, 1994; e.g., “My parent finds time to talk with me,”  $\alpha = .86$  for maternal warmth and  $\alpha = .89$  for paternal warmth), (3) *school engagement* (Fredericks, Blumenfeld, & Paris, 2005; e.g., “I complete my homework/assignments on time,”  $\alpha = .83$ ), (4) *self-worth* (Neeman & Harter, 1986; e.g., “I am happy being the way I am,”  $\alpha = .84$ ), and (5) *risk behaviors* (adapted from Add Health, e.g., marijuana use, use of prescription drugs without permission, and shoplifting,  $\alpha = .66$ ).

**Table 2.** Regression Analyses for Child-Reported Helicopter Parenting and Parental Warmth.

|                         | Self-Worth | School Engagement | Risk Behaviors |
|-------------------------|------------|-------------------|----------------|
| Step 1:                 |            |                   |                |
| Gender <sup>a</sup>     | .04        | .11*              | -.19***        |
| Age                     | .09        | .07               | .06            |
| Step 2:                 |            |                   |                |
| Maternal helicopter (A) | -.01       | -.15              | .06            |
| Maternal warmth (B)     | .21***     | .13*              | -.15**         |
| Paternal helicopter (C) | -.07       | -.04              | -.01           |
| Paternal warmth (D)     | .30***     | .05               | -.10           |
| Step 3:                 |            |                   |                |
| A × B                   | .11*       | .04               | -.14*          |
| C × D                   | .10        | -.06              | -.11           |
| R <sup>2</sup>          | .25***     | .08***            | .14***         |

Note. All values represent standardized beta weights.

<sup>a</sup>Females have the higher coded value.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

## Results

### Regression Analyses With Child-Reported Helicopter Parenting and Warmth

Means, standard deviations, and bivariate correlations for all study variables are presented in Table 1. Hierarchical regression analyses were conducted for each of the three dependent variables (self-worth, school engagement, and risk behaviors, see Table 2), with standard procedures used to avoid collinearity and plot and test simple regression slopes for interactions (Aiken & West, 1991).

**Self-worth.** Both maternal and paternal warmth were positively associated with self-worth,  $F(4, 429) = 28.69$ ,  $p < .001$ . There was also a significant two-way interaction between maternal helicopter parenting and warmth,  $F(2, 427) = 8.81$ ,  $p < .001$ . Simple slope follow-up analyses suggested that maternal helicopter parenting was negatively associated with self-worth at  $-1$   $SD$  of maternal warmth ( $\beta = -.22$ ,  $t = -3.84$ ,  $p < .001$ ).

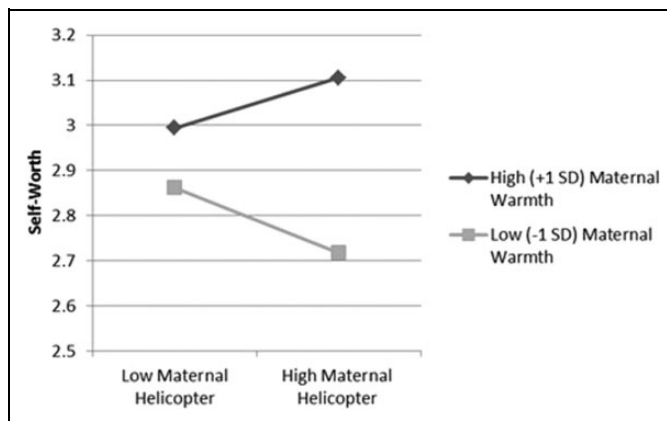


**Figure 1.** Two-way interaction predicting self-worth. Note. Simple slope follow-up analyses were significant at  $-1$  SD of maternal warmth and marginally significant at  $+1$  SD of maternal warmth.

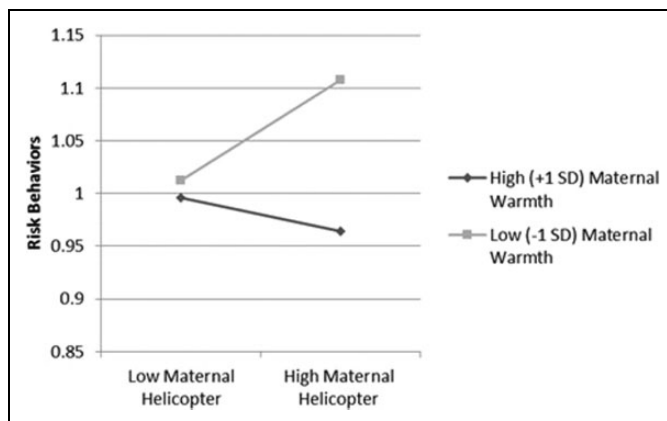


**Figure 2.** Two-way interaction predicting risk behaviors. Note. Simple slope follow-up analyses significant at both  $-1$  SD and  $+1$  SD of maternal warmth.

and marginally associated with self-worth at  $+1$  SD of maternal warmth ( $\beta = .12$ ,  $t = 1.92$ ,  $p = .056$ ; see Figure 1).

**School engagement.** Maternal warmth was negatively associated with school engagement,  $F(4, 429) = 6.99$ ,  $p < .001$ .

**Risk behaviors.** Maternal warmth was negatively associated with risk behaviors,  $F(4, 429) = 6.22$ ,  $p < .001$ . There was also a significant two-way interaction between maternal helicopter parenting and warmth,  $F(2, 427) = 10.09$ ,  $p < .001$ . Simple slope follow-up analyses suggested that maternal helicopter parenting was positively associated with risk behaviors at  $-1$  SD of maternal warmth ( $\beta = .21$ ,  $t = 3.51$ ,  $p < .001$ ) and negatively associated with risk behaviors at  $+1$  SD of maternal warmth ( $\beta = -.14$ ,  $t = -2.12$ ,  $p < .05$ ; see Figure 2).

## Discussion

Results of this study revealed that increased helicopter parenting was associated with lower levels of self-worth and

higher levels of risk behaviors for those emerging adults who reported low levels of maternal warmth from their parents. Furthermore, increased helicopter parenting was associated with lower levels of risk behaviors for those who reported that their mothers exhibit higher levels of warmth. These findings, although few in number, help make a significant contribution to our growing conceptual and empirical understanding of the role that helicopter parenting plays in the lives of emerging adults by demonstrating that helicopter parenting appears to be especially harmful when used in the context of low warmth.

In previous work we suggested that helicopter parenting might be “inappropriately intrusive and managing” but done out of “strong parental concern for the well-being and success of the child” (Padilla-Walker & Nelson, 2012, p. 1186). We recognize now that such a description may be inaccurate. With the contribution of this study, it is becoming increasingly clear that helicopter parenting (a) in and of itself is not inherently warm, (b) is not facilitative of emerging adults’ development, and (c) represents another form of control (besides behavioral and psychological control) that is linked to indices of maladjustment in emerging adulthood. This is not meant to suggest though that warmth does not play a role in the ways in which helicopter parenting may be linked to young people’s adjustment/maladjustment but rather suggests that warmth (or the lack thereof) might serve as the context in which helicoptering occurs. Our results show that helicopter parenting is associated with a number of indices of maladjustment, especially when it occurs outside the context of parental warmth, providing evidence that the absence of parental warmth might be a key determinant in whether or not helicopter parenting becomes predictive of maladjustment in emerging adulthood.

## Limitations

Despite its contributions, this study was not without limitations. First, although our discussion was framed in a way that suggested parenting was the driving force in children’s outcomes, the cross-sectional nature of the data precluded us from drawing any definitive conclusions in that regard. It may be that characteristics of some emerging adult children elicit more overly controlling behaviors from their parents. Another limitation is that the findings might not be generalizable to a nonstudent population, to all cultures around the world, or to all ethnic groups within the United States. Next, the fact that all of the variables were measured via self-report might lead to inflated relations due to shared method variance. Finally, although the items we used to measure helicopter parenting tended to focus on parents making decisions for their children in important life domains, other aspects of helicopter parenting might include invading their emerging adults’ privacy, giving excessive and underserving praise, or otherwise infantilizing their emerging adult children. Future work should give a more careful consideration of other indices of what might makeup the construct of helicopter parenting and examine the role of warmth in conjunction with them.



## Acknowledgment

We are grateful for the grant support of the Family Studies Center at Brigham Young University.

## Authors' Note

The authors express appreciation to the instructors and students at all Project R.E.A.D.Y. data collection sites for their assistance and to Stephanie Luster for her administrative assistance on the project.

## Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

## References

- Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.
- Aquilino, W. S. (2006). Family relationships and support systems in emerging adulthood. In J. J. Arnett & J. L. Tanner (Eds.), *Emerging adults in America: Coming of age in the 21st century* (pp. 193–217). Washington, DC: American Psychological Association. doi:10.1037/11381-008
- Cullaty, B. (2011). The role of parental involvement in the autonomy development of traditional-age college students. *Journal of College Student Development*, 52, 425–439. doi:10.1353/csd.2011.0048
- Donnelly, R., Renk, K., & McKinney, C. (2013). Emerging adults' stress and health: The role of parent behaviors and cognitions. *Child Psychiatry & Human Development*, 44, 19–38. Retrieved from <http://dx.doi.org/10.1007/s10578-012-0309-y>
- Fredericks, J. A., Blumenfeld, P. C., & Paris, A. H. (2005). School engagement. In K. A. Moore & L. H. Lippman (Eds.), *What do children need to flourish? Conceptualizing and measuring indicators of positive development* (pp. 305–321). New York, NY: Springer Science.
- Grolnick, W. S., Ryan, R. M., & Deci, E. L. (1991). The inner resources for school performance: Motivational mediators of children's perceptions of their parents. *Journal of Educational Psychology*, 83, 508–517.
- Kennedy, K. (2009). The politics and policies of parental involvement. *About Campus*, 14, 16–25. Retrieved from <http://dx.doi.org/10.1002/abc.297>
- LeMoyne, T., & Buchanan, T. (2011). Does “hovering” matter? Helicopter parenting and its effect on well-being. *Sociological Spectrum*, 31, 399–418. doi:10.1080/02732173.2011.574038
- Nelson, L. J., Padilla-Walker, L. M., Christensen, K. J., Evans, C. A., & Carroll, J. S. (2011). Parenting in emerging adulthood: An examination of parenting clusters and correlates. *Journal of Youth and Adolescence*, 40, 730–743.
- Neeman, J., & Harter, S. (1986). *Manual for the self-perception profile for college students*. Unpublished manuscript, University of Denver, Denver Colorado.
- Padilla-Walker, L. M., & Nelson, L. J. (2012). Black Hawk down? Establishing helicopter parenting as a distinct construct from other forms of parental control during emerging adulthood. *Journal of Adolescence*, 35, 1177–1190. Retrieved from <http://dx.doi.org/10.1016/j.adolescence.2012.03.007>
- Robbins, R. J. (1994). *An assessment of perceptions of parental autonomy support and control: Child and parent correlates*. Unpublished doctoral dissertation, Department of Psychology, University of Rochester, Rochester, NY.
- Schiffirin, H. H., Liss, M., Miles-McLean, H., Geary, K. A., Erchull, M. J., & Tashner, T. (2014). Helping or hovering? The effects of helicopter parenting on college students' well-being. *Journal of Child and Family Studies*, 23, 548–557.
- Segrin, C., Woszdilo, A., Givertz, M., Bauer, A., & Murphy, M. T. (2012). The association between overparenting, parent-child communication, and entitlement and adaptive traits in adult children. *Family Relations*, 61, 237–252. doi:10.1111/j.1741-3729.2011.00689.x
- Willoughby, B. J., Hersh, J. N., Padilla-Walker, L. M., & Nelson, L. J. (2013). “Back off”! Helicopter parenting and a retreat from marriage among emerging adults. *Journal of Family Issues*, 35, 1–25. doi:10.1177/0192513X13495854

## Author Biographies

**Larry J. Nelson** is a professor in the School of Family Life at Brigham Young University. He received his PhD in human development from the University of Maryland, College Park. He examines factors in cultural contexts that contribute to flourishing or floundering in the transition to adulthood with a particular emphasis on the parent-child relationship.

**Laura M. Padilla-Walker** is an associate professor in the School of Family Life at Brigham Young University. Her research is focused on parenting as it relates to moral and prosocial development during adolescence and emerging adulthood.

**Matthew G. Nielson** is a graduate student in the School of Family Life at Brigham Young University. His research is focused on gender socialization and development during adolescence and emerging adulthood.

## Student Participation and Parental Involvement in Relation to Academic Achievement

Anna Niia

Jönköping University and Mälardalen University

Lena Almqvist and Elinor Brunnberg  
Mälardalen University

Mats Granlund  
Jönköping University

This study shows that students, teachers, and parents in Swedish schools ascribe differing meanings and significance to students' participation in school in relation to academic achievement. Students see participation as mainly related to social interaction and not academic achievement, whilst teachers view students' participation as more closely related to activity and academic performance. Despite these differences, teachers and students are in close agreement regarding activities of a social nature. Teachers' and parents' ratings of parents' involvement in school demonstrate a higher agreement, but also correlate negatively with the academic achievement of the student. This is likely because communication is more frequent with parents of underachieving students than students demonstrating high academic performance. The partly inconsistent results in previous research regarding the relation between participation and academic achievement can here be explained by the choice of raters, as this connection only exists in ratings carried out by teachers.

*Keywords:* participation, students, parental involvement, self-ratings

### Introduction

Participation is often treated as a key issue in political documents, with definitions often containing terms such as involvement, engagement, and influence over one's situation. According to the Swedish National Agency for Education (2009), students and their parents should be given the chance to exert influence over school activities by having the teachers cooperate with caregivers and regularly inform them about the student's school situation and academic progress, and also keep them informed about the individual student's personal situation. This is done through yearly performance reviews and parent-teacher meetings. The democratic principles of influence, responsibility, and participation apply to each student, and the teacher shall prepare the students for participation and co-responsibility, and the rights and obligations that characterize a democratic society. In this study,

---

Anna Niia, CHILD, School of Health Sciences, Jönköping University/ICU, School of Health, Care and Social Welfare, Mälardalen University; Lena Almqvist, ICU, School of Health, Care and Social Welfare, Mälardalen University; Elinor Brunnberg, ICU, School of Health, Care and Social Welfare, Mälardalen University; Mats Granlund, CHILD, Disability Research, School of Health Sciences, Jönköping University.

Correspondence concerning this article should be addressed to Anna Niia. E-mail: [anna.niia@mdh.se](mailto:anna.niia@mdh.se)

participation and involvement are multidimensional concepts that have internal and external dimensions and are viewed from different positions. Children, parents, and teachers may view this process differently, as may be reflected in their answers. Previous research has noted a connection between parental involvement in school and academic motivation (Gonzalez-DeHass, Willems, & Doan Holbein, 2005)—which leads to better academic performance (Fortier, Vallerand, & Guay, 1995)—as well as between students' engagement in school and academic achievement (Skinner, Zimmer-Gembeck, & Conell, 1998). It is therefore reasonable to believe that increased student participation or parental involvement could increase academic achievement. Both students' participation and parental involvement are complex constructs that include diverse definitions (Fan & Williams, 2010; Mancini, Coster, Trombly, & Heeren, 2000) and which can be measured both by self-ratings and other types of ratings.

In Sweden the nine-year compulsory school [*grundskolan*] starts at seven years of age. Grades were previously given from 14 years of age, but in 2012 grades began to be given from 12 years of age. In order to qualify for high school [*gymnasieskolan*], students need passing grades in Swedish (or Swedish as a second language), English, Maths, and five to nine additional school subjects (Education Act, 16:30–31§§). The main goal of the compulsory school curriculum is to provide all students with the knowledge and skills to prepare them for everyday life in society, but the school should also serve as a support for the parents regarding their children's upbringing and development (Swedish National Agency for Education, 2011). Therefore the school and home contexts are intertwined, with each dependent on the other to function well.

### Participation

The United Nations Convention on the Rights of the Child (UN CRC, 2012), which has been ratified by Sweden, states that all children have equal rights (Article 2) and they have the right to education (Article 28) and to develop their personality, talents, and mental and physical abilities to their fullest potential (Article 29). All children also have the right to participation and to be heard in all matters affecting them (Article 12). This has not been implemented as well as expected, and the Council of Europe has adopted recommendations to member states on the participation of children and young people under the age of 18 (Committee of Ministers, 2012). In these recommendations “participation” is defined as “individuals and groups of individuals having the right, the means, the space, the opportunity and, where necessary, the support to freely express their views, to be heard and to contribute to decision making on matters affecting them, their views being given due weight in accordance with their age and maturity” (p. 3). Participation can also be defined in more practical terms as concerning the child's frequency of attending and degree of involvement in a community or activity. This definition partly overlaps with the definition of the subcomponent “participation” in the International Classification of Functioning, Disability and Health (ICF). Within the ICF, participation and activity are subcomponents of the factor “activity and participation,” and are described as important health-related factors and important conditions for being an active citizen (WHO, 2001). Common to both the definitions above and to previous studies is that participation is conceptualized as a multidimensional construct (Mancini et al., 2000) containing at least two dimensions: one that focuses on being present, i.e. attending an activity; and one that focuses on degree of influence over or involvement with the activity (Granlund et al., 2012). Attending is a necessary prerequisite for participation; for

example, a student must actually attend a lesson to learn from it and a parent must attend meetings with teachers to influence what is happening in school. To participate fully, it is not enough merely to be present; it is also necessary to be involved/engaged in the activity. A passive onlooker is less actively engaged in break time, for example, than a student who engages in peer interaction. The dimensions of being present and being involved are both dependent on environmental and personal characteristics described as “the rights, the means, the space, the opportunity and the support.” Therefore, in order to fully investigate participation it is necessary to investigate both dimensions of participation (attending and involvement) as well as personal and environmental characteristics affecting participation. Further complicating the matter, the participation construct can be applied to different hierarchical ecological system levels ranging from the individual level (e.g. student participation in classroom activities) to levels further up the hierarchy (e.g. parental influence over decisions made at the school). To obtain a comprehensive understanding of participation, expressions of participation at different levels need to be linked. The focus in this study is on measuring the two dimensions of participation for students and teachers in school and examining how they are related to parents’ and teachers’ perceptions of the collaboration between the family and the school.

### **Participation in School Activities**

Social participation seems to be especially important for academic achievement, as children who perceive themselves as lonely experience lower academic achievement (Guay, Boivin, & Hodges, 1999) and children who report positive peer associations have higher achievement levels (van den Oord & van Rossem, 2002; Stewart, 2008). In terms of the dimension of school attendance, this is supported by Strand (2012) and Strand and Granlund (2013), who report that students with high levels of truancy not only perform less well in school but also tend to be socially isolated. In addition, Veland, Midthassel, and Idsoe (2009) have shown that children with low socioeconomic standard (SES) also tend to report lower social inclusion (i.e. poorer relationships with teachers and peers, and being bullied), and this applies especially to children with additional disadvantages such as being placed in a foster home or institutional residence, having parents with alcohol- or drug-related problems, or being refugees and belonging to ethnic minority groups. Problems in school (social or academic) often result in long-term consequences in life (Berridge, 2007). Failing to complete school leads to reduced chances of moving on to higher education and a lower economic living standard and socioeconomic class, all of which are predictors of such children’s own children’s lower level of education (Berridge, 2007). Concerning the dimension of involvement in school, the expression “taking part” was found to be the primary definition of participation among students (Bergström & Holm, 2005), which is here called social participation and revolves more around a sense of belonging than the prospect of having influence (Åkerström, Aytar, & Brunnberg, 2013; Åkerström et al., 2010; Bergström & Holm, 2005; Elvstrand, 2009). Teacher ratings of students’ engagement, operationalized as how active, in terms of effort, attention, and persistence, a student is in learning activities, have also been identified as a strong predictor of children’s academic achievements and social functioning in school (Skinner et al., 1998). Larrivee, Semmel, and Gerber (1997) have argued that the teacher’s attitude towards the students is the primary environmental factor at the school level necessary for the students to experience participation, i.e. involvement. Teachers who emphasized the importance of the whole child (academic achievement and social and emotional development)

had students who experienced higher levels of participation and a sense of being seen as individuals (Larrivee et al., 1997). The context for the two dimensions of participation (attending and being involved) may vary. One example is provided by Emanuelsson and Sahlström's (2008) application of conversation analysis to video recordings from mathematics classrooms. They observe that, when the teacher invites the students to participate in the lecture, the teacher's control over the content, and thus the mathematical learning, decreases. Students are free to ask questions and might stray away from the topic, but on the other hand they have the chance to continuously check their understanding with the teacher. Teaching in this manner might take longer, but Emanuelsson and Sahlström argue that it also helps students to become democratic citizens.

Another aspect of participation is democratic participation, which focuses on the democratic value of participation, and stresses children's rights and opportunities to make their voices heard and influence their situation (Åkerström et al., 2010; Åkerström et al., 2013; Bergström & Holm, 2005; Sinclair, 2004; SOU, 2000; Thomas, 2007). Democratic participation is a right that should permeate Swedish education. It has positive health effects, according to a literary review by Wennerholm Juslin and Bremberg (2004) in which it was shown that 20 out of 24 studies reported positive outcomes from increased influence. Social and intellectual health were most positively affected; physical and psychological health were not improved to the same extent due to the fact that in some cases increased influence was used to abstain from physical education. Åkerström et al. (2013) found two additional aspects of students' experiences of participation through interactive research that included eight students (aged 15–19) as research partners. One aspect was "Taking Responsibility," which focuses on young people's agency in various activities, e.g. learning. The other aspect was "Understanding," which affects all other aspects as it focuses on communication, which is a prerequisite for social interaction, exerting influence, and understanding what is taught.

Concerning participation in school, there are no contradictions between the definitions and contextualizations provided above—if anything they complement each other—but they need to be measured in different ways. They can all be measured through self-ratings, although taking part in school activities and participating in decision making can also be observed and rated by others, e.g. teachers, and not just experienced. Because teachers' and students' perceptions of participation may vary, it is of interest to investigate similarities and differences between teachers' and students' ratings of participation. Thus, participation was operationalized as both (1) whether students and teachers perceived that there were opportunities to take part in different school activities and (2) the perceived frequency of taking part in academic and non-academic, social and non-social school activities.

### **Parental involvement in school**

Parental involvement has been defined and measured in several ways in different studies. One is to define the concept in theoretical and general terms, as Fishel and Ramirez do when claiming that parental involvement includes "a wide range of parent activities that support children's learning" (2005, p. 373). Wishing to avoid a one-dimensional, theoretical definition, Connors and Epstein (1994) have explored the concept empirically and found no less than six dimensions: Parenting, Communicating, Volunteering, Learning at Home, Decision Making, and Collaborating with Community. In relation to participation, one might say that Fishel and Ramirez's definition emphasizes the engagement aspect of involvement, while Connors and Epstein focus on the activities conducted (attending/performing).

The use of the two dimensions of participation as a starting point for defining parental involvement is supported by a Swedish literature review by Wennerholm Juslin and Bremberg (2005). In Sweden, parental involvement has previously mainly been defined and assessed in two ways: by measuring either the number of activities parents participate in, such as reading, visiting the school, and so on (i.e. frequency of taking part in school-related activities) or the amount of influence the parents exert or experience that they possess at their children's school (experienced involvement) (ibid).

Some studies have investigated the relations between parental involvement and aspects of student participation in school activities. Parents' involvement, in terms of frequency of attending events related to their children's education, positively affects the children's commitment to school, intrinsic and extrinsic motivation, perceived competence, perceived control, self-regulation, mastery, goal orientation, and motivation to read (Gonzalez-DeHass et al., 2005). To this can be added Rogers, Theule, Ryan, Adams, and Keating's (2009) findings that parental involvement is related to academic achievement via the child's perceived academic competence. When distinguishing between different kinds of communication between school and parents, patterns emerge that show that contact concerning poor performance or behavior problems affected students' motivation negatively while contact between school and parents on benign issues (e.g. educational plans) had a positive effect on student motivation (Fan & Williams, 2010).

In the present study, parental involvement has focused on the involvement dimensions in terms of sharing information about school and parents' perceived influence over the school situation for their child. The reason for this is that schools have an obligation to uphold regular two-way communication with each student's parents, as this is considered of significance for students' development (Swedish National Agency for Education, 2011). Parental involvement has been operationalized as the school-to-home and home-to-school communication about school programs and students' progress, and the questionnaire has been designed to include items about both the provision of information and influence over decisions.

### **Aim and Research Questions**

The aim of this study is to examine the relationships between academic achievement in terms of grades, student participation in terms of perceived frequency of attending school activities, and parental involvement in terms of communication with the school, as well as differences between and similarities in ratings dependent on who the rater is. The different perspectives of students and teachers might cause discrepancies in how they rate the relationships between participation and academic achievement. In order to sort out these patterns, the following research questions are posed: Are student and teacher ratings of students' participation related? Are parent and teacher ratings of parental involvement related? Is parental involvement related to students' experienced participation in school, and are these measures related to academic achievement?

### **Method**

#### **Participants**

The study was conducted in a medium-sized Swedish city with a history of extensive labor immigration from southern Europe in the 1950s and 1960s. In recent years most



new immigrants have been refugees. In 2007, when the data collection took place, the city had a population of slightly more than 130,000 people, 21 per cent of whom were under the age of 18 (Statistics Sweden, 2012b); the average income was 297,500 SEK (€34,200) for men and 209,900 SEK (€24,200) for women. In the two districts studied, the average income was 283,400 SEK (€32,600) and 242,100 SEK (€27,900), respectively, for men and 204,900 SEK (€23,600) and 177,500 SEK (€20,400), respectively, for women. The number of inhabitants in these districts born outside Sweden was 23 and 29 percent, respectively, compared to 17 percent in the city as a whole (Statistics Sweden, 2012a).

The participants in this study were 786 children, 13 to 15 years of age, from two different schools, their parents, and their teachers. In 2007, students in Sweden received grades from 14 years of age and up; therefore all calculations in relation to academic achievement will only employ data from children 14 years and older. The younger students are still included as they are part of what was to become a longitudinal data collection, which will be analyzed in future articles. Among Swedish students who graduated from compulsory school (at 15 years of age) in 2011, 12.3 percent were not qualified to proceed to high school (County Administrative Board of Stockholm County, 2012), and only 77 percent achieved the goals of all subjects (National Agency for Education, 2013). In the schools included in this study, 54 and 64 percent of the students, respectively, achieved the goals of all subjects in 2007, the national average being 76 percent (National Agency for Education, 2013).

Questionnaires were distributed by mail and the responses contained data from 146 out of a total of 786 children (18.6 percent), of which 59.6 percent were boys and 40.4 percent were girls. Data from parents concern the same set of 146 children. From the teachers, data were retrieved for 693 children (88.2 percent), of which 54.4 percent were boys and 45.6 percent were girls. The total sample in this article comprised 54.5 percent boys and 45.5 percent girls. A total of 132 children have data from all three sources. The number of individuals included in each analysis is presented in each table.

Since the focus of the study was to examine participation and involvement, it seemed important to further examine who did and did not respond to the questionnaire. The teachers responded to a high degree (88.2 percent) and can therefore give us information about those who did not respond. There was no difference in parental involvement, according to the teachers' assessments, between parents who did and did not respond ( $t(646) = -0.54$ ;  $p = ns$ ). The children in the families that did respond were not reported to have a higher degree of participation in school ( $t(335) = -1.39$ ;  $p = ns$ ). From this we conclude that those who chose to participate in the study do not stand out from those who chose not to, at least as rated by the teachers.

## Instruments

Data was collected through questionnaires containing an adapted version of Simeonsson, Carlsson, Huntington, McMillen, and Brent's (1999) measure of participation in school activities. Each child rated his or her level of participation in 15 school activities (group projects, oral presentations, individual written assignments, searching for information, computer-aided schoolwork, individual work, speaking in class, practical assignments, sports days, hanging out with peers during recess, helping other students, using the school library, student council, helping out in the cafeteria, and the recreation center). The scale included a question regarding whether or not a specific activity existed (yes or no) and how often the child perceived that he or she took part in the activity (not at all, sometimes,



or often). The teachers answered a questionnaire for each student containing the same 15 activities and response alternatives, whether or not the activity existed, and how often the teacher perceived that the student in question took part in the activity.

The teachers' and parents' questionnaires included a measurement of the parents' involvement with their children's school (Granlund, Eriksson, Almqvist, Luttrupp, & Björk-Åkesson, 2004). This measurement included a set of 10 statements (I have the possibility to discuss my child's future, I am regularly given information about my child's schoolwork, I am encouraged to express opinions and ideas concerning my child's school situation, I have regular contact with the staff, I am informed about changes affecting my child, I am encouraged to visit my child in school, I have the possibility to meet and discuss with other parents, I am engaged in my child's schooling, I trust the school's staff, and I feel that my child is safe in school) and a four-degree scale was used to rate their agreement with the statement (not at all, sometimes, often, or always). For teachers, these statements were slightly altered (i.e. Parents have the possibility to discuss their child's future, Parents are encouraged to visit their child at school, and Parents feel that their child is safe at school) but the response alternatives were the same.

The municipality completed the dataset by adding the year of birth, gender, and grades of the students.

## Procedure

Prior to collecting data, this study was approved by the Ethical Review Board of Uppsala (Dnr 2007-091). Questionnaires were sent out to the families through the regular postal service. Each envelope was addressed to the guardian of the child in question and contained a letter of information, the parents' questionnaire, the child's questionnaire, and a pre-stamped return envelope addressed to the researcher. The letter of information contained information for both parents and children about the aim of the survey, the survey being voluntary, how to contact the researcher, and so on, in accordance with the Swedish Research Council's ethical codex (n.d.). Each envelope also contained a letter with a short text in the five most common foreign languages spoken by families of non-Swedish origin in the districts studied (Arabic, Farsi, Somali, Spanish, and two dialects of Kurdish – Sorani and Kurmanji). This text provided the name and phone number of a person who spoke the language in question and could provide assistance by explaining the study and the questionnaire.

At each school the survey was presented orally at staff meetings, as well as in letters of information containing the researcher's contact information. Questionnaires were then distributed to the concerned teachers, one questionnaire for each student. Teachers were given approximately one month to answer the questionnaires, which were then personally collected at the school by the researcher.

Employees at the local government office with access to scanning equipment scanned all the questionnaires into SPSS data files. These files were then sent to the researcher for further processing, together with coded files containing background data on each child's year of birth, gender, and grades.

## Data Analysis

Questionnaires were coded so that each child's questionnaire could be linked to its corresponding parent and teacher questionnaires, allowing analyses to be made on an individual

basis. For each analysis, all available data has been used; this means that the number of individuals included in different calculations can differ.

If activities were noted as “not available,” the frequency of participation was automatically coded as “never.” No other action has been carried out to compensate for missing data. After this, the share of internally missing data varied between 2.1 and 14.0 percent for all items except the teacher question concerning students’ participation at the recreation center, which had 34.9 percent missing data and was therefore excluded. Most activities were available to a high extent (above 74 percent) according to both students and teachers. Some activities were less available; according to teachers, the activity of helping out in the cafeteria, and according to students, helping other students, participating in the student council, the recreation center, and helping out in the cafeteria, were only available to an extent of 46.6 to 69.7 percent. These items were, however, retained in the dataset. None of these activities are compulsory for the students. How often each child was perceived to participate on average was calculated separately according to both his or her self-ratings and the teacher ratings. Based on the parents’ and teachers’ ratings of parental involvement, average parental involvement was calculated for each child, broken down according to parents and teachers separately.

Measures of participation and parental involvement were examined through exploratory factor analysis (PCA, orthogonal rotation varimax) in order to detect teachers’ and students’ perspectives on the activities in question. The number of factors retrieved followed the rules of Kaiser’s criterion (eigenvalue above 1) and inspection of the screeplot (Pallant, 2007). For students’ ratings of participation, this generated five factors (Table 1). Teachers’ ratings of participation generated three factors (Table 2). Parental involvement generated two factors for both teachers’ and parents’ ratings (Table 3 and Table 4). The generated factors’ reliability was tested using Cronbach’s alpha and items lowering the reliability index were excluded.

Correlations with Pearson’s  $r$  were made between all generated factors and between factors and grades. Comparisons between responding and non-responding groups were made with independent sample  $t$ -tests.

## Results

The most prominent finding is that student participation is related to grades when rated by teachers but not when rated by students themselves. Observed participation (by teachers) and experienced participation (by students) must therefore be two partly different phenomena. Parental involvement has negative correlations with academic achievement, which is likely due to increased communication between school and parents when students fail to meet their academic goals.

### Students’ Participation

The index for self-rated participation in school had a mean value of 2.21 (0.29) and a Cronbach’s alpha value of 0.79. The index for teacher-rated student participation in school had a mean value of 2.46 (0.37) and a Cronbach’s alpha value of 0.88. These indexes were not significantly correlated ( $r = 0.24$ ;  $n = 67$ ;  $p = ns$ ).

**Exploratory factor analysis: Students’ self-ratings of participation.** In order to test the suitability of the data for factor analysis, Bartlett’s Test of Sphericity was conducted,

Table 1

*Subscales generated through Principal Component Analysis for students' self-rated participation*

| Item                                 | Loadings                |             |             |               |                  | Communalities | N   |
|--------------------------------------|-------------------------|-------------|-------------|---------------|------------------|---------------|-----|
|                                      | Non-academic activities | Initiative  | Information | Communication | Group activities |               |     |
| Recreation centre                    | <b>.759</b>             |             |             |               |                  | .711          | 140 |
| Helping out in the cafeteria         | <b>.733</b>             |             |             |               |                  | .601          | 138 |
| Student council                      | <b>.645</b>             |             |             |               | -.315            | .572          | 134 |
| Helping other students               | <b>.563</b>             | .355        |             |               |                  | .497          | 134 |
| Writing individual assignments       |                         | <b>.753</b> |             |               |                  | .611          | 130 |
| Hanging out with peers during recess |                         | <b>.628</b> |             | .341          |                  | .528          | 141 |
| Practical assignments                |                         | <b>.627</b> |             |               |                  | .511          | 139 |
| Computer aided schoolwork            |                         |             | <b>.852</b> |               |                  | .764          | 141 |
| Searching for information            |                         |             | <b>.765</b> |               |                  | .671          | 135 |
| Individual work                      |                         | .423        | .599        |               |                  | .555          | 139 |
| Oral presentations                   |                         |             |             | <b>.821</b>   |                  | .707          | 133 |
| Speaking in class                    |                         |             |             | <b>.731</b>   |                  | .717          | 140 |
| Group projects                       |                         |             |             | .505          | .335             | .470          | 141 |
| Sports day                           |                         |             |             |               | <b>.857</b>      | .754          | 140 |
| Use of the school library            | .387                    | .310        |             |               | <b>.526</b>      | .621          | 139 |

*Note:* Orthogonal rotation; Varimax was used. Items have been removed after reliability testing (Cronbach alpha); remaining items' loadings are bold.

giving a highly significant result ( $p < 0.001$ ), while the Kaiser–Meyer–Olkin (KMO) value was 0.70. This proves that there are sufficient intercorrelations among the items for the material to be suitable for factor analysis (Pallant, 2007). The analysis revealed five factors (Non-academic Activities, Initiative, Information, Communication, and Group Activities) with eigenvalue above 1, explaining 22.9, 13.3, 9.1, 8.4, and 8.1 percent of the variance, respectively. The screeplot inspection supported an additional factor, but this did not have an eigenvalue above 1 and was therefore excluded. Two items were excluded after reliability testing with Cronbach's alpha, resulting in alpha values of 0.64, 0.60, 0.71, 0.72, and 0.39 for the five factors (see Table 1). The remaining loadings were all above 0.5.

**Exploratory factor analysis: Teachers' ratings of student participation.** Bartlett's Test of Sphericity was conducted in order to test suitability for factor analysis and gave a highly significant result ( $p < 0.001$ ), while the KMO value was 0.87. The analysis revealed

Table 2

*Subscales generated through Principal Component Analysis for teachers' rated student participation*

| Item                                 | Loadings              |                   |                         | Communalities | N   |
|--------------------------------------|-----------------------|-------------------|-------------------------|---------------|-----|
|                                      | Individual activities | Social activities | Non-academic activities |               |     |
| Individual work                      | <b>.823</b>           |                   |                         | .725          | 664 |
| Writing individual assignments       | <b>.819</b>           |                   |                         | .764          | 665 |
| Searching for information            | <b>.817</b>           |                   |                         | .754          | 658 |
| Computer aided school work           | <b>.648</b>           | .391              |                         | .585          | 641 |
| Hanging out with peers during recess |                       | .772              |                         | .608          | 651 |
| Speaking in class                    | .418                  | <b>.667</b>       |                         | .657          | 644 |
| Group projects                       | .516                  | <b>.643</b>       |                         | .706          | 662 |
| Practical assignments                | .435                  | <b>.642</b>       | .311                    | .638          | 596 |
| Oral presentation                    | .476                  | <b>.614</b>       |                         | .701          | 651 |
| Sports day                           | .349                  | .592              |                         | .486          | 661 |
| Helping other students               |                       |                   | <b>.831</b>             | .719          | 596 |
| Student council                      |                       |                   | <b>.748</b>             | .577          | 622 |
| Using the school library             | .348                  |                   | <b>.678</b>             | .581          | 601 |
| Helping out in the cafeteria         |                       |                   | <b>.658</b>             | .476          | 609 |

*Note:* Orthogonal rotation; Varimax was used. Items have been removed after reliability testing (Cronbach alpha); remaining items' loadings are bold.

three factors (Individual Activities, Social Activities, and Non-Academic Activities) with eigenvalues above 1, which was supported by the screeplot inspection, explaining 42.2, 14.7, and 7.3 percent of the variance, respectively. After reliability testing with Cronbach's alpha, two items were excluded (see Table 2), and alpha values were 0.87, 0.88, and 0.74. All the remaining items had loadings above 0.6 in the factors where they were included.

Teacher factors are easily distinguishable; "Individual Activities" comprises individual academic activities where students are not supposed to interact with each other and that are graded; "Social Activities" comprises social academic activities where students may choose whether to interact spontaneously or not, and which are also graded (hence excluding hanging out with peers during recess); "Non-Academic Activities" comprises voluntary social activities that are not graded.

Student items were divided into five factors. "Non-Academic Activities" comprises voluntary and structured social activities that occur outside of the classroom. All of the activities that were rated by students as less available (46.6–69.7 percent) were placed in this factor. "Initiative" causes some concern, as it includes two seemingly very different items: "writing individual assignments" and "hanging out with peers during recess." But the writing of individual assignments can be conducted in a greatly unstructured manner, with the students themselves being allowed to decide where to sit (classroom, library, or hallway). This gives them the opportunity to interact with others, which makes both items social. "Information" consists of activities performed inside the classroom or computer rooms at school with a high level of structure and possibly a low degree of social interaction. "Communication" comprises items that take place in the classroom and maintain a strong social

focus, whether voluntary or compulsory; it is the most highly structured factor. “Group Activities” includes activities that are performed outside the classroom with a low degree of structure and high degree of social interaction, but this factor differs from “Initiative” in that the social interaction is imposed upon the students. Students are divided into groups for group projects, and on sports days they are assigned to teams or are grouped with other students who have chosen the same activity.

“Communication” correlates with all the other student factors (see Table 5), which seems to imply that students who often participate in activities high in both structure and social interaction also to a greater extent participate in other activities. “Group Activities” also correlates with “Initiative” and “Information,” where the common denominator is graded school activities.

All teacher factors were correlated (see Table 5), “Individual Activities” and “Social Activities” to a greater extent ( $r = 0.68$ ;  $n = 557$ ;  $p < 0.001$ ).

Teachers’ “Social Activities” was correlated with the student factors “Initiative” ( $r = 0.34$ ;  $n = 95$ ;  $p < 0.01$ ) and “Communication” ( $r = 0.28$ ;  $n = 96$ ;  $p < 0.01$ ).

### Parental Involvement

Parents’ ratings of parental involvement had a mean value of 2.74 (0.53) and a Cronbach’s alpha value of 0.83. Teachers’ ratings of parental involvement had a mean value of 3.29 (0.47) and a Cronbach’s alpha value of 0.87. No correlations were found between parents’ and teachers’ ratings of parental involvement as indexes ( $r = 0.15$ ;  $n = 114$ ;  $p = ns$ ).

**Exploratory factor analysis: Parents’ ratings of parental involvement.** An equivalent factor analysis (PCA, orthogonal rotation, varimax) was conducted for teachers’ and parents’ ratings of parental involvement, which resulted in two similar factors each. Parents’ ratings were suitable for factor analysis according to Bartlett’s test ( $p < 0.001$ ), and the KMO value was 0.84. Two factors (Communication and Sense of Trust) were

Table 3

*Subscales generated through Principal Component Analysis for parents’ ratings of parental involvement*

| Item                                     | Loadings      |                | Communalities | N   |
|------------------------------------------|---------------|----------------|---------------|-----|
|                                          | Communication | Sense of trust |               |     |
| Encouraged to express opinions and ideas | <b>.782</b>   |                | .626          | 143 |
| Regular contact with the staff           | <b>.727</b>   |                | .578          | 141 |
| Encouraged to visit child                | <b>.709</b>   |                | .522          | 142 |
| Information on school work               | <b>.669</b>   | .353           | .571          | 143 |
| Information on changes                   | <b>.662</b>   | .429           | .622          | 141 |
| Discussing child’s future                | <b>.604</b>   | .360           | .494          | 141 |
| Possibility to meet other parents        | .592          |                | .353          | 142 |
| Trusting the staff                       |               | <b>.864</b>    | .763          | 140 |
| Child is safe in school                  |               | <b>.861</b>    | .747          | 140 |
| Engaged in child’s schooling             |               | .349           | .184          | 140 |

*Note:* Orthogonal rotation; Varimax was used. Items have been removed after reliability testing (Cronbach alpha); remaining items’ loadings are bold.

retrieved (eigenvalue above 1 and according to screeplot analysis) and explained 41.8 and 12.8 percent of the variance, respectively. After reliability testing (Cronbach's alpha), two items were excluded and the remaining factors had alpha values of 0.85 and 0.76, respectively; three remaining items had loadings in both factors but the stronger ones were no lower than 0.6. See [Table 3](#).

**Exploratory factor analysis: Teachers' ratings of parental involvement.** Teachers' ratings of parental involvement also generated two factors. Bartlett's test showed suitability for factor analysis ( $p < 0.001$ ), and the KMO value was 0.82. Two factors (Communication and Sense of Trust) had eigenvalues above 1, and the explained variances for the two factors were 45.8 and 13.9 percent, respectively. According to the screeplot, a third factor was possible, but since the eigenvalue was too low, this one was excluded. Again, two items were excluded after reliability testing (Cronbach's alpha), resulting in alpha values of 0.84 and 0.95, respectively; three of the remaining items had loadings in both factors. Loadings in the final factor were no lower than 0.5 for any item. See [Table 4](#).

Both parents and teachers differentiated between "Communication" and "Sense of Trust" regarding the school. Communication in both cases included items concerning information exchange between school and parents (see [Table 3](#) and [Table 4](#)). Both the parents' and teachers' factor "Sense of Trust" was constructed by the same two items: "I trust the staff" and "My child is safe in school." Even though five of six items were the same for parents and teachers, there were some differences in the "Communication" factor concerning which items remained after reliability testing was performed. The parent factor contained the item "Discuss child's future," while the teacher factor instead contained the item "Possibility to meet other parents."

Both the "Communication" and "Sense of Trust" factors correlated modestly, with ( $r = 0.19$ ;  $n = 123$ ;  $p < 0.05$ ) and ( $r = 0.22$ ;  $n = 122$ ;  $p < 0.05$ ), respectively. At the item level, both items in "Sense of Trust" are correlated between teachers and parents: "Trusting the Staff" ( $r = 0.19$ ;  $n = 125$ ;  $p < 0.05$ ) and "Child is safe in school" ( $r = 0.18$ ;  $n = 125$ ;

Table 4

*Subscales generated through Principal Component Analysis for teachers' ratings of parental involvement*

| Item                                     | Loadings      |                | Communalities | N   |
|------------------------------------------|---------------|----------------|---------------|-----|
|                                          | Communication | Sense of trust |               |     |
| Encouraged to express opinions and ideas | <b>.813</b>   |                | .698          | 666 |
| Encouraged to visit child                | <b>.770</b>   |                | .599          | 662 |
| Possibility to meet other parents        | <b>.757</b>   |                | .573          | 659 |
| Information on school work               | <b>.734</b>   | .404           | .702          | 666 |
| Information on changes                   | <b>.563</b>   | .440           | .511          | 662 |
| Regular contact with the staff           | <b>.539</b>   | .404           | .454          | 666 |
| Trusting the staff                       |               | <b>.824</b>    | .703          | 662 |
| Child is safe in school                  |               | <b>.814</b>    | .690          | 659 |
| Engaged in child's schooling             |               | .699           | .494          | 661 |
| Discussing child's future                | .461          | .582           | .551          | 666 |

*Note:* Orthogonal rotation; Varimax was used. Items have been removed after reliability testing (Cronbach alpha); remaining items' loadings are bold.



Table 5

*Correlations within subscales generated by Principal Component Analysis*

|                                   | Students' non-academic activities | Students' initiative | Students' information | Students' communication | Students' group activities | Teachers' individual activities | Teachers' social activities | Teachers' non-academic activities | Parents' communication | Parents' sense of trust | Teachers' communication |
|-----------------------------------|-----------------------------------|----------------------|-----------------------|-------------------------|----------------------------|---------------------------------|-----------------------------|-----------------------------------|------------------------|-------------------------|-------------------------|
| Students' non-academic activities | -                                 |                      |                       |                         |                            |                                 |                             |                                   |                        |                         |                         |
| Students' initiative              | .13<br>n=117                      | -                    |                       |                         |                            |                                 |                             |                                   |                        |                         |                         |
| Students' information             | .08<br>n=117                      | .22*                 | -                     |                         |                            |                                 |                             |                                   |                        |                         |                         |
| Students' communication           | .21*<br>n=118                     | .42***               | .35***                | -                       |                            |                                 |                             |                                   |                        |                         |                         |
| Students' group activities        | .18<br>n=121                      | .26**                | .19*                  | .08<br>n=127            | -                          |                                 |                             |                                   |                        |                         |                         |
| Teachers' individual activities   | -.09<br>n=107                     | .16<br>n=108         | -.03<br>n=113         | .17<br>n=115            | -.13<br>n=118              | -                               |                             |                                   |                        |                         |                         |
| Teachers' social activities       | .07<br>n=95                       | .39***               | .15<br>n=101          | .32**                   | -.16<br>n=104              | .70***                          | -                           |                                   |                        |                         |                         |
| Teachers' non-academic activities | .07<br>n=94                       | .15<br>n=96          | .18<br>n=98           | 0.8<br>n=99             | -.11<br>n=103              | .21***                          | .35***                      | -                                 |                        |                         |                         |
| Parents' communication            | .19*<br>n=118                     | -.17<br>n=121        | -.06<br>n=126         | -.10<br>n=124           | .10<br>n=128               | .07<br>n=118                    | -.01<br>n=104               | -.21*                             | -                      |                         |                         |
| Parents' sense of trust           | -.06<br>n=119                     | -.07<br>n=121        | -.03<br>n=125         | .02<br>n=124            | -.04<br>n=128              | .06<br>n=119                    | -.03<br>n=105               | -.04<br>n=104                     | .43***                 | -                       |                         |
| Teachers' communication           | .08<br>n=112                      | -.13<br>n=113        | .03<br>n=118          | -.01<br>n=118           | .15<br>n=123               | .05<br>n=617                    | .03<br>n=549                | .00<br>n=526                      | .19*                   | -.06<br>n=124           | -                       |
| Teachers' sense of trust          | -.08<br>n=110                     | -.23*<br>n=111       | -.21*<br>n=116        | -.10<br>n=116           | -.04<br>n=121              | .10*<br>n=618                   | .09*<br>n=551               | -.06<br>n=528                     | .14<br>n=121           | .22*<br>n=122           | .45***<br>n=649         |

Pearson correlation \*= $p < 0.05$ , \*\*= $p < 0.01$ , \*\*\*= $p < 0.001$

$p < 0.05$ ). “Communication” contains two related items: “Information on Schoolwork” ( $r = 0.28$ ;  $n = 130$ ;  $p < 0.01$ ) and “Regular Contact with the Staff” ( $r = 0.21$ ;  $n = 128$ ;  $p < 0.05$ ). See Table 5.

### Interrelations

No correlations were found between parents’ ratings of parental involvement and teachers’ ratings of students’ participation ( $r = -0.11$ ;  $n = 50$ ;  $p = ns$ ) or between parents’ ratings of involvement and students’ self-rated participation in school ( $r = 0.05$ ;  $n = 93$ ;  $p = ns$ ). The assumed connection between parental involvement and student participation cannot be found here. A rather weak correlation was found between teachers’ ratings of student participation and teachers’ ratings of parental involvement ( $r = 0.12$ ;  $n = 321$ ;  $p < 0.05$ ), which probably results from an interrater effect.

### Academic Achievement

Correlation analysis was conducted with subscales from the factor analysis and grades, which showed consistent correlations between teachers’ ratings of participation and grades. The factors correlating most strongly with grades were “Individual Activities” and “Social Activities,” as both included activities that were graded (see Table 6). For students, there were only low negative correlations between “Group Activities” and grades in the subjects of Swedish ( $r = -0.19$ ;  $n = 134$ ;  $p < 0.05$ ) and mathematics ( $r = -0.18$ ;  $n = 134$ ;  $p < 0.05$ ).

When it comes to parental involvement, the parents’ factors did not correlate with grades, while the teachers’ factors showed low negative correlations with grades (see Table 7).

Table 6  
*Correlations between subscales of students’ participation and grades*

|                                   | Swedish         | Math            | English         |
|-----------------------------------|-----------------|-----------------|-----------------|
| Students’ non-academic activities | -.01<br>n=125   | -.02<br>n=125   | -.00<br>n=125   |
| Students’ initiative              | .08<br>n=128    | .13<br>n=128    | .06<br>n=128    |
| Students’ information             | .10<br>n=133    | .12<br>n=133    | .08<br>n=133    |
| Students’ communication           | .09<br>n=132    | .09<br>n=132    | .09<br>n=132    |
| Students’ group activities        | -.18*<br>n=136  | -.16*<br>n=136  | -.09<br>n=136   |
| Teachers’ individual activities   | .33***<br>n=636 | .32***<br>n=636 | .30***<br>n=636 |
| Teachers’ social activities       | .34***<br>n=568 | .37***<br>n=568 | .33***<br>n=568 |
| Teachers’ non-academic activities | .35***<br>n=546 | .32**<br>n=546  | .29**<br>n=546  |

Pearson correlation \*= $p < 0.05$ , \*\*= $p < 0.01$ , \*\*\*= $p < 0.001$

Table 7

*Correlations between subscales of parental involvement and grades*

|                          | Swedish          | Math             | English         |
|--------------------------|------------------|------------------|-----------------|
| Parents' communication   | -.03<br>n=138    | -.05<br>n=138    | .00<br>n=138    |
| Parents' sense of trust  | -.04<br>n=138    | -.01<br>n=138    | .01<br>n=138    |
| Teachers' communication  | -.11**<br>n=655  | -.09*<br>n=655   | -.11**<br>n=655 |
| Teachers' sense of trust | -.16***<br>n=657 | -.15***<br>n=657 | -.13**<br>n=657 |

Pearson correlation \*= $p < 0.05$ , \*\*= $p < 0.01$ , \*\*\*= $p < 0.001$ 

A higher degree of communication between school and home as rated by teachers is related to lower academic achievement when the communication could be an expression of concern about the child. A higher sense of trust in the school, according to the teachers, is also related to lower grades. Even though this may seem contradictory, the heightened trust could be a consequence of more intense communication with the parents of low achievers, as "Communication" and "Sense of Trust" are correlated both for parents ( $r = 0.43$ ;  $n = 134$ ;  $p < 0.001$ ) and teachers ( $r = 0.45$ ;  $n = 649$ ;  $p < .001$ ).

## Discussion

The intention of this study was to explore the relationship between student participation, parental involvement, and academic achievement in relation to who the rater is, which affects what perspective is represented. According to the results of this study, participation, in terms of rate of attendance, and academic achievement were only related when teachers were asked. The students' self-ratings for participation differed from how teachers perceived student participation in the sense that student ratings were mainly focused on social interaction. Teachers' ratings, on the other hand, had a clear connection to academic performance in the context of different activities. The divergence between teacher and student ratings was greatest regarding student participation in solitary activities. When teachers and students disagree on the extent of participation, which is the case with solitary activities, grades can be a misleading measure of students' efforts. Talented students with social inhibitions can have a hard time getting their teacher's attention and receiving acknowledgement, and can feel wrongly graded. Social interaction is highly connected to activity that seems to be understood similarly by teachers and students, as student and teacher ratings were related when activities are high in social interaction. However, there is no overall relationship between students' and teachers' ratings of participation, which suggests that teachers and students have different views on students' participation.

The teachers seem to view the activities asked about in terms of their function in relation to academic performance without always considering students' degree of motivation and engagement in such activities; non-performance-related activities are perceived as a unique dimension, and the rest of the activities are divided into social and non-social performance. Students, on the other hand, differentiate to a greater degree among activities according to the

extent to which social interactions are imposed on them. It makes a difference whether social interaction is spontaneous or required of them; i.e. self-initiated participation in activities commonly stems from a higher degree of internal motivation and engagement, while participation in activities perceived as more or less compulsory stems more from external motivation and performance requirements for grades.

Teacher ratings of student participation seem to be a better proxy for grades than student-rated participation when such a proxy may be needed, e.g. in assessing the academic performance of students who are too young to have received grades. Student ratings tell us something different, which is closer to a measure of social participation. Students who are unaware of the effect on their grades of being perceived as active by teachers have not received adequate information on standards for grading. This lack of information undermines their ability to fully participate, at least in activities perceived by teachers as important for academic achievement, and thus might violate participation as highlighted in a Recommendation to Member States by the EU Committee of Ministers (2012) regarding the CRC (UN CRC, 2012). Students who are active, on the other hand, can perceive higher grades as a form of encouragement, and therefore as giving them greater self-confidence in the classroom, which reinforces their active approach to schoolwork. The lack of correspondence between self-rated student participation and grades shows the importance of being heard, which is emphasized in both the Convention on the Rights of the Child (UN CRC, 2012) and in the national curriculum (Swedish National Agency for Education, 2011). Other studies have indicated that students who feel socially accepted among their peers perform better in school than those who do not (Guay et al., 1999; van den Oord & van Rossem, 2002; Stewart, 2008). The importance of participation in school can be viewed from both perspectives. In the eyes of the teachers, participation is important in order to perform well in school. In the eyes of the students, participation is important in order to experience social inclusion. Both are important positive factors for well-being.

Concerning parental involvement, parents and teachers agree conceptually to a large extent. Both have viewpoints that divide the items into two factors: on the one hand, communication and social interaction, which again connect to activity and, on the other hand, a sense of trust, a personal perception of the school staff's attitude towards students, which connects to involvement. The strongest connection between teachers' and parents' ratings concerns "regular contact and information," which is implemented through yearly and individual meetings and group parent-teacher meetings every semester. The connection between involved parents and participating students is weak and seems to exist only in the eyes of teachers. This may be explained by an assumed relation between parents' social skills and those of their children. Also the teachers' ratings of parental involvement are related to achievement in the sense that parents of low achievers are more involved than those of high achievers, possibly as a consequence of more intensive communication. Parents' trust in the school appears to be influenced by the level of communication, with more communication inducing a higher sense of trust, since parents of low achievers actually have a higher sense of trust in the school than others. These shared perceptions of a sense of trust, participation, and two-way communication may partly be explained by the fact that two-way communication is mandated by the school code and the Swedish national curriculum (Swedish National Agency for Education, 2011).

One limitation of this study is the relatively low response rate from students and parents. However there were enough respondents to conduct the analysis as planned with robust results, and comparisons made using the information available (teachers' ratings and data

from the municipality) showed no obvious differences between responding and non-responding parents and students.

Having students and teachers, as well as parents and teachers, answer the same questions caused a fundamental difference in their answers, because teachers could only provide their perceptions of the others' attitudes and behavior. As a result, some differences between their responses were expected, but it was unclear how and where these differences would emerge.

What needs to be investigated further are the consequences of the fact that teachers and students perceive participation differently. Although teachers and students to a great extent agree on the level of participation in social activities, the teachers seem to focus on achievement and the students on social interaction. In addition, because interaction primarily involves verbal communication, what are the effects on interaction if one party (the student) has a different mother tongue to the teacher and other students and therefore risks not being as verbally capable as other students?

### Acknowledgements

This research was made possible thanks to all the teachers, parents and students who engaged in answering questionnaires.

### References

- Åkerström, J., Aytar, O., & Brunnberg, E. (2013). Intra- and inter-generational perspectives on youth participation in Sweden: A study with young people as research partners. *Children & Society*. doi:10.1111/chso.12027.
- Åkerström, J., Bdaoui, M., Boson, F., Brandt Korall, E., Jansson, H., Kleber, E., Matthiesen, F., Pettersson, F., Thalayhan, H., & Brunnberg, E. (2010). *Young people's voices on participation in school*. Eskilstuna: Mälardalen University/Örebro University, ICU CHILD.
- Bergström, M., & Holm, I. (2005). *Den svårfångade delaktigheten i skolan—Ett ungdomsperspektiv på hinder och möjligheter [The elusiveness of participation in school—A youth perspective on the obstacles and opportunities]*. Linköping: Linköping University.
- Berridge, D. (2007). Theory and explanation in child welfare: Education and looked-after children. *Child and Family Social Work*, 12, 1–10.
- Committee of Ministers. (2012). Recommendation CM/Rec (2012)2 of the Committee of Ministers to Member States on the participation of children and young people under the age of 18. Adopted by the Committee of Ministers on 28 March 2012. Retrieved May 14, 2012, <https://wcd.coe.int/ViewDoc.jsp?id=1927229&Site=CM>.
- Connors, L. J. & Epstein, J. L (1994). *Taking stock: Views of teachers, parents, and students on school, family, and community partnerships in high schools*. Baltimore, MD: Johns Hopkins University Press.
- County Administrative Board of Stockholm County. (2012). *Nutid och framtid – Om Stockholmsregionens utveckling [Present and future – The development in the region of Stockholm]*. Stockholm: County Administrative Board of Stockholm.
- Elvstrand, H. (2009). *Delaktighet i skolans vardagsarbete [Participation in the school's everyday work]*. Linköping: Linköping University.
- Emanuelsson, J., & Sahlström, F. (2008). The price of participation: Teacher control versus student participation in classroom interaction. *Scandinavian Journal of Research Education*, 52(2), 205–223.
- Fan, W., & Williams, C. M. (2010). The effects of parental involvement on students' academic self-efficacy, engagement and intrinsic motivation. *Educational psychology*, 30(1), 53–74.

- Fishel, M., & Ramirez, L. (2005). Evidence-based parent involvement interventions with school-aged children. *School Psychology Quarterly*, 20(4), 371–402.
- Fortier, M. S., Vallerand, R. J., & Guay, F. (1995). Academic motivation and school performance: Toward a structural model. *Contemporary Educational Psychology*, 20, 257–274.
- Gonzalez-DeHass, A. R., Willems, P. P., & Doan Holbein, M. F. (2005). Examining the relationship between parental involvement and student motivation. *Educational Psychology Review*, 17, 99–123.
- Granlund, M., Arvidsson, P., NiiA, A., Björck-Åkesson, E., Simeonsson, R., Maxwell, G., Adolfsson, M., Eriksson-Augustine, L., & Pless, M. (2012). Differentiating activity and participation of children and youth with disability in Sweden: A third qualifier in the International Classification of Functioning, Disability, and Health for Children and Youth? *American Journal of Physical Medicine & Rehabilitation/Association of Academic Psychiatry*, 91(13, Suppl. 1), 84–96.
- Granlund, M., Eriksson, L., Almqvist, L., Luttrupp, A., & Björck-Åkesson, E. (2004). *Delaktighet, sammanfattning av ett forskningsprojekt [Participation, summary of a research project]*. Västerås: Mälardalen University, Special Education Institute and Stiftelsen ALA, Stockholm.
- Guay, F., Boivin, M., & Hodges, E. V. E. (1999). Predicting change in academic achievement: A model of peer experiences and self-system processes. *Journal of Educational Psychology*, 91(1), 105–115.
- Larivee, B., Semmel, M. I., & Gerber, M. M. (1997). Case Studies of Six Schools Varying in Effectiveness for Students with Learning Disabilities. *Elementary School Journal*, 98(1), 27–50.
- Mancini, M. C., Coster, W. J., Trombly, C. A., & Heeren, T. C. (2000). Predicting elementary school participation in children with disabilities. *Archives of Physical Medicine and Rehabilitation*, 81, 339–347.
- Oord, E. van den & van Rossem, R. (2002). Differences in first graders' school adjustment: The role of classroom characteristics and social structure of the group. *Journal of School Psychology*, 40(5), 371–394.
- Pallant, J. (2007). *SPSS Survival Manual*. New York: McGraw-Hill.
- Rogers, M. A., Theule, J., Ryan, B. A., Adams, G. R., & Keating, L. (2009). Parental involvement and children's school achievement: Evidence for mediating processes. *Canadian Journal of School Psychology*, 24(1), 34–57.
- Sinclair, R. (2004). Participation in practice: Making it meaningful, effective and sustainable. *Children & Society*, 18, 106–118.
- Skinner, E. A., Zimmer-Gembeck, M. J., & Conell, J. P. (1998). Individual differences and the development of perceived control. *Monographs of the Society for Research in Child Development*, 63(2–3), 1–220.
- Simeonsson, R. J., Carlsson, D., Huntington, G., McMillen, J., & Brent, L. (1999). *Participation of students with disabilities: A national survey of participation in school activities*. Chapel Hill, NC: Frank Porter Graham Child Development Center.
- SOU. (2000). *En uthållig demokrati! Politik för folkstyrelse på 2000-talet [Sustainable democracy! Policies for citizen government in the 2000s]*. Retrieved January 8, 2013, <http://www.government.se/content/1/c4/06/24/1c43643c.pdf>.
- Statistics Sweden. (2012a). *Statistical database*. Retrieved April 26, 2012, [www.scb.se](http://www.scb.se).
- Statistics Sweden. (2012b). *Statistical database*. Retrieved November 12, 2012, [www.scb.se](http://www.scb.se).
- Stewart, E.B. (2008). School structural characteristics, student effort, peer associations, and parental involvement: The influence of school- and individual-level factors on academic achievement. *Education and Urban Society*, 40(2), 179–204.
- Strand, A.-S. (2012). “School—no thanks, it ain’t my thing”: Accounts for truancy. Students’ perspectives on their truancy and school lives. *International Journal of Adolescence and Youth*. DOI: 10.1080/02673843.2012.743920.

- Strand, A.-S., & Granlund, M. (2013). The school situation for students with high level of absenteeism in compulsory school: Is there a pattern in documented support? *Scandinavian Journal of Educational Research*. DOI: 10.1080/00313831.2013.773561.
- Swedish National Agency for Education [Skolverket]. (2009). *Det svenska skolsystemet: Grundskola* [The Swedish school system: Primary school]. Retrieved October 13, 2010, [www.skolverket.se](http://www.skolverket.se).
- Swedish National Agency for Education [Skolverket]. (2011). *Läroplan för grundskolan, förskoleklassen och fritidshemmet 2011* [Curriculum for primary schools, preschool classes and after-school 2011]. Retrieved November 5, 2012, [www.skolverket.se](http://www.skolverket.se).
- Swedish National Agency for Education [Skolverket]. (2013). *Statistical database SALSA*. Retrieved July 2, 2013, [www.skolverket.se](http://www.skolverket.se).
- Swedish Research Council [Vetenskapsrådet]. (n.d.). *Forskningsetiska principer* [Research on ethical principles]. Stockholm: Elanders Gotab.
- Thomas, N. (2007). Towards a theory of children's participation. *International Journal of Children's Rights*, 15, 199–218.
- UN CRC. (2012). United Nations Convention on the Rights of the Child. Retrieved May 14, 2012, <http://www2.ohchr.org/english/law/crc.htm>
- Veland, J., Midthassel, U. V., & Idsoe, T. (2009). Perceived socio-economic status and social inclusion in school: Interactions of disadvantages. *Scandinavian Journal of Educational Research*, 53(6), 515–531.
- Wennerholm Juslin, P., & Bremberg, S. (2004). *När barn och ungdomar får bestämma mer påverkas hälsan* [When children and young people make more decisions their health is influenced]. Östersund: Swedish National Institute of Public Health.
- Wennerholm Juslin, P., & Bremberg, S. (2005). *Bättre skolprestationer med ökat föräldrainflytande* [Better school performance with greater parental influence]. Östersund: Swedish National Institute of Public Health.
- WHO. (2001). *International Classification of Functioning, Disability and Health*. Geneva: World Health Organization.



Copyright of Scandinavian Journal of Educational Research is the property of Routledge and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.

# Correlates of Parent Involvement in Students' Learning: Examination of a National Data Set

Donald P. Oswald<sup>1</sup>  · Hiba B. Zaidi<sup>1</sup> · D. Scott Cheatham<sup>1</sup> · Kayla G. Diggs Brody<sup>1</sup>

Published online: 27 September 2017  
© Springer Science+Business Media, LLC 2017

**Abstract** Parent involvement in students' learning has been recognized as an important aspect of children's education and is empirically related to students' academic performance and engagement. In the present study we constructed a measure of parent involvement, drawing on items from the 2012 National Household Education Surveys (NHES) Program. Survey items included in the measure addressed parent participation in school activities, participation in school meetings, learning activities at home, learning activities in the community, and parent involvement in homework. The resulting measure of Parent Involvement in Children's Learning (PICL) was used to investigate predictors associated with variation in parent involvement. Following a review of the literature on parent involvement, potential predictor variables were selected from the NHES data set, including child characteristics, family demographics, school characteristics, the child's school experience, and parent satisfaction with school services. Preliminary multivariate linear regression models were created to screen potential predictors and the final multivariate linear regression model identified significant predictors of parental involvement. We consider how the correlates contribute to the evolution of the construct of parent involvement in children's learning.

**Keywords** Parent involvement · Home-based involvement · School-based involvement · Child characteristics · Family characteristics

Parent involvement in students' learning has been recognized as an important aspect of children's education. Parent involvement has been defined as "parents' interaction with schools and with their children to benefit their children's education success." (Hill et al. 2004, p. 1491). Activities that have been considered to represent parent involvement (Hill and Tyson 2009) include involvement at school (e.g., parent-teacher communication, attending school events, and volunteering at school), involvement at home (e.g., structured homework time and educational opportunities, monitoring schoolwork and academic progress), and academic socialization (e.g., communicating parents' expectations regarding schoolwork, encouraging educational and career goals, and preparation for future goals).

Parental involvement is empirically related to students' academic outcomes such as academic performance and engagement across middle and high school (Hill and Tyson 2009). Increased parental involvement is associated with gains in cognition and language and social-emotional development (USDHHS 2016) as well as children's self-esteem, emotional self-regulation, and self-perceptions of academic competence (Wang and Sheikh-Khalil 2014).

Differences in parent involvement are found to be related to family characteristics. Financial stability, parents' educational attainment, parents' mental health, secure housing, healthcare, and access to nutritious foods have been identified as predictors of children's school readiness and success (USDHHS 2016).

The goals of the present study were (1) to construct a measure of parent involvement in students' learning, using data from an existing national education-related survey, and (2) to investigate which child, family, and school characteristics were associated with variation in parent involvement.

---

✉ Donald P. Oswald  
doswald@vcu.edu

<sup>1</sup> School of Education, Virginia Commonwealth University, 1000 E. Marshall St., Box 980405, Richmond, VA 23298, USA

## Method

The 2012 National Household Education Surveys Program (NHES:2012) consists of the Early Childhood Program Participation (ECP) Survey and the Parent and Family Involvement in Education (PFI) Survey (McPhee et al. 2015). The ECP survey has a target population of children age 6 or younger who are not yet in kindergarten. The PFI survey has a target population of children and youth age 20 or younger who are enrolled in kindergarten through 12th grade in a public or private school or who are being homeschooled for the equivalent grades.

Because our interest was primarily school-age children, only the PFI survey data were included in the present analyses. Further, because the nature of parent involvement in children's learning is, by definition, different for homeschooled children, that group of subjects were excluded from the analyses. The homeschooled portion of the sample was relatively small ( $n = 397$ ).

The NHES Data File User's Manual describes the survey process as follows:

"The NHES:2012 was a two-phase survey conducted primarily by mail. The first phase of the survey was the administration of a short household screener questionnaire used to identify households with children under age 20. A total of 159,994 households were selected, and the response rate was 73.5%. The second phase of the survey was the collection of topical survey data from households with eligible children. The topical response rate was... 78.4% for the PFI survey. The overall response [rate] (the product of the screener response rate and the topical response rate) [was]... 57.6% for the PFI survey.... The PFI survey file contains data from surveys completed with the parents or guardians of 17,563 children age 20 or younger in kindergarten through 12th grade, including 17,166 students whose parents completed the PFI-Enrolled questionnaire for students enrolled in public or private school." (p. 1; MCPhee et al. 2015)

The NHES:2012 survey program was designed to provide nationally representative data, usable for research that would inform education policy. Households were randomly sampled from the 50 states and the District of Columbia and the survey was conducted from January through August 2012. No more than one child per household was included in the sample. The NHES:2012 oversampled Black and Hispanic households in order to produce more reliable estimates for subdomains defined by race and ethnicity. Survey data were weighted to account for differential probabilities of selection and to reduce potential bias owing

**Table 1** Parent/caregiver participation at the child's school

---

|                                                                                                                                           |
|-------------------------------------------------------------------------------------------------------------------------------------------|
| Since the beginning of this school year, has any adult in this child's household done any of the following things at this child's school? |
| a. Attended a school or class event, such as a play, dance, sports event, or science fair..                                               |
| b. Served as a volunteer in this child's classroom or elsewhere in the school.....                                                        |
| c. Attended a general school meeting, for example, an open house, or a back-to-school night.....                                          |
| d. Attended a meeting of the parent-teacher organization or association.....                                                              |
| e. Gone to a regularly scheduled parent-teacher conference with this child's teacher.....                                                 |
| f. Participated in fundraising for the school.....                                                                                        |
| g. Served on a school committee.....                                                                                                      |
| h. Met with a guidance counselor in person.....                                                                                           |

---

to nonresponse and differential coverage of subpopulations. (McPhee et al. 2015). Weighted data were used for the analyses included in the present study.

The NHES included a number of items and item sets related to parent involvement in their child's learning. Five groups of items were identified and extracted from the data set and were then transformed to create component variables, each with a value of 0 or 1, based on a median split of the data. The choice to use a median split reflects the fact that data from the groups of items were not normally distributed. Component variables were subsequently combined to construct a composite measure of parent involvement

The first component was based on a set of survey items related to parent or caregiver participation at the child's school (see Table 1); this 8-item set was similar to items in the PEELS survey (Markowitz et al. 2006). Each item was recoded (No = 0; Yes = 1) and a Participation at School variable was created that summed the scores for the eight items. The range for the Participation at School variable was 0–8 (mean = 4.22; SE = .022; median = 4). A new component variable, Participation at School—Median, was created based on a median split of these data and assigned the value of 0 (at or below the median) or 1 (above the median).

A second parent involvement component variable was drawn from a survey item related to parent/caregiver participation in school meetings or activities (i.e., "During this school year, how many times has any adult in the household gone to meetings or participated in activities at this child's school?"). Responses ranged from 0–99 with a median of 5. The component variable, Participation in Meetings—Median, was created based on a median split of these data and assigned the value of 0 (at or below the median) or 1 (above the median).

The third parent involvement component variable was based on seven survey items related to parent involvement

**Table 2** Learning activities at home

|                                                                                        |
|----------------------------------------------------------------------------------------|
| In the past week, has anyone in your family done the following things with this child? |
| a. Told him/her a story                                                                |
| b. Done activities, like arts and crafts, coloring, painting, pasting, or using clay   |
| c. Played board games or did puzzles with him/her                                      |
| d. Worked on a project like building, making or fixing something                       |
| e. Played sports, active games, or exercised together                                  |
| f. Discussed with him/her how to manage time                                           |
| g. Talked with him/her about the family's history or ethnic heritage                   |

**Table 3** Learning activities in the community

|                                                                                                  |
|--------------------------------------------------------------------------------------------------|
| In the past month, has anyone in your family done the following things with this child?          |
| a. Visited a library                                                                             |
| b. Visited a bookstore                                                                           |
| c. Gone to a play, concert, or other live show                                                   |
| d. Visited an art gallery, museum, or historical site                                            |
| e. Visited a zoo or aquarium                                                                     |
| f. Attended an event sponsored by a community, religious, or ethnic group                        |
| g. Attended an athletic or sporting event outside of school in which this child was not a player |

with child learning activities at home (see Table 2). Each item was recoded (No = 0; Yes = 1) and a Learning Activities at Home variable was created that summed the scores for the seven items. The range for the Learning Activities at Home variable was 0–7 (mean = 4.09; SE = .020; median = 4). The component variable, Learning Activities at Home—Median, was created based on a median split of these data and assigned the value of 0 (at or below the median) or 1 (above the median).

A fourth parent involvement variable was based on survey items related to parent involvement with child learning activities in the community (see Table 3). Each item was recoded (No = 0; Yes = 1) and a Learning Activities in the Community variable was created that summed the scores for the seven items. The range for the Learning Activities in the Community variable was 0–7 (mean = 2.45; SE = .019; median = 2). The component variable, Learning Activities in the Community—Median, was created based on a median split of these data and assigned the value of 0 (at or below the median) or 1 (above the median).

The final component variable was related to parent involvement in homework. The variable, Parent Involvement in Homework, was based on three survey items.

**Table 4** Aspects of parent involvement: Correlation matrix

|                                           | PS     | PM     | LH     | LC     |
|-------------------------------------------|--------|--------|--------|--------|
| Participation at School (PS)              | –      |        |        |        |
| Participation in Meetings (PM)            | 0.4770 |        |        |        |
| Learning Activities at Home (LH)          | 0.3085 | 0.1395 |        |        |
| Learning Activities in the Community (LC) | 0.3730 | 0.2259 | 0.4503 |        |
| Parent Involvement in Homework (PH)       | 0.2319 | 0.0588 | 0.3896 | 0.2241 |

The first item, “Is there a place in your home that is set aside for this child to do homework?” was recoded as 0 (“No” or “Child does not do homework at home”) or 1 (“Yes”). The second item, “How often does any adult in your household check to see that this child’s homework is done?” was recoded as 0 (“Never”/“Rarely”/“Sometimes”) or 1 (“Always”). The third item, “During this school year, about how many days in an average week does anyone in your household help this child with his/her homework?” was recoded as 0 (“Less than once a week” “Never”) or 1 (“1 to 2 days a week” “3 to 4 days a week” “5 or more days a week”). These three items were summed to create the Parent Involvement in Homework variable with a range of 0–3 (mean = 2.22; SE = .010; median = 2). The component variable, Parent Involvement in Homework—Median, was created based on a median split of these data and assigned the value of 0 (at or below the median) or 1 (above the median).

These five parent involvement component variables were taken to represent distinct but related aspects of parents’ involvement in children’s learning. A correlation matrix (see Table 4) indicates the extent to which the variables were inter-related.

A composite Parent Involvement in Children’s Learning (PICL) variable was created as the sum of the five median-split component variables; thus, PICL ranged from 0–5 (mean = 2.25; SE = .017; median = 2). PICL was created as a measure of parent involvement in children’s learning that incorporated each of the aspects of parent involvement included in the survey, and weighting them equally.

### Correlates of Parent Involvement

The PFI survey instrument was scrutinized to identify potential correlates of parent involvement, based on a review of the literature. Potential correlates were grouped conceptually into the following categories: (a) Child characteristics; (b) Family demographics; (c) School characteristics; (d) Child’s school experience; (e) Parent satisfaction. The variables included in each category are listed in Table 5.

**Table 5** Logistic regression results

| predictor variable                                                                                                                                                     | Significant in preliminary models | Significant in final model |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|----------------------------|
| a. Child characteristics:                                                                                                                                              |                                   |                            |
| Child sex                                                                                                                                                              | X <sup>a</sup>                    | X                          |
| Child race/ethnicity (White/Black/Hispanic/Other)                                                                                                                      | X                                 | X                          |
| Child's grade in school (K-12)                                                                                                                                         | X                                 | X                          |
| Child's health                                                                                                                                                         | X                                 | X                          |
| Child's disability status                                                                                                                                              | X                                 | X                          |
| b. Family demographics:                                                                                                                                                |                                   |                            |
| Respondent parent's sex                                                                                                                                                | — <sup>b</sup>                    | —                          |
| Parent relationship (biological/step/adoptive/foster/grandparent)                                                                                                      | X                                 | —                          |
| Marital status (Married/Domestic partnership or civil union/Living with a partner/Separated/Divorced/Widowed/Never married)                                            | X                                 | —                          |
| Parent education level (Less than HS diploma/HS diploma/less than Bachelor's degree/less than Master's degree/graduate degree)                                         | X                                 | X                          |
| Household income                                                                                                                                                       | —                                 | —                          |
| Parent employment status (Employed for pay or income/Self-employed/Unemployed or out of work/Full-time student/Stay at home parent/Retired/Disabled or unable to work) | X                                 | X                          |
| c. School characteristics:                                                                                                                                             |                                   |                            |
| School size                                                                                                                                                            | X                                 | X                          |
| Child attends public school (vs. private school)                                                                                                                       | X                                 | X                          |
| Child attends regularly assigned school                                                                                                                                | X                                 | X                          |
| d. Child's school experience:                                                                                                                                          |                                   |                            |
| Child enjoying school                                                                                                                                                  | X                                 | X                          |
| Child getting better grades in school                                                                                                                                  | X                                 | —                          |
| Number of absences                                                                                                                                                     | X                                 | —                          |
| Child repeated any grade                                                                                                                                               | X                                 | —                          |
| Child had in-school suspension                                                                                                                                         | X                                 | —                          |
| Child had out-of-school suspension                                                                                                                                     | —                                 | —                          |
| Child had been expelled from school                                                                                                                                    | —                                 | —                          |
| e. Parent satisfaction:                                                                                                                                                |                                   |                            |
| Parent satisfaction with school                                                                                                                                        |                                   |                            |
| Parent satisfaction with teacher                                                                                                                                       | X                                 | —                          |
| Parent satisfaction with how school interacts with parents                                                                                                             | X                                 | X                          |
| Parent satisfaction with academic standards of the school                                                                                                              | —                                 | —                          |
| Parent satisfaction with order and discipline at the school                                                                                                            | —                                 | —                          |

<sup>a</sup> "X" =  $p < .01$ <sup>b</sup> "—" = NS

## Statistical Analyses

All models were created using the Stata 13.1 survey data analysis linear regression procedure which is appropriate to the complex sampling schema employed for the NHES survey.

Parent Involvement in Children's Learning (PICL) was the dependent variable and potential correlates were entered

as predictor variables in linear regression models. Because of the large number of predictor variables considered, the level of statistical significance was set at  $p < .01$ .

Each group of potential predictors was first run in a separate, preliminary regression model. Significant predictor variables from each preliminary regression model were then combined in a final model.

## Results

### Child Characteristics Model

In the multivariate model including all child characteristics ( $F(18, 16,515) = 94.63$ ;  $p = 0000$ ;  $R^2 = .164$ ), all predictor variables were significantly related to parent involvement (see Table 5). The predicted level of parent involvement was greater for girls than for boys; compared to parents of White children, parents of Hispanic children had less involvement in their child's learning. Parents of kindergarten through fourth grade did not differ in level of parent involvement but, compared to parent of kindergarten students, parents of children in grades 5–12 had lower parent involvement. Parents had more involvement if their child's health was better and less if the child had a disability.

### Family Demographics Model

In the multivariate model including all demographic predictor variables, parent-type was a significant predictor of PICL ( $F(23, 16,510) = 28.17$ ;  $p = 0000$ ;  $R^2 = .067$ ); compared to biological parents, step-parents had lower parent involvement (see Table 5). Marital status of the responding parent was a significant predictor of PICL; compared to married parents, responding parents who were divorced had lower parent involvement. Parent education was a significant predictor of PICL; compared to parents without a high school diploma, all other parents had greater parent involvement and the predicted level of PICL was greater for each successive level of parent education. Parent employment status was a significant predictor of PICL; compared to responding parents who were employed, stay-at-home parents had greater parent involvement. Nonsignificant predictors among the demographic variables were the responding parent's sex, and household income.

### School Characteristics Model

In the multivariate model including all school/school choice variables ( $F(6, 16,448) = 133.58$ ;  $p = 0000$ ;  $R^2 = .073$ ), all of the variables were significant predictors of PICL (see Table 5). Compared to parents of children in schools of less than 300 students, parents of students in schools with over 1000 students were less involved. Compared to parents of children in private schools, parents of children in public school had lower parent involvement. Parents of children that did not attend their regularly assigned school had greater parent involvement, compared to parents of children who did attend their regularly assigned school.

### Child's School Experience Model

In the multivariate model including all child's school experience variables ( $F(10, 16,523) = 65.02$ ;  $p = 0000$ ;  $R^2 = .072$ ), parents of children thought to be enjoying school, children with higher grades, children with fewer absences, children who had not repeated any grades, and children who had not had an in-school suspension were more likely to be involved in their child's learning (see Table 5). Nonsignificant predictors among the child's school experience variables were: the child having experienced expulsion or out-of-school suspension.

### Parent Satisfaction Model

In the multivariate model including all parent satisfaction variables ( $F(5, 16,528) = 51.28$ ;  $p = 0000$ ;  $R^2 = .033$ ), greater parent involvement with children's learning was associated with being more satisfied with the child's current teacher, and being more satisfied with how school staff interacts with parents. Nonsignificant predictors among the parent satisfaction variables were: parent satisfaction with the school the child attends this year, parent satisfaction with academic standards of the school, and parent satisfaction with order and discipline at the school.

### Final Model

A final model of predictors of parent involvement ( $F(55, 16,399) = 56.76$ ;  $p = 0000$ ;  $R^2 = .229$ ) combined all significant predictors from the preliminary models (see Table 5). In the final model, as in the preliminary model the predicted level of parent involvement was greater for girls than for boys; compared to parents of White children, parents of children in the Other race/ethnicity category had less involvement in their child's learning. Parents of kindergarten through fourth grade did not differ in level of parent involvement but, compared to parent of kindergarten students, parents of children in grades 5–12 had lower parent involvement. Parents had more involvement if their child's health was better and less if the child had a disability. Parent education was a significant predictor of PICL; compared to parents without a high school diploma, all other parents had greater parent involvement and the predicted level of PICL was greater for each successive level of parent education. Parent employment status remained a significant predictor of PICL; compared to responding parents who were employed, parents who were self-employed or stay-at-home parents had greater parent involvement.

School/school choice variables continued to be significant predictors: Compared to parents of children in schools of less than 600 students, parents of students in schools with over 600 students were less involved.



Compared to parents of children in private schools, parents of children in public school had lower parent involvement. Parents of children that did not attend their regularly assigned school had greater parent involvement, compared to parents of children who did attend their regularly assigned school.

Parents of children thought to be enjoying school were more likely to be involved in their child's learning. Greater parent involvement with children's learning was associated with being more satisfied with how school staff interacts with parents.

Parent type and parent marital status were not significant predictors in the final model. Children's grades no longer predicted parent involvement, nor did absences, repeating a grade, in-school suspension, or satisfaction with the child's current teacher.

## Discussion

Parent involvement in students' learning is a complex construct involving a variety of parental actions and attitudes. The parent involvement outcome variable created for the present study combined several measures of parent behaviors, including parent participation at school, and learning related activities at home and in the community. The variable is a composite of information in the NHES data set that most obviously reflects parent involvement. The creation of the variable reflects a decision to weight the various aspects of involvement equally, a decision that sought to avoid arbitrary emphasis on any single aspect.

The validity of the parent involvement measure employed in the present study is supported, to some extent, by the observed relationships with predictor variables previously found to be associated with the construct. For example, the finding that parent involvement was related to a range of family demographic characteristics was consistent with existing literature; for example, Peña (2000) also found that parent involvement was influenced by, among other factors, parent educational level. Parents with less education may not have the same level of knowledge and confidence related to their child's education. Those without a high school diploma may not feel comfortable with the material that their children are learning.

Child characteristics have also previously been found to be associated with parent involvement. For example, Hickman et al. (1995) reported that female students had parents who were more involved their education. This relationship seems likely to be largely culturally driven, reflecting current values and expectations in the United States, and cannot be assumed to apply in other countries.

The finding that parental involvement is greatest for students in the lower grades is unsurprising but has not been

consistently reported; Hickman et al. (1995) reported that involvement was greater for students in grades 9 and up. However, parents of students in higher grades typically have fewer opportunities to be engaged in the classroom and are less likely to support their children in the completion of academic assignments. Indeed, older students, wanting more independence, may urge their parents to refrain from involvement in their school life.

The finding that parents had more involvement if their child's health was better and less if the child had a disability is somewhat counterintuitive; children with special health care needs might be thought to require more coordination between parents and school personnel, or their parents might be expected to take more concern to be aware of and involved with their education. On the other hand, children with disabilities may require substantially more engagement in health care activities, resulting in less available time and energy for parental involvement in education-related activities.

However, the types of activities that are constitute parent involvement, at least in the data set used for the present study, might also introduce a systematic disadvantage for families of children with disabilities. These families might, for example, be less likely to have "Attended a school or class event, such as a play, dance, sports event, or science fair" if the child's disability makes participation in such events more difficult. Although one might expect children with disabilities to engage in as many, or more, learning activities in the home, the activities specified in the survey items may be more accessible to families of typically-developing children. Similarly, the specified "Learning activities in the community" may not be as open to, or as appropriate for, some children with disabilities. The education of children with disabilities seemingly pulls strongly for parent involvement but the activities reflecting such involvement may be quite different than for most children in general education. The possibility of such unintended bias in the survey items raises the possibility that current definitions of parent involvement in children's learning should be designated as limited to children without special health care or education needs; alternate definitions might be put forward for the families of children with disabilities.

Lower parental involvement among divorced parents may reflect the fact that single parents are more likely to have limited time to participate in school activities or to support their child's education with home and community activities. A similar limitation may underlie the finding that stay-at-home parents are more involved in their child's education, compared to employed parents; while not surprising, the finding raises some challenging questions of social value in light of the increase in maternal participation in the labor force (U.S. Bureau of Labor Statistics 2015). At the same time, it is also possible that the types of activities that have been considered parent involvement may



disadvantage single parents and families with two working parents, who may find other ways to support their child's learning, not reflected in current definitions.

This finding that step-parents are less involved may be related to step-parents' perceptions of their role in the family. Parents living in a stepfamily household may have conflicting ideas about how involved a step-parent should be and what role they should play in their stepchild's life. Stepchildren's perceptions are also likely to play a role; children may characterize the role of a step-parent as a "friend" rather than a "parent" (Fine et al. 1998) and involvement with children outside of the current marriage may also limit a step-parent's participation in their stepchild's education (Downey 1995).

The finding that greater parent involvement with children's learning was associated with greater satisfaction with how school staff interacts with parents is consistent with other research. Henderson and Mapp (2002) reported that school factors, specifically those that are relational in nature, have a major impact on parents' involvement. When school staff engage in caring and trusting relationships with parents and recognize parents as partners in the educational development of children, the relationships enhance parents' motivation to be involved and influence how actively they participate in their children's educational development. Walker et al. (2005) reported that parents' perceptions of invitations for involvement from the school, specific teachers, and the child affect their level of involvement. This suggests that schools can foster, or undermine, positive perceptions by the manner in which they invite participation from parents.

School characteristics are also associated with parent involvement. The fact that parents are more involved in smaller schools may be in part a function of the school's desire and ability to recruit parent participation in school events. Parents that enroll their children in private school are likely to hold specific values that relate to their choice of school, and some of those values may also contribute to involvement in the child's education.

Satisfaction with the child's current teacher and with how school staff interacts with parents likely contributes to parents' motivation to interact with school personnel, an essential component of parent involvement. Mapp (2002) observed that parents respond to a culture that welcomes, honors, and connects them by participating in their children's education and by becoming loyal members of the school community.

## Limitations

The present study reflects conceptually based decisions regarding the components of parent involvement in children's learning, and regarding how those components are

weighted in a composite measure of involvement. While the method employed here shows promise in light of the findings, it is clear that other decisions might lead to different results.

Some models of parent involvement in children's learning incorporate actions by the school as well. It is clear that school policy and practice can affect parent involvement significantly; however, such school variables were excluded from the present study in a choice to concentrate on child and family characteristics and activities.

As noted above, the items identifying specific activities that reflect parent involvement may systematically disadvantage subgroups of children and families. Questions about the nature and impact of parent involvement may require a reconceptualization and alternate definitions for those subgroups.

Technology innovations were not addressed in the survey and may be an important means to increase parent involvement and overcome some of the barriers to involvement suggested by present findings. Some schools have implemented technology systems that provide parents with information about assignments and extracurricular opportunities as well as their child's academic performance. Other technology innovations may make it possible for parents to participate virtually in meetings and school activities when they are unable to be physically present. While such systems might be expected to increase parent involvement by offering more information about their child's education and making communication easier, the effects of such innovations with respect to parent involvement as conventionally conceptualized are largely unknown.

Considerable research has demonstrated the value of parent involvement at all levels of education. Child, family, and school characteristics associated with parent involvement offer clues about how to increase it; for example, extra effort that avoids condescension and paternalism may be required to engage parents who have less education. Approaches that demonstrably increase the amount of parent involvement in their child's learning will prove a sound investment in terms of parent satisfaction and child educational outcomes.

**Funding** Support for this project was provided in part by the Virginia Leadership Education in Neurodevelopmental Disabilities program, with funding from the Maternal and Child Health Bureau (T73MC00040).

## Compliance with Ethical Standards

**Conflict of Interest** The authors declare that they have no competing interests.

**Ethical Approval** This article does not contain any studies with human participants performed by any of the authors.

## References

- Downey, D. B. (1995). Understanding academic achievement among children in stephouseholds: The role of parental resources, sex of stepparent, and sex of child. *Social Forces*, 73, 875–894.
- Fine, M. A., Coleman, M., & Ganong, L. H. (1998). Consistency in perceptions of the step-parent role among step-parents, parents and stepchildren. *Journal of Social and Personal Relationships*, 15, 810–828.
- Henderson, A. T., & Mapp, K. L. (2002). *A new wave of evidence: The impact of school, family, and community connections on student achievement*. Austin, TX: Southwest Educational Development Laboratory.
- Hickman, C. W., Greenwood, G., & Miller, M. D. (1995). High school parent involvement: Relationships with achievement, grade level, SES, and gender. *Journal of Research & Development in Education*, 28, 125–134.
- Hill, N. E., Castellino, D. R., Lansford, J. E., Nowlin, P., Dodge, K. A., Bates, J. E., & Pettit, G. S. (2004). Parent academic involvement as related to school behavior, achievement, and aspirations: Demographic variations across adolescence. *Child Development*, 75, 1491–1509. <https://doi.org/10.1111/j.1467-8624.2004.00753.x>.
- Hill, N. E., & Tyson, D. F. (2009). Parental involvement in middle school: A meta-analytic assessment of the strategies that promote achievement. *Developmental Psychology*, 45, 740–763. <https://doi.org/10.1037/a0015362>.
- Mapp, K.L. (2002). Having their say: Parents describe how and why they are involved in their children's education. Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, LA.
- Markowitz, J., Carlson, E., Frey, W., Riley, J., Shimshak, A., Heinzen, H., Strohl, J., Lee, H., & Klein, S. (2006). *Preschoolers' characteristics, services, and results: Wave 1 overview report from the preelementary education longitudinal study (PEELS)*. Rockville, MD: Westat. [www.peels.org](http://www.peels.org).
- McPhee, C., Bielick, S., Masterton, M., Flores, L., Parmer, R., Amchin, S., Stern, S., & McGowan, H. (2015). *National household education surveys program of 2012: Data file user's manual (NCES 2015-030)*. Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.
- Peña, D. C. (2000). Parent involvement: Influencing factors and implications. *The Journal of Educational Research*, 94, 42–54. <https://doi.org/10.1080/00220670009598741>.
- U.S. Bureau of Labor Statistics (December 2015). *Women in the labor force: A databook, Report 1059*. <https://www.bls.gov/opub/reports/womens-databook/archive/women-in-the-labor-force-a-databook-2015.pdf>
- USDHHS (2016). *Policy statement on family engagement: From the early years to the early grades*. U.S. Department of Health and Human Services; U.S. Department of Education. <https://www2.ed.gov/about/initiatives/earlylearning/files/policy-statement-on-family-engagement.pdf>
- Walker, J. M. T., Wilkins, A. S., Dallaire, J. R., Sandler, H. M., & Hoover-Dempsey, K. V. (2005). Parental involvement: Model revision through scale development. *The Elementary School Journal*, 106, 85–104.
- Wang, M., & Sheikh-Khalil, S. (2014). Does parental involvement matter for student achievement and mental health in high school? *Child Development*, 85, 610–625. <https://doi.org/10.1111/cdev.12153>.



# No Parent Left Behind: Predicting Parental Involvement in Adolescents' Education Within a Sociodemographically Diverse Population

SIRA PARK

SUSAN D. HOLLOWAY

University of California, Berkeley

**ABSTRACT.** Numerous studies have investigated the utility of the Hoover-Dempsey and Sandler (HDS) model for predicting parents' involvement in students' education. Yet, the model has yet to be thoroughly evaluated with respect to youth who are (a) in high school and (b) from sociodemographically diverse families. Using a nationally representative sample of 3,248 parents drawn from the 2007 National Household Educational Survey, the authors examined the relationship of high school outreach efforts, parent satisfaction with the school, and parental beliefs to 3 types of parent involvement. The analysis largely confirmed the power of the HDS model. Furthermore, the findings suggest that school outreach efforts are particularly important in promoting historically disenfranchised parents' involvement in the schools, whereas enhancing parenting self-efficacy is crucial for supporting their engagement at home.

**Keywords:** adolescence, parent involvement, parental beliefs, school outreach efforts

Parents' involvement in their children's schooling has long been believed to promote a range of positive child outcomes, including academic achievement, engagement in schoolwork, and lower dropout rates (Jeynes, 2007; Yan & Lin, 2005). Because of these benefits, a great deal of research and policy-making activity has been dedicated to increasing parental involvement. Supporting parental involvement was one of the six central goals of the Bush administration's No Child Left Behind Act of 2001 (2002) and has also received the support of President Obama, who declared that

[t]here is no program or policy that can substitute for a mother or father who will attend those parent-teacher conferences or help with the homework or turn off the TV, put away the video games, read to their child. Responsibility

for our children's education must begin at home. (Obama, 2009)

Despite the professed intentions of policymakers to boost parental involvement, it is clear that not all parents are able or willing to be involved. A number of studies have found that in general, low-income and/or ethnic/racial minority parents are less likely than other parents to participate in some forms of involvement in their children's schooling (Lee & Bowen, 2006; Wong & Hughes, 2006). However, relatively few studies have examined why socioeconomic status and race/ethnicity are associated with parental involvement, and hence researchers lack a clear idea as to the processes that account for the differences that have been observed (Hill et al., 2004).

Furthermore, relatively little is known about parental involvement during the adolescent period. Given that the developmental needs of children change dramatically during adolescence, parenting practices that were helpful when their children were young may lose their effectiveness as they become more mature. Additionally, the changes in the school context that accompany matriculation into high school necessitate new forms of parental engagement (Hill & Tyson, 2009).

The purpose of our analyses was to address these gaps in the literature by identifying the factors that promote parental involvement in their adolescent children's education across a variety of racial/ethnic and sociodemographic groups within a nationally representative sample. Our starting premise was that parents draw upon culturally available

---

*Address correspondence to Sira Park, School of Education, University of California, Berkeley, 4312 Tolman Hall, Berkeley, CA 94720, USA. (E-mail: sirapark@berkeley.edu)*

forms of involvement that are relevant and potentially useful given the current circumstances and contexts that they and their children face in their daily lives (Reese & Gallimore, 2000). Thus, we expected that parents in historically disenfranchised racial/ethnic groups, who may experience ongoing mistrust and perception of unfair treatment within the schools, may be more likely to be engaged in home-based activities and less involved at the school site than their more advantaged counterparts. We also sought to explore the ways in which race/ethnicity and socioeconomic status (SES) moderated the relationship of parental involvement to school outreach efforts as well as parents' beliefs and self-evaluations concerning their role. We hypothesized that for historically disenfranchised groups, it may be particularly important for schools to engage in outreach efforts in order to encourage them to become involved at the school site.

#### *Parent Involvement During Adolescence: Definition and Dimensions*

Parent involvement is usually defined as parents' interactions with children and schools that are intended to promote academic achievement. Epstein (1987) identified six basic categories of parent involvement: parenting, communicating with the school, volunteering at the school, facilitating children's learning at home, participating in decision making at the school, and collaborating within the community to improve the education system. These six categories are often operationalized in terms of two basic dimensions: participation at home and at the school site.

Studies have consistently shown that parental involvement at the school site tends to decline as children move into the middle and high school years (Green, Walker, Hoover-Dempsey, & Sandler, 2007; Spera, 2005). Scholars have argued that this notable decrease in parent involvement is due to normative developmental changes during adolescence. As students become more autonomous, they may have little desire for their parents to be engaged in school activities (Stevenson & Baker, 1987) or supervise their academic work (Seginer, 2006). Dramatic cognitive changes also boost students' sense of autonomy, ability to make decisions, and coordination of multiple goals, thereby enabling them to play an increasingly active role in their own education (Falbo, Lein, & Amador, 2001). As a result, the direct forms of parental involvement that may be necessary when children are young become less relevant and less effective as they grow older.

In addition, parents experience changes in their own capabilities regarding support for their adolescents' education. As the curriculum becomes more advanced, many parents feel less able to assist with their children's homework (Hill & Tyson, 2009). As the parent-child relationship becomes less hierarchical and more bidirectional, new forms of interaction based on discussion and negotiation come into play (Smetana, 2011; Stone, 2006).

Furthermore, the high school setting itself complicates parents' direct involvement at school sites. The size and complexity of the high school context can present a challenge to parents' involvement, making it difficult for them to know how to be effectively involved (Hill & Craft, 2003).

However, while parents of high school students may be less involved than parents of younger children at the school site, such declines do not necessarily mean that they are (or should be) less involved at home (Larson & Richards, 1995). Hill and Tyson (2009) used the term *academic socialization* to characterize the forms of parental involvement that become increasingly frequent during children's adolescent years. Academic socialization entails parents' communicating expectations regarding grades, fostering educational and vocational aspirations, discussing learning strategies, and helping formulate plans for the future. Academic socialization is an effective form of parent involvement as it affirms adolescents' developmental need for autonomy while continuing to support their need for relatedness. In an empirical study of 463 middle school students, Hill and Tyson found that parents' academic socialization was more strongly linked to achievement than was home- or school-based involvement.

In the present study, we focus on one particular element of academic socialization, namely parental expectations regarding their children's future schooling. Among all of parents' academic socialization practices, parental expectations are perhaps the most powerful. Meta-analyses undertaken by Jeynes (2005, 2007) found exceptionally high effect sizes for the relation of parental expectations to achievement of secondary school students (.88) compared with the effect sizes for other parent involvement practices such as checking homework (.38). Additionally, although the effect sizes for many indicators of parent involvement decrease from the elementary school to secondary school years, the impact of parental expectations becomes stronger as children enter high school. Yet, although parental expectations are generally predictive of achievement, the literature—much of it based on studies of young children and their parents—suggests that the power of this construct differs depending on the race or ethnicity of the student. Furthermore, the factors that predict parental expectations also differ across racial and ethnic groups (Yamamoto & Holloway, 2010).

In our study, we extend the work on parental expectations by examining how they are related to family race/ethnicity and social class background, school outreach, and parental beliefs about their role and capabilities of providing support. These factors have all been identified by Hoover-Dempsey and Sandler, whose model of the determinants of parental involvement we describe in the subsequent section.

#### *Influences on Parent Involvement: Hoover-Dempsey and Sandler's Model*

Given that parental involvement remains important as children enter their high school years, it is important to

understand who becomes involved and why they become involved. To date, the most comprehensive theoretical model of the psychological processes predicting parental involvement is that of Hoover-Dempsey and her colleagues (Hoover-Dempsey & Sandler, 1997; Hoover-Dempsey, Ice, & Whitaker, 2009). According to the Hoover-Dempsey and Sandler (HDS) model, parents' decision to become involved is based on three general factors: (a) parents' beliefs that participating in their children's learning is a part of their responsibility (i.e., parental role construction) and their evaluation of their capabilities in that regard (i.e., parenting self-efficacy), (b) parents' perception of invitations or demands from schools and teachers and from their children to be involved, and (c) demands on parents' time and energy that may conflict with involvement activities (e.g., caring for other children, extended family responsibilities, demanding or inflexible work schedules).

Existing research testing the utility of the HDS model has confirmed its significant power to predict parental involvement at the elementary school level (Anderson & Minke, 2007; Martinez-Lora & Quintana, 2009; Reed, Jones, Walker, & Hoover-Dempsey, 2000). Additionally, two studies testing the HDS model with parents of early adolescents have found support for its extension to older students. Specifically, Deslandes and Bertrand (2005) found that parents' role construction and parents' perceptions of invitation from the teachers predicted parent involvement at the seventh and ninth grade level. Green et al. (2007) found that parent involvement at the school site was predicted by invitations from the teachers, parental role construction, parenting self-efficacy, and invitation to participate from their sixth-grade children. Parental involvement at home was predicted by all of these factors except invitations from teachers.

In addition to research based on the HDS model, other studies have focused on the vital role of school-teacher outreach in promoting parent involvement during adolescence. For instance, analyses conducted with 11,000 parents of high school seniors participating in the National Educational Longitudinal Study of 1988 (U.S. Department of Education, National Center for Education Statistics, 1988) revealed that school outreach practices (e.g., keeping parents informed regularly about student progress, class rules, expectations, and current activities) were more strongly associated with parental involvement than were parent education, family size, and marital status (Simon, 2004; see also Sanders, Epstein, & Connors-Tadros, 1999). Despite the critical role of school outreach efforts in promoting parent involvement, high school teachers report less outreach to and more mistrust of parents than do their elementary school counterparts (Stone, 2003).

In summary, in the present study we examined the key elements of the HDS model and tests their power in predicting developmentally appropriate forms of parental involvement in support of the school achievement of adolescents.

### *The Role of Race/Ethnicity and SES in Parent Involvement*

Research suggests that parents from particular racial or ethnic groups tend to demonstrate specific patterns of involvement depending on the dimension of parent involvement under consideration (Lareau & Horvat, 1999; Lopez, 2001; Peña, 2000). Latino parents consistently endorse the importance of education (Lopez, 2001) but may express lower expectations concerning their future achievement than do parents in other groups (Hao & Bonstead-Bruns, 1998; Vartanian, Karen, Buck, & Cadge, 2007; Yamamoto & Holloway, 2010). Black parents have frequently been found to hold significantly higher expectations than European American parents after controlling for SES (Glick & White, 2004; Hao & Bonstead-Buns; for an exception, see Suizzo & Stapleton, 2007). Whereas Black parents report less involvement at school than did White parents, they describe having similar or greater levels of involvement at home than do either White or Latino parents (Moles, 1993; Sheldon, 2002; Yan & Lin, 2005).

However, such generalizations about ethnic and racial differences are potentially misleading, as it is clear that parental involvement are also associated with such confounding structural elements as language capabilities (Yamamoto & Holloway, 2010). Parents who do not speak English or who are not familiar with the educational system in the United States may find it difficult to participate at the school site (García Coll & Marks, 2009; Suárez-Orozco & Suárez-Orozco, 2001). For instance, Wong and Hughes (2006) found that while White and Black parents reported more frequent communication with the school and more shared responsibility than did Latino parents, Spanish-speaking Latino parents were particularly likely to report lower levels of these forms of involvement. Second, there may be cultural differences in perceptions of parental roles such that some groups construe their role as pertaining to socialization at home rather than being active at the school site (Chavkin, 1993; Goldenberg & Gallimore, 1995; Scribner, Young, & Pedroza, 1999). Third, for parents of stigmatized minority groups, perceptions of racial discrimination and mistrust of school personnel may lead to less frequent participation at the school site (Lareau & Horvat, 1999).

It is also likely that ethnic/racial differences in parent involvement are partially attributable to confounding differences in SES. White families are more likely to have better access to material resources, higher quality schools, and extensive social networks with connections to the educational establishment (Hill et al., 2004; Lareau, 2003). However, research devoted to disentangling the effects of race/ethnicity and SES has revealed somewhat contradictory findings. While the influential work of Entwistle and Alexander (1996) seemed to indicate that SES was the primary driver of variability in parent involvement, subsequent studies indicate that race/ethnicity and SES each have a unique effect on parent involvement (e.g., Desimone, 2000;

Lee & Bowen, 2006). Thus, the influence of racial/ethnic group membership can be overestimated if mediating family factors, such as household income or parent education, are not taken into account.

### *The Present Study*

The aim of this study was to extend the HDS model by exploring forms of parent involvement specifically suited to adolescents. Our study further contributes to this emerging literature by investigating distinctive patterns of parent involvement across diverse SES and racial/ethnic groups, and thus has the potential to move the field farther away from a one size fits all approach to understanding and working with diverse populations (García Coll & Marks, 2009). Specifically, we explored three research questions:

*Research Question 1:* What are the key dimensions of parent involvement during this age period and are there racial/ethnic and SES differences across these dimensions of parent involvement?

*Research Question 2:* To what extent do parent sociodemographic variables (i.e., race/ethnicity, primary language, household income level), together with perceptions of school outreach efforts (i.e., school staff willingness to engage in informative communication with parents and to create a welcoming climate), parent satisfaction with the school, and parental motivational beliefs (i.e., parenting self-efficacy and parental role construction) predict distinctive dimensions of parental involvement?

*Research Question 3:* Do parents' sociodemographic characteristics moderate the relationship of school outreach efforts, parent satisfaction, and parental motivational beliefs to parental involvement practices?

## **Method**

### *Data*

Our analyses drew from the Parent and Family Involvement in Education Survey of the 2007 National Household Education Surveys Program (PFI-NHES:2007; U.S. Department of Education, National Center for Education Statistics, 2007). The NHES data was developed by the National Center for Education Statistics and obtained from a nationally representative of families with a child enrolled in kindergarten through Grade 12. The sample was selected using the random-digit-dial method. Participating parents or guardians were interviewed by telephone. In total, 10,681 interviews were completed. In PFI-NHES:2007, information was collected about the characteristics of one mother in the household (if any) and one father in the household (if any). If there were no parents in the household, data were collected from the child's guardian. Data on the characteristics of the children's schools were also obtained from parents (for additional information on this dataset, see <http://nces.ed.gov/nhes/index.asp>).

For our analyses, we selected all Black, White, and Latino participants who reported having a child in high school. There was not enough data on Asian, Pacific Islander, and Native American families to include them in our analyses. We dropped 134 cases in which the respondent did not specify mother's education level. The resulting sample contained 3,248 respondents, of whom 71% were White, 12% were Black, and 17% were Latino. See Table 1 for participants' demographic information.

### *Measures*

*School outreach efforts and parent satisfaction.* Participants were asked to rate their perception of school outreach efforts and school satisfaction with a set of 12 questions (see Table 2). A 4-point Likert-type scale was used for all of the items, ranging from 1 (*does it very well or very satisfied*) to 4 (*doesn't do it at all or very dissatisfied*). For data reduction purposes, we conducted an exploratory factor analysis (varimax rotation). Factors with an eigenvalue greater than 1 were retained, yielding a three-factor solution. Items with factor loadings greater than .5 were retained. Table 2 shows the question wording and factor loading for each item. We created two composites (informative communication, satisfaction with school) by summing the raw scores of all relevant items (Cronbach's  $\alpha = .78$  and  $.80$ , respectively). The third factor, welcoming environment, was represented by a single item.

*Parental motivational beliefs.* To assess parenting self-efficacy, parents were asked to rate how confident they were in helping with their child's school work. The parental role construction score was measured from the sum of two questions, one asking to what extent the respondent thought it was the parents' responsibility to teach their children to value education and success in school and one asking to what extent it was the parents' responsibility to attend meetings with teachers or other school staff. These questions had a 4-point Likert-type scale ranging from 1 (*strongly agree*) to 4 (*strongly disagree*). The correlation between these two items was .54.

*Parent involvement.* Parents were asked to rate their degree of involvement in their children's schooling on 12 items. Exploratory factor analysis revealed three factors: school-based involvement, homework monitoring, and educational expectations and college planning. Composites were formed by summing the raw scores of all items in each factor. For the school-based involvement composite, parents reported on their attendance at school meetings, parent-teacher conferences, PTA meetings, and school events, and their engagement in volunteer activities at the school. For the homework involvement composite, parents reported whether their children had a designated place to study, whether parents had established rules about homework, and whether parents checked homework. For the educational expectations and college planning composite, parents reported on their



TABLE 1. Participants' Demographic Characteristics According to Racial/Ethnic Group

| Variable                       | All parents |      | White |      | Black |      | Latino |      |
|--------------------------------|-------------|------|-------|------|-------|------|--------|------|
|                                | n           | %    | n     | %    | n     | %    | n      | %    |
| Relationship to focal child    |             |      |       |      |       |      |        |      |
| Mother                         | 2,369       | 72.9 | 1,689 | 73.3 | 265   | 69.6 | 414    | 73.5 |
| Father                         | 683         | 21.0 | 529   | 23.0 | 52    | 13.6 | 102    | 18.1 |
| Grandparent                    | 107         | 3.3  | 48    | 2.0  | 36    | 9.4  | 23     | 4.6  |
| Relative                       | 47          | 1.5  | 16    | 0.8  | 18    | 4.7  | 13     | 2.3  |
| Focal child's grade            |             |      |       |      |       |      |        |      |
| 9                              | 750         | 23.1 | 521   | 22.6 | 91    | 23.9 | 138    | 24.5 |
| 10                             | 809         | 24.9 | 561   | 24.3 | 89    | 23.4 | 159    | 28.2 |
| 11                             | 863         | 26.6 | 621   | 27.0 | 105   | 27.6 | 137    | 24.3 |
| 12                             | 824         | 25.4 | 600   | 26.0 | 96    | 25.2 | 128    | 22.7 |
| Household income               |             |      |       |      |       |      |        |      |
| \$50,000 or less               | 1,096       | 33.7 | 545   | 23.6 | 223   | 58.5 | 328    | 58.2 |
| Between \$50,000 and \$100,000 | 1,221       | 37.6 | 964   | 41.9 | 107   | 28.1 | 150    | 26.7 |
| More than \$100,00             | 931         | 28.7 | 795   | 34.5 | 51    | 13.4 | 85     | 15.1 |
| Mother's highest education     |             |      |       |      |       |      |        |      |
| Less than high school          | 228         | 7.0  | 50    | 2.2  | 28    | 7.3  | 150    | 26.6 |
| High school graduate           | 778         | 24.0 | 525   | 22.8 | 110   | 28.9 | 143    | 25.4 |
| Some college                   | 987         | 30.4 | 710   | 30.8 | 130   | 34.1 | 147    | 26.1 |
| College graduate               | 642         | 19.8 | 530   | 23.0 | 54    | 14.2 | 58     | 10.3 |
| Graduate or professional       | 478         | 14.7 | 396   | 17.2 | 38    | 10.0 | 44     | 7.0  |
| Language spoken at home        |             |      |       |      |       |      |        |      |
| English only                   | 2,921       | 89.9 | 2,274 | 98.7 | 375   | 98.5 | 272    | 48.5 |
| Spanish only                   | 244         | 7.5  | —     | —    | —     | —    | 242    | 43.2 |
| English and Spanish            | 48          | 1.5  | —     | 0.1  | —     | —    | 46     | 8.7  |
| Other language                 | 35          | 1.1  | 27    | 1.2  | 5     | 1.5  | 3      | 0.6  |
| Total                          | 3,248       |      | 2,304 |      | 381   |      | 563    |      |

expectations about their children's future schooling, and their intentions and plans for funding their children's college education. The internal consistency of the school-based involvement and homework involvement composites was good (Cronbach's  $\alpha = .82$  and  $.71$ , respectively), whereas that of the educational expectations and college planning composite was somewhat low (Cronbach's  $\alpha = .51$ ).

*Parent demographics.* Four demographic constructs were included based on their associations with parent involvement in prior studies: race/ethnicity, language used for the interview, household income level, and mother's highest level of education. Categories for race/ethnicity were White, Black, and Latino, and were dummy coded, with White parents serving as the reference group. Our measure of language preference was based on whether parents opted to conduct the interview in English or Spanish. Use of Spanish for the interview was coded as 1. Household income level—the total income of all persons in the household—was assessed on a 14-point ordinal scale from \$5,000 or less to over \$100,000. Mothers' highest education was assessed using a 13-point ordinal scale from up to Grade 8 to a PhD or EdD degree. For the regression analyses, we treated these two ordinal scales as continuous variables in their original forms. However, for tests of group differences (i.e., analysis of variance [ANOVA]), we dichotomized the scales at the mean. The

education variable differentiated mothers who were high school graduates from those who had attended some college, or who had a college diploma or advanced degree. Using the 2006 poverty threshold as a criterion, we contrasted families whose total annual income was less than or equal to \$35,000 (poor) from those whose income was above \$35,000 (non-poor).

## Results

### Descriptive Analyses

Table 3 presents correlations among the five predictors of parent involvement and the three dependent variables, along with descriptive data. The predictors of parent involvement were moderately to strongly intercorrelated. Parents' satisfaction with the school was strongly associated with the composites related to a welcoming environment ( $r = .61$ ) and informative communication ( $r = .62$ ). The correlations among the three parent involvement variables were generally weak, although the composite reflecting parent involvement in homework was negatively correlated with the educational expectations and college planning composites. Additionally, each predictor showed a significant association with at least one of the parent involvement outcomes. Parent involvement at school and educational expectations and college planning were positively associated with all

TABLE 2. Standardized Factor Loadings for School Outreach, School Satisfaction, Parent Motivational Beliefs, and Parent Involvement Composites (N = 3,248)

| Item                                                                                                  | Item description                                                                                                                                                                                                   | Loading | Reliability<br>( $\alpha$ ) |  |
|-------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------------------------|--|
| School outreach and satisfaction composites                                                           |                                                                                                                                                                                                                    |         |                             |  |
| Informative communication                                                                             |                                                                                                                                                                                                                    |         |                             |  |
| Please tell me how well (child)'s school has been doing the following things during this school year. |                                                                                                                                                                                                                    |         |                             |  |
| PJ2A                                                                                                  | Let you know between report cards how (child) is doing in school                                                                                                                                                   | .76     | $\alpha = .78$              |  |
| PJ2B                                                                                                  | Provides information about how to help (child) with (his/her) homework                                                                                                                                             | .80     |                             |  |
| PJ2C                                                                                                  | Provides information about why (child) is placed in particular groups or classes                                                                                                                                   | .67     |                             |  |
| PJ2D                                                                                                  | Provides information on how to help (child) plan for college or vocational school                                                                                                                                  | .68     |                             |  |
| PJ2E                                                                                                  | Provides information on your expected role at (child)'s school                                                                                                                                                     | .70     |                             |  |
| Satisfaction with school                                                                              |                                                                                                                                                                                                                    |         |                             |  |
| PK1A                                                                                                  | You are satisfied with the school (child) attends this year                                                                                                                                                        | .69     | $\alpha = .80$              |  |
| PK1B                                                                                                  | You are satisfied with the teachers (child) has this year                                                                                                                                                          | .71     |                             |  |
| PK1C                                                                                                  | You are satisfied with the academic standards of the school                                                                                                                                                        | .70     |                             |  |
| PK1D                                                                                                  | You are satisfied with the order and discipline at the school                                                                                                                                                      | .86     |                             |  |
| PK1E                                                                                                  | You are satisfied with the way that school staff interacts with parents                                                                                                                                            | .78     |                             |  |
| Welcoming environment <sup>a</sup>                                                                    |                                                                                                                                                                                                                    |         |                             |  |
| PL3C                                                                                                  | (Child)'s school as a whole is welcoming to my family                                                                                                                                                              | .59     | $r = .54$                   |  |
| Parent motivational beliefs composites                                                                |                                                                                                                                                                                                                    |         |                             |  |
| Role construction <sup>b</sup>                                                                        |                                                                                                                                                                                                                    |         |                             |  |
| PL3D                                                                                                  | It is the parents' responsibility to teach their children to value education                                                                                                                                       | .75     |                             |  |
| PL3E                                                                                                  | It is the parents' responsibility to attend meetings with teachers or other school staff                                                                                                                           | .91     |                             |  |
| Parent self-efficacy <sup>a</sup>                                                                     |                                                                                                                                                                                                                    |         |                             |  |
| PL3A                                                                                                  | I know how to help my child do well in school                                                                                                                                                                      | .80     | $\alpha = .71$              |  |
| Parent involvement composites                                                                         |                                                                                                                                                                                                                    |         |                             |  |
| School-based involvement                                                                              |                                                                                                                                                                                                                    |         |                             |  |
| Since the beginning of the school year, (have/has) (you/any adult in your household)                  |                                                                                                                                                                                                                    |         |                             |  |
| PI1A                                                                                                  | Attended a general school meeting, (e.g., an open house, or a back to school night?                                                                                                                                | .69     |                             |  |
| PI1B                                                                                                  | Attended a meeting of the parent-teacher organization?                                                                                                                                                             | .71     | $\alpha = .82$              |  |
| PI1C                                                                                                  | Attended a regularly scheduled parent-teacher conference with (child's) teacher?                                                                                                                                   | .89     |                             |  |
| PI1D                                                                                                  | Attended school or class event, such as a play, dance, sports event, or science fair?                                                                                                                              | .79     |                             |  |
| PI1E                                                                                                  | Served as a volunteer in (child)'s classroom or elsewhere in the school?                                                                                                                                           | .56     |                             |  |
| PI1F                                                                                                  | Participated in fundraising for the school?                                                                                                                                                                        | .51     |                             |  |
| Involvement in homework                                                                               |                                                                                                                                                                                                                    |         |                             |  |
| PM4                                                                                                   | Is there a place in your home that is set aside for (child) to do homework?                                                                                                                                        | .88     | $\alpha = .51$              |  |
| PM5                                                                                                   | Are there family rules for (child) about doing homework?                                                                                                                                                           | .82     |                             |  |
| PM6                                                                                                   | Do (you/any adult in your household) check to see (child's) homework is done?                                                                                                                                      | .77     |                             |  |
| Educational expectations and college planning                                                         |                                                                                                                                                                                                                    |         |                             |  |
| PH12                                                                                                  | How far do you expect (child) to go in (his/her) education?                                                                                                                                                        | .52     |                             |  |
| PH13                                                                                                  | Do you or does anyone in your family plan to help (child) pay for (his/her) education after high school or have you not thought about it yet?                                                                      | .53     | $\alpha = .49$              |  |
| PH14                                                                                                  | Have you or anyone in your family opened any type of account to save for (child's) college education, for example, a 529 plan, a Coverdell Education Savings Account, Education IRA, or a prepaid tuition account? | .49     |                             |  |

<sup>a</sup>One-item measure, no alpha available.<sup>b</sup>Two-item measure, correlation is given.

TABLE 3. Correlations and Descriptive Data (N = 3,435)

| Variable                     | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8    |
|------------------------------|-------|-------|-------|-------|-------|-------|-------|------|
| 1. Parent self-efficacy      | —     |       |       |       |       |       |       |      |
| 2. Parent role construction  | .36** | —     |       |       |       |       |       |      |
| 3. Welcoming environment     | .32** | .39** | —     |       |       |       |       |      |
| 4. Informative communication | .23** | .20** | .46** | —     |       |       |       |      |
| 5. Satisfaction with school  | .25** | .21** | .61** | .62** | —     |       |       |      |
| 6. Homework involvement      | .03   | .06*  | -.04* | .03   | -.05* | —     |       |      |
| 7. School-based involvement  | .20** | .27** | .23** | .30** | .19** | .07*  | —     |      |
| 8. Expectations and planning | .20** | .15** | .11** | .11** | .13** | -.08* | .24** | —    |
| M                            | 3.33  | 7.29  | 3.33  | 14.57 | 16.97 | 2.28  | 3.45  | 6.45 |
| SD                           | 0.64  | 0.89  | 0.66  | 4.23  | 3.12  | 0.83  | 1.66  | 1.06 |

Note. Means and standard deviations are presented in the variable's original metric for better interpretation.

\* $p < .05$ . \*\* $p < .01$ .

the predictors, while parent involvement in homework was negatively related to welcoming environment and school satisfaction.

#### *Differences in Parent Involvement Practices Among Diverse Groups*

Univariate ANOVAs and  $t$  tests were used to examine demographic differences in the three parent involvement behaviors and their predictors (see Table 4). Black parents reported significantly less satisfaction with their child's school and perceived the environment to be less welcoming than did White and Latino parents. There was no significant difference between the White and Latino parents in terms of the two school outreach variables, but Latino parents were less satisfied with the school than White parents. In terms of parent motivational beliefs, Latino parents reported a lower level of self-efficacy and placed less emphasis on the importance of parental involvement in schooling than did White and Black parents. This tendency became more pronounced when Spanish-speaking parents were compared to English-speaking parents.

Regarding the three aspects of parent involvement, White parents reported significantly higher levels of involvement at school as well as a higher degree of educational expectations and college planning than did Latinos. Black parents reported higher levels of involvement in homework than Latinos, who in turn reported higher levels than Whites. Spanish-speaking parents' involvement in school-based involvement and educational expectations and college planning was lower than that of English speakers but their involvement in homework monitoring was greater than that of English speakers. Table 5 presents the results of these analyses.

Table 4 also highlights a clear pattern of SES differences. Parents categorized as nonpoor felt more efficacious and responsible for their children's education, perceived their children's school as being more informative, welcoming and satisfactory, and were more involved in school based activ-

ities and in educational expectations and college planning. However, they engaged in less monitoring of homework. Similarly, when parents of different maternal education levels were compared, college graduates reported higher levels of efficacy and role construction, perceived the school as more welcoming, and participated more in school activities and educational expectations and college planning, but were less involved in homework monitoring than were high school graduates.

#### *Predictors of Parent Involvement*

The random sampling method used to obtain these data resulted in a nonhierarchical data structure. Thus, we used ordinary least squares (OLS) regression rather than multi-level modeling as the primary data analysis tool. In particular, we conducted hierarchical regression analyses to examine the relationship of parent demographics, school outreach efforts, parent satisfaction with the school, and parental motivational beliefs to the three parent involvement dimensions. To estimate effect sizes for the variables of interest, we divided the standardized coefficient of each variable by the pooled standard deviation units of all predictors in the regression model. The use of pooled standard deviation units takes into account the variability of all of the covariates (Galindo & Sheldon, 2011).

To examine whether the associations between our predictors and the parent involvement indicators was moderated by parents' demographic characteristics, we conducted a separate stepwise hierarchical analysis using only the interactions between predictors and sociodemographic variables (i.e., the cross-product of each predictor with each sociodemographic variable). Significant interaction terms were retained and included in the final regression model. Independent variables were centered around their means to facilitate interpretation of interaction effects and alleviate multicollinearity problems.

For our OLS regression analyses, we created four models for each of the three parent involvement composites. The

TABLE 4. Comparisons of Group Means for Parent Involvement Predictors and Reported Involvement

| Characteristic     | Parenting self-efficacy          |      | Parent role construct            |      | School information   |      | School satisfaction               |      | School welcoming                 |      | Homework involvement             |      | School-based involvement         |      | Educational planning           |      |
|--------------------|----------------------------------|------|----------------------------------|------|----------------------|------|-----------------------------------|------|----------------------------------|------|----------------------------------|------|----------------------------------|------|--------------------------------|------|
|                    | M                                | SD   | M                                | SD   | M                    | SD   | M                                 | SD   | M                                | SD   | M                                | SD   | M                                | SD   | M                              | SD   |
| Race/Ethnicity     |                                  |      |                                  |      |                      |      |                                   |      |                                  |      |                                  |      |                                  |      |                                |      |
| White              | 3.37 <sup>***</sup> <sub>a</sub> | 0.62 | 7.34 <sup>***</sup> <sub>a</sub> | 0.87 | 14.64                | 4.15 | 17.14 <sup>***</sup> <sub>a</sub> | 3.01 | 3.38 <sup>***</sup> <sub>a</sub> | 0.65 | 2.20 <sup>***</sup> <sub>c</sub> | 0.85 | 3.56 <sup>***</sup> <sub>a</sub> | 1.62 | 6.48 <sup>*</sup> <sub>a</sub> | 1.06 |
| Black              | 3.27 <sup>b</sup>                | 0.69 | 7.28                             | 0.87 | 14.25                | 4.43 | 16.23 <sup>c</sup>                | 3.47 | 3.16 <sup>b</sup>                | 0.72 | 2.59 <sup>a</sup>                | 0.72 | 3.39                             | 1.17 | 6.43                           | 1.02 |
| Latino             | 3.23                             | 0.67 | 7.11 <sup>b</sup>                | 0.95 | 14.51                | 4.45 | 16.79 <sup>b</sup>                | 3.22 | 3.24                             | 0.60 | 2.41 <sup>b</sup>                | 0.76 | 3.04 <sup>b</sup>                | 1.71 | 6.33 <sup>b</sup>              | 1.06 |
| Language           |                                  |      |                                  |      |                      |      |                                   |      |                                  |      |                                  |      |                                  |      |                                |      |
| English            | 3.35 <sup>***</sup>              | 0.64 | 7.31 <sup>***</sup>              | 0.88 | 14.54                | 4.23 | 16.98                             | 3.12 | 3.34 <sup>*</sup>                | 0.66 | 2.27 <sup>***</sup>              | 0.84 | 3.50 <sup>***</sup>              | 1.65 | 6.47 <sup>***</sup>            | 1.06 |
| Spanish            | 3.06                             | 0.62 | 6.97                             | 0.94 | 15.09                | 4.32 | 16.84                             | 3.09 | 3.20                             | 0.53 | 2.49                             | 0.70 | 2.56                             | 1.58 | 6.10                           | 1.05 |
| Mother's education |                                  |      |                                  |      |                      |      |                                   |      |                                  |      |                                  |      |                                  |      |                                |      |
| High school        | 3.20 <sup>***</sup>              | 0.68 | 7.10 <sup>***</sup>              | 0.93 | 14.42                | 4.37 | 16.85                             | 3.14 | 3.26 <sup>***</sup>              | 0.65 | 2.38 <sup>***</sup>              | 0.79 | 2.96 <sup>***</sup>              | 1.70 | 6.04 <sup>***</sup>            | 1.10 |
| College            | 3.41                             | 0.61 | 7.40                             | 0.85 | 14.69                | 4.13 | 17.05                             | 3.18 | 3.37                             | 0.65 | 2.23                             | 0.85 | 3.71                             | 1.58 | 6.60                           | 0.99 |
| Poverty status     |                                  |      |                                  |      |                      |      |                                   |      |                                  |      |                                  |      |                                  |      |                                |      |
| Poor               | 3.19 <sup>***</sup>              | 0.67 | 7.08 <sup>***</sup>              | 0.93 | 14.25 <sup>***</sup> | 4.51 | 16.55 <sup>***</sup>              | 3.83 | 3.24 <sup>***</sup>              | 0.66 | 2.45 <sup>***</sup>              | 0.76 | 2.86 <sup>***</sup>              | 1.71 | 6.08 <sup>***</sup>            | 1.09 |
| Nonpoor            | 3.44                             | 0.59 | 7.43                             | 0.82 | 15.01                | 4.01 | 17.38                             | 2.88 | 3.43                             | 0.64 | 2.17                             | 0.85 | 3.85                             | 1.56 | 6.71                           | 0.97 |

Note. Different subscripts for means in the race/ethnicity analysis indicate significant pairwise contrasts ( $p < .05$ ). For mother's education, high school includes mothers of high school graduates or less. College includes mothers with some college, college diploma, or advanced degree. For poverty status, a household was considered poor if the total income was less than or equal to \$35,000. The threshold to define poverty was based on the 2006 U.S. Census poverty threshold (U.S. Census Bureau, 2006).

\* $p < .05$ . \*\*\* $p < .001$ .

TABLE 5. Hierarchical Multiple Regression Results

| Variable                   | School-based involvement |      |                  |              | Homework involvement |      |         |              | Expectations/College planning |      |         |              |
|----------------------------|--------------------------|------|------------------|--------------|----------------------|------|---------|--------------|-------------------------------|------|---------|--------------|
|                            | B                        | SE B | $\beta$          | $\Delta R^2$ | B                    | SE B | $\beta$ | $\Delta R^2$ | B                             | SE B | $\beta$ | $\Delta R^2$ |
| Model 1                    |                          |      |                  | .02***       |                      |      |         | .03***       |                               |      |         | .01*         |
| Black                      | -.17                     | .09  | -.03*            |              | .39                  | .04  | .14***  |              | -.05                          | .07  | -.01    |              |
| Latino                     | -.30                     | .09  | -.07***          |              | .17                  | .04  | .07***  |              | -.06                          | .06  | -.02    |              |
| Spanish interview          | -.70                     | .15  | -.09***          |              | .11                  | .07  | .03     |              | -.31                          | .12  | -.05*   |              |
| Model 2                    |                          |      |                  | .04***       |                      |      |         | .04***       |                               |      |         | .02***       |
| Black                      | .14                      | .09  | .02              |              | .33                  | .05  | .12***  |              | .13                           | .06  | .03     |              |
| Latino                     | -.06                     | .09  | -.01             |              | .12                  | .04  | .06**   |              | .11                           | .06  | .03     |              |
| Spanish interview          | -.12                     | .15  | -.07*            |              | .01                  | .08  | .00     |              | .21                           | .12  | .04     |              |
| Mother's education         | .09                      | .01  | .17***           |              | -.01                 | .00  | -.05*   |              | .11                           | .00  | .29***  |              |
| Income                     | .34                      | .04  | .16***           |              | -.08                 | .00  | -.08*** |              | .21                           | .03  | .15***  |              |
| Model 3                    |                          |      |                  | .13***       |                      |      |         | .03***       |                               |      |         | .02***       |
| Black                      | .13                      | .08  | .03              |              | .31                  | .05  | .11***  |              | .14                           | .06  | .04*    |              |
| Latino                     | -.02                     | .08  | -.01             |              | .11                  | .04  | .06**   |              | .13                           | .06  | .02     |              |
| Spanish interview          | -.23                     | .14  | -.05*            |              | .00                  | .08  | .00     |              | .19                           | .12  | .03     |              |
| Mother's education         | .07                      | .01  | .15***           |              | -.02                 | .00  | -.05*   |              | .10                           | .00  | .28***  |              |
| Income                     | .27                      | .04  | .14***           |              | -.08                 | .02  | -.07*** |              | .20                           | .03  | .14***  |              |
| School welcoming           | .10                      | .05  | .10***           |              | -.01                 | .02  | .00     |              | .02                           | .04  | .01     |              |
| Informative communication  | .11                      | .00  | .27***           |              | .02                  | .00  | .10***  |              | .01                           | .00  | .04*    |              |
| School satisfaction        | -.04                     | .01  | -.07**           |              | -.02                 | .00  | -.09*** |              | .02                           | .01  | .06*    |              |
| Model 4                    |                          |      |                  | .04***       |                      |      |         | .02***       |                               |      |         | .03***       |
| Black                      | .14                      | .08  | .02              |              | .30                  | .05  | .11***  |              | .14                           | .06  | .04*    |              |
| Latino                     | -.02                     | .08  | -.01             |              | .11                  | .04  | .05*    |              | .12                           | .06  | .03     |              |
| Spanish interview          | -.23                     | .14  | -.05*            |              | .02                  | .08  | .00     |              | .10                           | .12  | .01     |              |
| Mother's education         | .07                      | .01  | .13***           |              | -.01                 | .00  | -.06**  |              | .10                           | .00  | .26***  |              |
| Income                     | .28                      | .04  | .13***           |              | -.02                 | .00  | -.10*** |              | .19                           | .03  | .13***  |              |
| School welcoming           | .10                      | .05  | .05*             |              | -.07                 | .03  | -.01    |              | -.04                          | .04  | -.02    |              |
| Informative communication  | .10                      | .00  | .26***           |              | .02                  | .00  | .10***  |              | .00                           | .06  | .02     |              |
| Satisfaction with school   | -.03                     | .01  | -.06**           |              | -.02                 | .00  | -.08*** |              | .02                           | .00  | .04     |              |
| Parenting self-efficacy    | .10                      | .04  | .03              |              | .05                  | .02  | .04*    |              | .22                           | .03  | .10***  |              |
| Parent role construction   | .29                      | .03  | .15***           |              | .08                  | .01  | .09***  |              | .09                           | .02  | .06**   |              |
| Black $\times$ Informative | .47                      | .02  | .13 <sup>†</sup> |              |                      |      |         |              |                               |      |         |              |
| Poor $\times$ Efficacy     |                          |      |                  |              | .20                  | .06  | .32**   |              |                               |      |         |              |
| Black $\times$ Efficacy    |                          |      |                  |              |                      |      |         |              | -.25                          | .10  | -.25**  |              |
| Spanish $\times$ Welcoming |                          |      |                  |              |                      |      |         |              | -.57                          | .29  | .34**   |              |

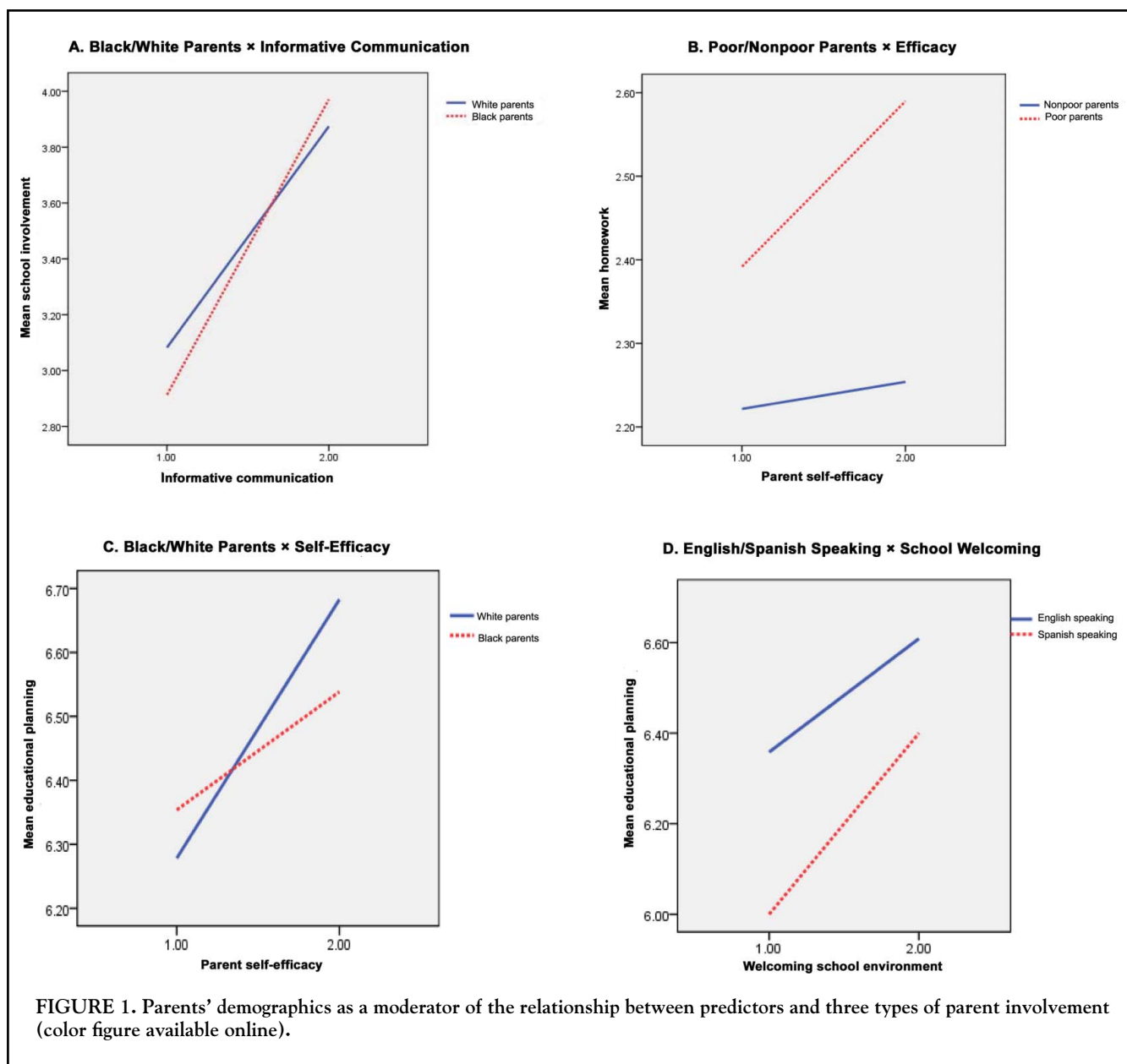
<sup>†</sup> $p < .06$ . \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

first model contained only parents' race/ethnicity and language preference. In the second model, we added two SES variables (household income, mother's education level) to see if any significant effects of parents' race/ethnicity remained after controlling for family SES and to predict the direct influence of SES on parent involvement. The two school outreach constructs (welcoming environment, informative communication) and satisfaction with school were included in Model 3. For Model 4, we added the two parent motivational beliefs (parent role construction, parenting self-efficacy), as well as the significant cross-products of the demographic variables and the substantive predictors that were identified in the separate stepwise procedure.

*Parent involvement at school.* Overall, the final model predicting parent involvement at the school site was significant

( $R^2 = .24$ ). The magnitude of the association between individual predictors and parent involvement at school was modest, ranging from 0.06 to 0.31 *SD*. Examination of the  $R^2$  change as each new group of predictors was added to the model reveals that each contributed significantly to the overall prediction of parental involvement at school.

In Model 1, the three indicators of parents' race/ethnicity were all significant predictors of parent involvement at school; White parents reported more involvement at school than did Black and Latino parents. When the two SES indicators were added in Model 2, however, the effects of race/ethnicity disappeared and the two SES variables were significant. The predictive power of SES remained high in Models 3 and 4. In families where mothers were more educated (0.15 *SD*), and family income was higher (0.15 *SD*), parents were more involved in the school. Involvement of



Spanish-speaking parents at the school remained significantly lower than that of English-speaking parents in the final model (0.06 SD).

The three school outreach variables were significant predictors in Models 3 and 4. Informative communication (0.31 SD) and welcoming environment (0.06 SD) had a positive relationship with parent involvement at school, whereas satisfaction with school (0.07 SD) was negatively associated with this outcome. Regarding parent motivational beliefs, which were entered in Model 4, the effect of parent role construction (0.18 SD) was significant, but parenting self-efficacy was not. Overall, in Model 4, informative communication was the most influential variable ( $\beta = .26$ ) among all the predictors of parental involvement at school.

With respect to the moderator analysis, one interaction term (Black  $\times$  Informative Communication) was marginally significant ( $p < .06$ ). The simple equation for this interaction is graphed in Figure 1. Graph A shows that the slope representing the relationship of informative communication to parent school involvement was steeper for Black than for White parents, suggesting that Black parents were relatively more likely to increase their involvement at the school site when the school provided helpful information.

*Parent involvement in homework.* Overall, the HDS model was less effective in predicting parent involvement in homework than in predicting involvement at the school site. The  $R^2$  value of the final model explaining parent involvement

in homework was .12, half that obtained for parent involvement at school. The effect size of the predictors of involvement at home was smaller (0.02–0.06 *SD*) than in the analyses of involvement at school.

In Model 1, Black (0.06 *SD*) and Latino parents (0.03 *SD*) reported a higher level of involvement in children's homework than did White parents, the opposite pattern from the one that emerged with respect to involvement at school. Furthermore, unlike the findings for involvement at school, this racial/ethnic difference remained significant after holding SES constant. In Model 2, contrary to our expectations, both of the indicators of parents' socioeconomic status (mother's education, household income) were negatively associated with their involvement in homework (0.04 and 0.06 *SD*, respectively). In Model 3, one of the school outreach variables (informative communication) was positively associated with parent involvement in homework (0.06 *SD*), but the coefficient ( $\beta = .10$ ) was less than half the size of the corresponding coefficient in the school involvement analysis. Parental satisfaction with the schools was again negatively related to home-based involvement (0.04 *SD*). These two school outreach variables remained significant in Model 4. In Model 4, parents' role construction predicted parent involvement in homework (0.05 *SD*), as it did parents' involvement in school. Parenting self-efficacy was also significant (0.02 *SD*), although less powerful than role construction. Graph B (Figure 1) illustrates that the positive association between parent self-efficacy and involvement in homework was stronger for poor than for nonpoor parents.

*Educational expectations and college planning.* Overall, the final model predicting educational expectations and college planning was significant. The  $R^2$  value of the final model explaining parent expectations and college planning was .08. The effect size of the predictors ranged from 0.03 to 0.24 *SD*.

Although participants' racial/ethnic identity was not a significant predictor in the first two models, in Models 3 and 4, the coefficient for being a Black participant was significant (0.03 *SD*). By comparison, there was a statistically significant effect of income (0.12 *SD*) and particularly of mothers' highest level of education (0.24 *SD*) in all the models including these constructs. The school outreach variables were not strongly related to this aspect of parent involvement. Informative communication was a significant predictor in Model 3 but not in Model 4. Unlike with the other two parent involvement outcome measures, the effect of parents' satisfaction with school was positively, not negatively, related to this indicator (and only in Model 3). After the parental belief variables were added in Model 4, both school-related effects disappeared, suggesting that the effect of school outreach efforts may be mediated through parent motivational beliefs. Both parental self-efficacy and role construction predicted parents' expectation and college planning (0.09 and 0.05 *SD*, respectively).

With regard to the relationship between parents' self-efficacy and their educational expectations and planning, Graph C (Figure 1) indicates that this positive association was stronger for White parents than for Black parents. Graph D (Figure 1) suggests that a welcoming school environment triggered higher college expectations and more planning for Spanish- than for English-speaking parents.

## Discussion

In this study, we investigated the utility of the HDS model for predicting sociodemographically diverse parents' involvement in the education of youth who are in high school. More specifically, we first examined the structure of parental involvement and tested for racial/ethnic and SES differences on each of the component dimensions. We then tested the hypothesis that school outreach efforts and parental beliefs about their own role in the education process were predictors of parental involvement in their high school children's schooling. We expected that, due to language barriers as well as lack of knowledge and/or mistrust of the school institution, Black and Latino parents would be less likely to be involved at the school site, but would be equally or more involved at home than their White counterparts. We also expected that lower SES families would be less involved at home and at school. Finally, we were interested in exploring the ways in which these diverse sociodemographic categories moderated the relation of school outreach and parent beliefs to various types of parent involvement.

### *The Nature of Parental Involvement During Adolescence*

Our factor analysis revealed that in addition to the two parent involvement indicators frequently included in studies of younger children (i.e., parent involvement at home and at school), parents' college expectations and financial planning constitutes a third important dimension of parent involvement in the lives of high school students. Furthermore, in contrast to research indicating that the dimensions of parent involvement are positively intercorrelated at the elementary level (Lee & Bowen, 2006; Reed et al., 2000), our study suggests these associations change as students move into high school. In particular, we found that parents who were more involved in the home were actually less likely to hold high educational expectations and engage in college planning. These results suggest that future researchers on parent involvement in their adolescents' education need to take into accounts multiple dimensions of parental behaviors that are developmentally appropriate and effective.

### *Predictors of Multiple Dimensions of Parental Involvement*

In modeling school-based involvement, we found that the effect of racial/ethnic affiliation disappeared when household income and mothers' education were taken into account. School outreach efforts (welcoming environment and



informative communication) were strongly associated with school-based involvement, as was parental role construction. Moderator analyses indicated that Black parents were particularly more active in school-based involvement if they perceived that school personnel were making and effort to engage in effective and informative communication.

For home-based involvement (i.e., monitoring homework), we found that Black and Latino parents were more involved than their White counterparts, even after controlling for mother's education and income. Additionally, higher SES parents were less involved at home than were low SES parents. The role of informative communication between high schools and families was significant, although less powerful than in the school-based analyses. Parenting self-efficacy and role construction were also significant predictors. For economically disadvantaged parents, parenting self-efficacy was particularly powerful in predicting involvement.

For predicting parents' educational expectations and planning, race/ethnicity was not a powerful predictor, although there was some tendency for Black parents to hold higher expectations. Rather, it was parent education and family income that played a significant role. Furthermore, parents' perceptions of the schools did not seem to affect their involvement in these activities, whereas both parental belief variables were significant. Additionally, moderator analyses indicated that expectations and planning were particularly enhanced for Black parents who felt efficacious and Spanish-speaking parents who felt that the school had a welcoming environment.

On the whole, our findings are consistent with the principal predictions of the HDS model. The primary constructs identified within the HDS model—school outreach, parenting self-efficacy, parental role construction, and parental resources—were all significantly related to one or more dimensions of parent involvement. Initially, Hoover-Dempsey and Sandler (1997) hypothesized that parent role construction was the most influential predictor of parent involvement, followed by self-efficacy and invitations from teachers. Our analyses suggest that parental role construction is the strongest predictor only for educational expectations and college planning. The impact of self-efficacy was marginally significant with respect to homework involvement and moderately significant with respect to educational expectations and college planning.

Furthermore, our findings regarding the powerful impact of school outreach efforts on parent involvement are consistent with those of previous studies (Galindo & Sheldon, 2011; Patrikakou & Weissberg, 2000; Simon, 2004). Specifically, our analyses suggest that school outreach efforts (especially the perception of informative communication between school and family) were a very strong predictor of parent involvement at school, and although less strong in absolute terms as a predictor of home involvement, it was still the strongest of the substantive predictors for that outcome as well. We consider these results to be promising in

that they suggest that even in high school it is possible for teachers and staff to play a pivotal role in bolstering parent involvement.

Another interesting finding was the possible mediating role of parent beliefs (role construction and parenting self-efficacy) in the relation between school outreach efforts and parent educational expectations and college planning. In our analyses, when these two parent beliefs variables were added to the model containing the school outreach factors, the school outreach factors were no longer significant predictors. Interestingly, these findings support a recent addition to the HDS model in which Hoover-Dempsey et al. (2009) suggest that deliberate efforts by elementary school staff to help parents engage with their child's education are part of a social process that affects parents' perception of their role. With respect to high school students, it is also possible that when the school plays an active role in providing parent with information about preparing their children to obtain a college education, these efforts facilitate parents' confidence and lead them to feel more responsible for guiding them with respect to higher education.

#### *Sociodemographic Variability in Parent Involvement*

As noted previously, we found stronger racial/ethnic differences with respect to parental involvement in school than the other two outcomes. Overall, White parents were more likely to engage in school-related involvement practices than were Black and Latino parents. Spanish-speaking parents were less involved at the school site than English-speaking parents. However, Black and Latino parents were actively engaged in parental involvement in homework, and Black parents were more likely to have a plan for funding their children's college education. Our analysis thus supports findings from previous studies (Lee & Bowen, 2006; Lopez, 2001; Peña, 2000) showing that Black and Latino parents become involved in their children's schooling but may do so in ways that are not detected or appreciated by school administrators and teachers.

With regard to the effect of SES on parent involvement, it is noteworthy that household income and mother's education had independent effects on all three outcomes. We found that, overall, parents from higher socioeconomic backgrounds are more likely to be involved than parents of lower SES at school and in educational expectations and college planning. With respect to educational aspirations and planning, mother's education level was particularly powerful, although household income was also a significant predictor. Contrary to our expectation, mother's education and household income were negatively related to involvement at home.

Thus, for each of the three outcome measures, the relationship between race/ethnicity and SES played out differently. With respect to school involvement, only SES predicted involvement, but there was no main effect for race/ethnicity. However, school information made more

difference for Black than White parents. With respect to involvement in homework, Black parents, and lower SES parents were more involved than White and higher SES parents. Parenting self-efficacy made more of a difference for poor than nonpoor parents. With respect to college planning, black and higher SES parents were more involved and efficacy made even more of a difference for black than white parents. We would argue that this suggests that it is crucial to include race/ethnicity, mother's education, and household income in analyses of parent involvement, since they exert independent effects.

### *Study Limitations*

As is true in any project involving secondary analyses, our analyses were limited to the items available in the dataset. The NHES data does not include questions to measure the extent to which the child seeks (or tolerates) parental involvement; this is a significant omission given that adolescents are more capable of discouraging or blocking parent action than are younger children. Another measurement issue commonly encountered when working with large datasets is that relatively few items are available to measure complex constructs, as was true with several of the composites in our analysis. Second, it is worth noting that causal processes and relationships among factors cannot be definitively established from cross-sectional data. While theoretical models of parental involvement treat it as a precursor of academic success, it is also possible that parent involvement may occur in response to children's academic difficulties. Third, these are self-reported measures of parent involvement, which are vulnerable to social desirability bias. Ideally, we would have had corroborating data based on teacher perceptions of parents' school-based participation, although collecting information from a third party regarding parents' home-based practices would not be possible with a sample of this size.

### *Implication for Educational Practices and Policy*

This study holds important implications for parents, teachers, principals, and policymakers whose interests lie in promoting strong family-school partnerships. The significant association we found between high school outreach efforts and parental involvement suggests that high school staff do have the capacity to increase parents' participation and parents are responsive to the information schools provide. Thus, contrary to the current tendency to focus on parental education at the elementary level, it may be worth developing more sustained programs for parents with children at the high school level not only to provide practical information about preparing for college but also to enhance parents' self-efficacy and beliefs about their role in promoting student achievement and supporting their planning for the future.

In the course of implementing specific programs, the first step a school can take to build a meaningful partnership is to

create a school climate that is welcoming, caring, and receptive to parents. Mapp, Johnson, Strickland, and Meza (2010) found that application of an effective parent involvement program in high school yielded significant results only when the high school environment was genuinely welcoming to parents. A key aspect of developing this kind of supportive environment is establishing effective and frequent communication between home and school.

Considering racial/ethnic variations in parent involvement, our findings suggest that it is important for school staff to recognize that parents are often involved in their children's education in a variety of ways that depend on their personal and cultural beliefs and resources, as well as the characteristics of the school context. Programs and policies designed to promote involvement of White parents may be ineffective in promoting involvement of parents from other backgrounds. Thus, we agree with Hill and Craft (2003), who argued that interventions designed to support parent involvement must begin by building on each group's strengths and challenges. At the same time, Reese and Gallimore (2000) cautioned against taking the essentialist position that parents from a particular group will monolithically and persistently employ the same practices when it comes to their children's education. Rather, school staff must engage in the delicate practice of understanding how parents draw upon available cultural models but adapt them to their own personal resources as well as the contextual demands that they and their children encounter.

Parents' language capabilities are particularly influential in shaping the type of involvement that parents have in their children's education. Our analysis found that Spanish-speaking parents reported the lowest level of involvement at school and the differences in level of school involvement between Spanish-speaking parents and White parents persisted even after controlling for parents' SES. This result is consistent with previous research by other investigators (García Coll & Marks, 2009; Wong & Hughes, 2006). Thus it would be beneficial to implement school policies designed particularly to support Spanish-speaking parents, including recruitment of bilingual teachers and staff.

However, given all of their other responsibilities, teachers cannot be expected to take do all the work necessary for building strong partnerships between the school and families. Specially designated parent coordinators can be helpful in creating a welcoming atmosphere, developing a communication network, and, most of all, being an asset in dealing with cultural and language differences (Floyd, 1998; Scribner et al., 1999). Parent coordinators can be particularly beneficial at the secondary level where parents often have difficulty in determining whom to contact and how to intervene when they have little understanding of the curriculum.

In conclusion, we found support for the HDS model when applied to adolescents and their parents. Parent involvement was generally associated with greater school outreach efforts as well as with parents' beliefs concerning their

role and capabilities. In addition, our findings suggest that parents' race/ethnicity as well as their socioeconomic status set the stage for certain kinds of involvement. Our analyses indicate that the relatively low involvement by Black and Latino parents at the school site can be explained by social class and by mistrust and dissatisfaction with the school. We also found that ethnic minority and lower SES parents were highly involved in their children's homework, particularly when they felt efficacious, and that Black parents held high expectations and were highly involved in planning for their children's future, again particularly when they perceived themselves as being efficacious. Thus, when it comes to involvement outside the school, it is individual perceptions of efficacy rather than school characteristics that are more salient for these groups. Cultural, structural, and school-based explanations must all be considered in order to understand which parents are involved in schooling and why.

## REFERENCES

- Anderson, K. J., & Minke, K. M. (2007). Parent involvement in education: toward an understanding of parents' decision making. *The Journal of Educational Research*, 100, 311–425.
- Chavkin, N. F. (1993). *Families and schools in a pluralistic society*. New York, NY: State University of New York Press.
- Desimone, L. (2000). Linking parent involvement with student achievement: Do race and income matter? *The Journal of Educational Research*, 93, 11–30.
- Deslandes, R., & Bertrand, R. (2005). Motivation of parent involvement in secondary-level schooling. *The Journal of Educational Research*, 98, 164–175.
- Entwisle, D. R., & Alexander, K. L. (1996). Family type and children's growth in reading and math over the primary grades. *Journal of Marriage and the Family*, 58, 341–355.
- Epstein, J. L. (1987). Toward a theory of family-school connections: Teacher practices and parent involvement. In H. Klaus, K. Franz-Xaver, & L. Friedrich (Eds.), *Prevention and intervention in childhood and adolescence* (pp. 121–136). Oxford, UK: Walter De Gruyter.
- Falbo, G., Lein, L., & Amador, N. A. (2001). Parental involvement during the transition to high school. *Journal of Adolescent Research*, 16, 511–529.
- Floyd, L. (1998). Joining hands: A parental involvement program. *Urban Education*, 33, 123–135.
- Galindo, C., & Sheldon, S. B. (2011). School and home connections and children's kindergarten achievement gains: The mediating role of family involvement. *Early Childhood Research Quarterly*, 27, 90–103.
- García Coll, C., & Marks, A. K. (2009). *Immigrant stories: Ethnicity and academics in middle childhood*. New York, NY: Oxford University Press.
- Glick, J. E., & White, M. J. (2004). Post-secondary school participation of immigrant and native youth: The role of familial resources and educational expectation. *Social Science Research*, 33, 272–299.
- Goldenberg, C., & Gallimore, R. (1995). Immigrant Latino parents' values and beliefs about their children's education: Continuities and discontinuities across cultures and generations. *Advances in Motivation and Achievement*, 9, 183–228.
- Green, C. L., Walker, J. M. T., Hoover-Dempsey, K. V., & Sandler, H. M. (2007). Parents' motivations for involvement in children's education: An empirical test of a theoretical model of parental involvement. *Journal of Educational Psychology*, 99, 532–544.
- Hao, L., & Bonstead-Burns, M. (1998). Parent-child differences in educational expectations and the academic achievement of immigrant and native students. *Sociology of Education*, 71, 175–198.
- Hill, N. E., Castellino, D. R., Lansford, J. E., Nowlin, P., Dodge, K. A., Bates, J. E., & Pettite, G. (2004). Parent academic involvement as related to school behavior, achievement and aspirations: Demographic variations across adolescence. *Child Development*, 75, 1491–1509.
- Hill, N. E., & Craft, S. A. (2003). Parent-school involvement and school performance: Mediated pathways among socioeconomically comparable African-American and Euro-American families. *Journal of Educational Psychology*, 95, 78–83.
- Hill, N. E., & Tyson, D. F. (2009). Parental involvement in middle school: A meta-analytic assessment of the strategies that promote achievement. *Developmental Psychology*, 45, 740–763.
- Hoover-Dempsey, K. V., Ice, C. L., & Whitaker, M. C. (2009). Why and how parental involvement in adolescence makes sense. In N. E. Hill & R. K. Chao (Eds.), *Families, schools and the adolescent: Connecting research, policy, and practice* (pp. 53–72). New York, NY: Teachers College Press.
- Hoover-Dempsey, K. V., & Sandler, H. M. (1997). Why do parents become involved in their children's education? *Review of Educational Research*, 67, 3–42.
- Jeynes, W. (2005). A meta-analysis of the relation of parental involvement to urban elementary school student academic achievement. *Urban Education*, 40, 237–269.
- Jeynes, W. (2007). The relationship between parental involvement and urban secondary school student academic achievement: A meta-analysis. *Urban Education*, 42, 82–110.
- Lareau, A. (2003). *Unequal childhoods: Class, race, and family life*. Berkeley, CA: University of California Press.
- Lareau, A., & Horvat, E. M. (1999). Moments of social inclusion and exclusion: Race, class, and cultural capital in family-school relationships. *Sociology of Education*, 72, 37–53.
- Larson, R., & Richards, M. H. (1995). *Divergent realities: The emotional lives of mothers, fathers and adolescents*. New York, NY: Basic Books.
- Lee, J. S., & Bowen, N. K. (2006). Parent involvement, cultural capital, and the achievement gap among elementary school children. *American Educational Research Journal*, 43, 193–218.
- Lopez, G. R. (2001). The value of hard work: Lessons on parent involvement from an immigrant household. *Harvard Educational Review*, 71, 416–437.
- Mapp, K. L., Johnson, V. R., Strickland, C. S., & Meza, C. (2010). High school family centers: Transformative spaces linking schools and families in support of student learning. In W. Jeynes (Ed.), *Family factors and the educational success of children* (pp. 336–366). New York, NY: Routledge.
- Marinez-Lora, A. M., & Quintana, S. M. (2009). Low-income urban African American and Latino parents' school involvement: Testing a theoretical model. *School Mental Health*, 1, 212–228.
- Moles, O. C. (1993). Collaboration between schools and disadvantaged parents: Obstacles and openings. In N. F. Chavkin (Ed.), *Families and schools in a pluralistic society* (pp. 21–42). New York, NY: State University of New York Press.
- No Child Left Behind Act of 2001, Pub. L. No. 107–110, § 115, Stat. 1425 (2002).
- Obama, B. (2009). *Address to a joint session of the United States Congress*. Retrieved from [www.whitehouse.gov/the\\_press\\_office/remarks-of-president-barack-obama-address-to-joint-session-of-congress](http://www.whitehouse.gov/the_press_office/remarks-of-president-barack-obama-address-to-joint-session-of-congress)
- Patrikakou, E. N., & Weissberg, R. P. (2000). Parents' perceptions of teacher outreach and parent involvement in children's education. *Journal of Prevention & Intervention in the Community*, 20, 103–119.
- Peña, D. C. (2000). Parent involvement: Influencing factors and implications. *The Journal of Educational Research*, 94, 42–54.
- Reed, R. P., Jones, K. P., Walker, J. M., & Hoover-Dempsey, K. V. (2000, April). Parents' motivations for involvement in children's education: Testing a theoretical model. Paper presented at the Meeting of the American Educational Research Association, New Orleans, LA. (ERIC Document Reproduction Service No. ED444109)
- Reese, L., & Gallimore, R. (2000). Immigrant Latinos' cultural model of literacy development: An evolving perspective on home-school discontinuities. *American Journal of Education*, 108, 103–134.
- Sanders, M. G., Epstein, J. L., & Connors-Tadros, L. (1999). *Family partnerships with high schools: The parent's perspective*. Washington, DC: U.S. Department of Education, Office of Educational Resources Information Center.
- Scribner, J. D., Young, M. D., & Pedroza, A. (1999). Building collaborative relationships with parents. In P. Reyes, J. D. Scribner, & A. P. Scribner (Eds.), *Lessons from high-performing Hispanic schools: Creating learning communities*. (pp. 36–66). New York, NY: Teachers College Press.
- Seginer, R. (2006). Parents' educational involvement: A developmental ecology perspective. *Parenting: Science and Practice*, 6, 1–48.
- Sheldon, S. B. (2002). Parents' social networks and beliefs as predictors of parent involvement. *Elementary School Journal*, 102, 301–316.
- Simon, B. S. (2004). High school outreach and family involvement. *Social Psychology of Education*, 7, 185–209.

- Smetana, J. G. (2011). *Adolescents, families and social development: How teens construct their worlds*. New York, NY: Wiley-Blackwell.
- Spera, C. (2005). A review of the relationship among parenting practices, parenting styles and adolescent school achievement. *Educational Psychology Review*, 17, 125–146.
- Stevenson, D. L., & Baker, D. P. (1987). The family-school relation and the child's school performance. *Child Development*, 58, 1348–1357.
- Stone, S. (2003). The transition to high school: Teacher and parent perspectives in a large, urban, predominantly minority school system. *Journal of Ethnic and Cultural Diversity in Social Work*, 12, 47–67.
- Stone, S. (2006). Correlates of change in student reported parent involvement in schooling: A new look at the National Education Longitudinal Study of 1988. *American Journal of Orthopsychiatry*, 76, 518–539.
- Suárez-Orozco, C., & Suárez-Orozco, M. (2001). *Children of immigration: The developing child*. Cambridge, MA: Harvard University Press.
- Suizzo, M., & Stapleton, L. M. (2007). Home based parental involvement in young children's education: Examining the effects of maternal education across U.S. ethnic groups. *Educational Psychology*, 27, 533–556.
- U.S. Census Bureau. (2006). *Poverty thresholds for 2006 by size of family and number of related children under 18 years*. Retrieved from <http://www.census.gov/hhes/www/poverty/threshld/thresh06.html>
- U.S. Department of Education, National Center for Education Statistics. (1988). *National Education Longitudinal Study, 1988* [Computer file]. Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement.
- U.S. Department of Education, National Center for Education Statistics. (2007). *Parent family involvement in education survey of National Household Educational Survey Program, 2007* [Computer file]. Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement.
- Vartanian, T. P., Karen, D., Buck, P. W., & Cadge, W. (2007). Early factors leading to college graduation for Asians and non-Asians in the United States. *The Sociological Quarterly*, 48, 165–197.
- Wong, S. W., & Hughes, J. N. (2006). Ethnicity and language contributions to dimensions of parent involvement. *School Psychology Review*, 35, 645–662.
- Yamamoto, Y., & Holloway, S. D. (2010). Parental expectations and children's academic performance in sociocultural context. *Educational Psychology Review*, 22, 189–214.
- Yan, W., & Lin, Q. (2005). Parent involvement and mathematics achievement: Contrast across racial and ethnic groups. *The Journal of Educational Research*, 99, 116–127.

## AUTHORS NOTE

Sira Park is a doctoral candidate in the School of Education at the University of California, Berkeley. Her research interests are motivational and developmental processes in learning, the influence of parenting on students' achievement, and multilevel, longitudinal data analysis. Her doctoral dissertation will address longitudinal associations between parental involvement and students' achievement.

Susan D. Holloway is a Professor in the Graduate School of Education at the University of California, Berkeley. Her research focuses on schooling and family processes in the context of class and culture. Her most recent book is *Women and Family in Contemporary Japan*, published by Cambridge University Press.



## The effects of school-based parental involvement on academic achievement at the child and elementary school level: A longitudinal study

Sira Park & Susan D. Holloway

To cite this article: Sira Park & Susan D. Holloway (2017) The effects of school-based parental involvement on academic achievement at the child and elementary school level: A longitudinal study, *The Journal of Educational Research*, 110:1, 1-16, DOI: [10.1080/00220671.2015.1016600](https://doi.org/10.1080/00220671.2015.1016600)

To link to this article: <https://doi.org/10.1080/00220671.2015.1016600>



Published online: 19 Aug 2016.



Submit your article to this journal [↗](#)



Article views: 1604



View related articles [↗](#)



View Crossmark data [↗](#)



Citing articles: 2 View citing articles [↗](#)

## ARTICLES

# The effects of school-based parental involvement on academic achievement at the child and elementary school level: A longitudinal study

Sira Park<sup>a</sup> and Susan D. Holloway<sup>b</sup>

<sup>a</sup>Teaching Strategies, Bethesda, Maryland, USA; <sup>b</sup>Graduate School of Education, University of California, Berkeley, California, USA

### ABSTRACT

Policy makers view parental involvement (PI) as a crucial component of school reform efforts, but evidence of its effect on student achievement is equivocal. Using the Early Childhood Longitudinal Study–Kindergarten Cohort dataset, we examined the long-term impact on student- and school-level achievement of three types of school-based PI: PI to help an individual's own child (private-good PI), PI to improve the school (public-good PI), and PI through peer networking. Hierarchical linear modeling analyses indicated that all three types raised student-level achievement in mathematics but only private-good PI was associated with reading achievement. Public-good PI and parent networking boosted school-level achievement. Public- and private-good PI were more strongly associated with student-level mathematics achievement for high socioeconomic status (SES) students; aggregated private-good PI was more strongly related to school-level achievement in low-SES schools. These results provide empirical evidence about the effectiveness of school-based PI, but also suggest a need for schools to explore more effective ways to leverage the social capital of low-SES families.

### ARTICLE HISTORY

Received 13 May 2014  
Revised 12 November 2014  
Accepted 26 January 2015

### KEYWORDS

Growth curve analysis;  
mathematics achievement;  
parental involvement;  
reading achievement

Parents' involvement in children's education has long been believed to promote a range of academic outcomes, including higher achievement, greater engagement in schoolwork, and lower dropout rates (Fan & Chen, 2001; Hill & Tyson, 2009; Lee & Bowen, 2006). For many educators and policy makers, the focus has been on involvement at the school site rather than—or in addition to—involvement at home. Accordingly, there are provisions to strengthen school-based parental involvement (PI) in various pieces of federal legislation including the Goals 2000: Educate America Act, the No Child Left Behind Act, and the Race to the Top Fund. Additionally, many states grant parental leave time from work to attend parent–teacher conferences and other school activities (e.g., Family School Partnership Act in California, School Conference and Activity Leave in Illinois). Indeed, since the implementation of these policies, the percentage of parents reporting involvement at the school site has risen significantly (Child Trends, 2010). However, despite the significant political momentum behind this issue, the findings concerning the efficacy of school-based PI are complex and in some cases contradictory. We begin by providing an overview of this previous work, and then propose a new direction that addresses several problematic aspects of earlier studies.

While a number of studies demonstrate an association between school-based PI and student achievement, many of them draw on cross-sectional data (e.g., Pomerantz, Moorman, & Litwack, 2007; Sheldon & Epstein, 2005; Sheridan, Knoche, Edwards, Bovaird, & Kupzyk, 2010; Xu, Kushner Benson, Mudrey-Camino, & Steiner, 2010). As such they do not provide sufficient grounds for asserting strong claims regarding the causal effects of school-based PI. Moreover, a number of large-scale longitudinal studies have found no significant association between school-based PI and student

achievement after controlling for previous achievement (Domina, 2005; El Nokali, Bachman, & Votruba-Drzal, 2010). Furthermore, even among cross-sectional studies, the effect sizes for school-based PI are relatively modest, especially when compared with home-based activities and parental expectations (for reviews, see Jaynes, 2005; Yamamoto & Holloway, 2010).

In addition to the lack of firm evidence of a causal association between school-based PI and student achievement, the meaning of the available evidence is somewhat obscured in studies that treat PI as a unitary construct. In much of the extant research literature as well as in policy documents, school-based PI is conceptualized as engagement in activities aimed at boosting the achievement of an individual child but is operationalized to include activities such as fundraising that are likely to benefit the school as a whole (Epstein, 1995; Hill & Tyson, 2009; No Child Left Behind Act of 2001, 2002). PI directed at the school bears little theoretical or logical association to the subsequent academic performance of a particular student. In this article, drawing from the literature in economics as well as education, we differentiate the characteristics of private-good PI directed toward the benefit of a particular child from those of public-good PI directed toward all the students in a classroom or a school. We then examine whether each of these two dimensions of PI is associated with achievement at the individual as well as the institutional (i.e., school-wide) level.

In addition to exploring the distinctive affordances of private- and public-good PI in a longitudinal framework, we extend the notion of PI to include parent networking. Social ties to other parents, when activated, are instrumental to the allocation of educational resources from nonfamilial sources,

especially when within-family resources are limited (Wellman & Wortley, 1990). According to social capital theory, parents use peer networks to obtain information about school policies and practices and to help monitor the behavior and achievement of their children (Carbonaro, 1998; McNeal, 1999). Parents who participate in peer networks often develop shared norms and group solidarity, enabling them to organize and advocate for school improvement (Morgan & Sørensen, 1999). Despite these apparent benefits, the relative efficacy of parent networking in promoting individual and institutional-level academic achievement has rarely been compared to that of more conventional forms of PI, such as attending parent–teacher association (PTA) or parent–teacher organization meetings or parent–teacher conferences.

In summary, our study moves the field forward in four ways with respect to the association between school-based PI and student achievement. First, we examine the effects of two distinct types of school-based PI: involvement in activities that concern an individual child (private-good PI) and involvement in activities that target the improvement of a group of students in a classroom or a school (public-good PI). Second, we explore the association of a third and relatively unstudied aspect of PI—parent networking—to student achievement. Third, we examine the effects of these three aspects of school-based PI on individual student achievement as well as on school-wide achievement. Fourth, we used growth curve modeling techniques to examine the longitudinal links between school-based PI and individual and school-wide outcomes. With these statistically powerful analyses we can illuminate the role of school-based PI in fostering student achievement and thereby shed light on the efficacy of current policy efforts.

## Literature review

### Defining PI

In this study, we distinguish three types of parental involvement: Private-good PI, public-good PI, and parent networking. The concepts of private- and public-good activities derive from the field of economics but are increasingly being applied in the field of education (Cucchiara & Horvat, 2009; McMillan, 2000; Walsh, 2010). Descriptive analyses suggest that most parents are more likely to engage in private-good PI than public-good PI. Analyses conducted by the National Center for Education

Statistics (2001) found that 80% of parents of elementary students attend their child’s parent–teacher conference, whereas only 43% belong to the PTA or a similar organization. Furthermore, public-good PI appears to be more often stratified by socioeconomic status compared to private-good PI. For example, Shumow and Miller (2001) found that parents with college degrees were more likely than less educated parents to be involved in the PTA but found no effects of parent education on homework assistance. Similarly, in their analysis of the National Education Longitudinal Study of 1988 (NELS:88; National Center for Education Statistics [NCES], 2002) dataset, Sui-Chu and Willms (1996) found that parents’ membership in the PTA and other volunteer activities was higher in high socioeconomic status (SES) schools, but did not observe SES differences in parents’ likelihood of attending a parent–teacher conference.

In contrast with public- and private-good PI, parent networks are relatively informal groups based on trust, obligation, and shared identity, and as such are not initiated or supervised by the school (Goddard, 2003; Sheldon, 2002). As such, they constitute an important source of information about events or conditions that the school might prefer to conceal from parents. For instance, parents can discuss the reputation of particular teachers or compare strategies for gaining access to special education. This information can be used to benefit the academic outcomes of particular students whose parents are in the network—a matter of private good—or it can be used to identify and address institutional problems (Jackson & Cooper, 1989). In our study, we provide an initial exploration of the impact of network extensiveness on individual student achievement as well as the overall achievement level at a particular school. Table 1 provides a definition of each type of PI along with illustrative examples.

### Relationship of school-based PI and individual achievement

As noted previously, cross-sectional studies typically find a positive association between school-based PI and children’s academic achievement (e.g., Lee & Bowen, 2006; Sheldon & Epstein, 2005; Xu et al., 2010). For instance, using the Early Childhood Longitudinal Study–Kindergarten Cohort (ECLS-K; National Center for Education Statistics [NCES], 2001), Xu et al. (2010) measured school-based PI by averaging six items

**Table 1.** Three aspects of parent school-based involvement.

| Type            | Format           | Definition                                              | Example                                                   | Operationalization                                           | Expected benefits                                                                           |
|-----------------|------------------|---------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| Public-good PI  | School-sponsored | Involvement in school activities to benefit the school  | Fundraising, PTA membership, volunteering                 | Whether or not parents participate in each of the activities | Shared benefits to other families at the same school, possible private benefit              |
| Private-good PI | School-sponsored | Involvement in school activities to support own child   | Attending parent-teacher conference, back-to-school night | Whether or not parents participate in each of the activities | Private returns to the family involved, possible spill-over effects to the school community |
| Parent network  | Parent-initiated | Regular contact with parents in their children’s school | Sharing information about school policies                 | The extensiveness of parents’ network in their child’s class | Public and private returns                                                                  |



regarding private-good activities (attending the school's open house, back-to-school night, and parent-teacher conferences) and public-good activities (attending PTA meetings, volunteering in the classroom, and participating in fundraising). They found that this omnibus measure of school-based PI was associated with reading scores in Grade 5.

However, recent longitudinal studies have failed to find a link between global school-based PI and student achievement. For instance, a longitudinal study of within-family changes in PI did not find associated gains in reading and mathematics standardized scores during the elementary years (El Nokali et al., 2010). Similarly, using a time-lagged growth model, Domina (2005) found no association between parents' volunteer activities and children's academic achievement, net the effects of prior achievement.

Despite the lack of strong longitudinal evidence for school-based PI, it may be premature to conclude that school-based PI is an ineffective way to boost student achievement. Although treating school-based PI as a unitary construct offers the advantage of parsimony, it may obscure the distinctive benefits of particular types of school-based PI activities. In the remainder of this section, we revisit the literature on school-based PI, teasing apart the effects of public-good activities from those that are directed toward the private good. We also examine the literature on parent networking, which has not been fully integrated into the PI literature. Overall, our review suggests that each dimension of school-based PI may be differentially associated with particular domains of achievement. Therefore, we argue that it is worth developing models to test the unique effects of each dimension.

Several cross-sectional studies examining the effects of private-good PI on individual student achievement have found positive relationships (for a review, see Fan & Chen, 2001), while others have found that private-good PI—particularly parents' contact with schools—is negatively associated with academic outcomes (Desimone, 1999; Jeynes, 2005, 2007). Rather than interpreting this negative association as evidence of a harmful influence of PI, some researchers have argued that parents may react to low achievement by increasing their involvement (McNeal, 2012). A related explanation is that school staff may ask parents of academically underperforming children to attend additional conferences, thus accounting for a negative association between contact frequency and contemporaneous achievement. If the reactive hypothesis is correct, there is reason to believe that private-good PI can be helpful to individual children.

In contrast, there is less evidence that public-good PI confers particular benefits to the individual child whose parent is involved. For instance, Okpala, Okapala, and Smith (2001) found that the amount of time a parent volunteered in his or her child's classroom was not associated with that child's achievement in mathematics. And in a recent longitudinal study (Domina, 2005), parents' participation in the PTA showed no evidence of association with their own children's mathematics and reading scores, net of prior achievement. Although there appears to be little overall effect of public-good PI on individual child achievement, there is some evidence of effects from public-good PI on individual children from economically advantaged families (Brent, 2000; Crosnoe & Cooper, 2010; Desimone, 1999; McNeal, 1999).

A third type of PI—parent networking—shifts the focus from the school-parent partnership to the relationship among parents. Several studies drawing upon the NELS:88 data have found that the parents of higher achieving students were more likely to know the parents of their friends than were the parents of lower achieving students (e.g., Muller, 1993; Pong, 1997; Yan & Lin, 2005). Surprisingly, other studies using the same data have found a negative rather than a positive association between parent networks and student achievement. For instance, Morgan and Sørensen (1999) found that the density of parent network appears to depress mathematics learning in public schools, and suggested that these networks may have been reinforcing norms that were not as clearly linked to students' achievement. Several authors, including Carbonaro (1999) and Hallinan and Kubitschek (1999), have raised concerns over the conceptualization and measurement issues in Morgan and Sørensen's (1999) study, and the matter remains a matter of dispute (see Morgan & Todd, 2009).

Like the effects of public-good PI, the influence of parent networks on student achievement may also be conditioned by parents' socioeconomic status. On one hand, more highly educated parents bring more knowledge about the structure and content of the education system to the network and they can effectively deploy this pooled knowledge due to their sense of efficacy in interacting with school staff. In their qualitative work, Lareau (2003) and Horvat et al. (2003) found that middle class parents were more likely than working class parents to associate with the parents of their children's classmates, and that these networks more often included parents with professional skills relevant to addressing problems their children were experiencing in school. These middle-class families were able to react collectively when an issue arose at the school and to mobilize network members to provide needed information, expertise and authority. In contrast, the lower middle class families were more likely to associate with extended family members or community members who did not hold professional positions. While supportive, their networks did not constitute a bridge to access the capital possessed by higher SES parents.

Although lower SES parents may have less access to individuals with large amounts of social and cultural capital, there is evidence that they can create efficacious networks given support from the schools or the outside organizations. For instance, research conducted by Bryk, Sebring, Allensworth, Luppescu, and Easton (2010) in the Chicago Public Schools showed that low-SES parents who became classroom aides often formed relationships with other parents that eventually enabled them to pressure the district to make certain much-needed reforms. The same effect has been found in studies of parents who have a child in need of special education services. While higher SES parents are at an advantage in terms of advocating for their children, research suggests that low-SES and immigrant parents who participate in local support groups can learn these essential skills from experienced peers (Dominguez-Pareto, 2014; Ong-Dean, 2009).

In any case, the effects of parent networking merit further study, particularly as the recent proliferation of social media platforms has made it increasingly easy for parents to establish and maintain close communication regarding their children's schooling. By examining parent network size in addition to the more conventional forms of PI, we were able to investigate the independent contribution of this relatively unstudied but

potentially important activity. Moreover, we were particularly interested in exploring possible moderating effects of family and school-level SES on this relationship.

### **Relationship of school-based PI to school-level outcomes**

To date, the majority of work on school-based PI has examined the effects on individual student outcomes. However, it is logical to expect that public-good PI, which by definition is aimed at the school rather than the individual, will also be associated with school-wide benefits. In fact, the research examining effects of public-good PI on school-level outcomes tends to find positive associations. For instance, the size of PTA membership in a particular school appears to be associated with indicators of school quality including administration effectiveness and the quality of instruction (Walsh, 2008) as well as with higher school-wide test scores (McMillan, 2000). Interviews with school principals suggest that when parents are active volunteers they gain a better understanding of how the schools operate and demonstrate greater respect for teachers and administrators (Brent, 2000). This shift in attitudes may in turn contribute to greater school effectiveness and increased student achievement.

In addition to the benefits of public-good PI, it is also possible for private-good PI to have a spillover effect on the school as a whole. When a large percentage of parents attend parent-teacher conferences, teachers are more likely to feel motivated and supported, which can result in more effective instruction and a better school climate (Epstein & Dauber, 1991; Haynes, Comer, & Hamilton-Lee, 1989). In the previously mentioned longitudinal study conducted within the Chicago public school system (Bryk et al., 2010), amount of private-good PI was strongly correlated with school safety, order, and a student-centered learning climate. Furthermore, schools with more private-good PI were four times more likely than to show school-wide improvement in reading and ten times more likely to show improvement in mathematics.

As we have already noted, parent networking can be used to influence school policy and thereby alter the learning opportunities of all students in the school. Using the Education Longitudinal Study of 2002 (ELS:2002; National Center for Education Statistics [NCES], 2004) dataset, Morgan and Todd (2009) found substantial associations between parental network closure (i.e., extensiveness of network with other parents) and high school student achievement at the school level, but not at the individual level. This finding is consistent with results obtained from analyses of the NELS:88 data, where net individual-level associations were small in comparison to school-level associations (Carbonaro, 1999; Morgan & Sørensen, 1999). Thus there is substantial evidence—primarily from cross-sectional studies—that parental networking is associated with student achievement, particularly at the level of the school. Our study builds on this work by investigating the question in a longitudinal dataset, thereby providing a clearer sense of the direction of these associations.

### **The present study**

Overall, our review suggests that private-good PI can be beneficial to individual student achievement, and may have a spillover effect at the school level particularly in schools serving

low-SES students. In contrast, public-good PI appears to be most likely to benefit the school as a whole rather than an individual student. In addition, preliminary evidence suggests that the extensiveness of parent networks, which can serve private- or public-good functions, is associated with individual level as well as school-level achievement. However, few studies have examined these various relationships in a longitudinal framework. In our study, we explored this multi-dimensional web of possible effects by examining the association of three aspects of school-based PI to individual and school-level achievement. The research questions addressed in this study are as follows:

1. Research Question 1. To what extent are three dimensions of school-based PI (public-good PI, private-good PI, and activation of parent network) related to individual children's mathematics and reading scores across kindergarten and Grades 1, 3, and 5?
2. Research Question 2. To what extent are these three dimensions of school-based PI aggregated at the school level related to school-wide academic achievement across kindergarten and Grades 1, 3, and 5?
3. Research Question 3. Do children from high-SES families benefit more from school-based PI than do children from low-SES families or vice versa?
4. Research Question 4. Do schools with a higher concentration of poverty benefit more from school-mean PI than do schools with a lower concentration of poverty or vice versa?

To address these questions, we drew on data from the ECLS-K. By using three-level growth curve modeling we were able to capture growth in student achievement as well as the influences of school-based PI on growth, controlling for potentially confounding family and school factors (Rabe-Hesketh & Skrondal, 2008; Singer & Willet, 2003).

## **Method**

### **Data source**

The ECLS-K dataset traces the academic development of a nationally representative cohort of students entering kindergarten in the 1998–1999 school year. The sample was obtained by identifying 100 geographical sampling units and then randomly selecting 1,000 schools (public and private) within the selected units. An average of 23 students was randomly sampled within each school. In the base kindergarten year, the cohort consisted of 21,409 students in 992 schools. The analytic sample that we used includes a total of 17,385 students who were followed through Grade 5 and had one or more scores in reading and in mathematics.

Participating students were assessed on six occasions: Fall and spring of kindergarten, fall and spring of Grade 1, spring of Grade 3, and spring of Grade 5. Trained assessors administered child assessments in schools, and conducted parent interviews by telephone about family characteristics and PI in school activities. In the spring of each survey year, school administrators completed a survey concerning the school's physical, organizational, and learning environment. The ECLS-K sample design and data collection procedures are further described at the National Center for Education Statistics website (<http://nces.ed.gov/ecls>).

Rates of missing data were generally less than 4% for the demographic and child–parent characteristics. Approximately 6–13% of the data on school-level achievement was missing, as was 14–22% of the data (depending on the wave) on school-level percentage of students eligible for free or reduced-price lunch. To make use of all legitimate, available information without imputing values or excluding cases, we utilized full-information maximum likelihood estimation, which allows any child contributing one or more outcome scores to be included in the analyses and contribute to the within-person estimation (Rabe-Hesketh & Skrondal, 2008). We also specified the control variables as time invariant and fixed these to the average of the available values across waves, thus permitting any student with survey data from one or more waves to have an empirically based value for these variables. Subsequent to the application of these strategies, one percent of the students lacked data on student-level control variables, and 12% lacked data on school-level control variables.

### Measures

Appendixes A and B present detailed descriptions of all the variables used in the individual- and school-level models, respectively.

#### Time

Time was specified as the child's grade from kindergarten to Grade 5. Kindergarten was coded as 0; other grade levels (i.e., Grades 1, 3, and 5) were coded as the corresponding number. Thus, the intercept in the hypothesized individual growth trajectory represents the students' initial outcome status in the spring of kindergarten. Our analyses focused on the four spring waves when the children were in kindergarten and Grades 1, 3, and 5.

#### School-based PI

In each wave, parents rated their involvement in their children's schooling on seven dichotomous items. For the public-good PI composite, we used parents' report of whether or not they had participated in PTA meetings, volunteering, and fundraising (0 = no, 1 = yes). The interitem reliability of public-good PI was moderate (i.e., Cronbach's alpha ranged from .51 to .55 across the waves). For the private-good PI composite, we used parents' reported attendance at parent–teacher conferences, open house, back-to-school night, and other school events. The internal consistency of involvement for private-good PI was good (i.e., Cronbach's alpha ranged from .57 to .62 across waves). Parent network was represented by a single item, the parent's estimate of the number of other parents in the classroom that he or she regularly talked with in person or on the phone. For the student-level analyses, we used individual parents' responses on the relevant questions. For the school level, we computed the average level of involvement at the school for each of the relevant questions.

#### Mathematics and reading achievement

Individual academic achievement was represented by item response theory (IRT) scale scores on individually-administered reading and mathematics assessments in the spring of kindergarten and Grades 1, 3, and 5. In each subject area,

children took the assessments in two stages. The first stage was uniform across all children. In this stage, children received a 12- to 20-item routing test. Their performance on the routing items guided whether they took the low, medium, or high difficulty version at the second stage. IRT was used to calculate the predicted probability of each item being answered correctly by each student. The overall IRT scores thus represent the predicted number of items the student would have answered correctly at each measurement point if all questions from the first- and second-stage tests had been administered. These scores are comparable across students within wave and across waves.

#### School-level achievement

Academic achievement scores for participating schools are not available in the ECLS-K dataset. Instead, we used school administrators' estimates of overall achievement of their school. Specifically, as part of the survey administered in the spring of each year, school administrators were asked to report the percentage of currently enrolled students testing at or above grade level in reading or verbal skills and mathematics skills. The response rate was approximately 90% within each wave. For each school, a mean percentage score was calculated using estimated percentage of proficient students at verbal and mathematics skills.

#### Family characteristics

Child and family demographic information was collected through parent surveys during the base-year interview. Time-invariant family control variables included whether families spoke non-English (0) or English (1) at home, and whether the child lived in a two-biological parent family (0) or a single- or step-parent family (1). Family SES was a continuous measure computed by ECLS-K that included father or male and mother or female guardian's education; father or male and mother or female guardian's occupational prestige based on the 1989 General Social Survey; and household income.

#### School characteristics

Three time-invariant variables were used as school-level controls: School size, percentage of ethnic or racial minority students in the school, and percentage of students eligible to receive free or reduced-price lunch. These data were derived from administrator interviews.

#### Analytic techniques

The current study considers the possibility that school-based PI may affect both individual child- and school-level outcomes. Thus, we built two separate models of school-based PI that estimated both effects.

#### Individual-level model

Analyses were estimated with Level 1 as occasions (within-individual effects), Level 2 as families (between-family and within-school effects), and Level 3 as schools (between-school effects). Growth curve models were fitted by maximum likelihood using Stata 13's xtmixed (StataCorp, College Station, TX). Preliminary inspection of empirical growth plots as a function of grade suggested that the growth patterns were not linear. A quadratic growth specification was the most appropriate way of representing the individual

growth trajectories in mathematics/reading achievement. Thus the multilevel model for change was expressed in terms of grade and the quadratic term of grade. We used parents' report of their participation in school activities at every wave, making these variables time varying. Time-varying predictors predicted the contemporaneous value of outcomes. The three subscripts on the school PI variables signify their time-varying nature.

Level 1:

$$\begin{aligned}
 Y_{tij} = & \pi_{0ij} + \pi_{1ij}(\text{grade})_{tij} + \pi_{2ij}(\text{grade}^2)_{tij} \\
 & + \pi_{3ij}(\text{publicPI})_{tij} + \pi_{4ij}(\text{Private PI})_{tij} + \pi_{5ij}(\text{Network})_{tij} \\
 & + \pi_{6ij}(\text{PublicPI})(\text{grade})_{tij} + \pi_{7ij}(\text{PrivatePI})(\text{grade})_{tij} \\
 & + \pi_{8ij}(\text{Network})(\text{grade})_{tij} + \varepsilon_{tij}
 \end{aligned}$$

In this equation,  $\pi_{0ij}$  represents the performance of child  $i$  in school  $j$  at the initial assessment, when the three PI variables equal zero;  $\pi_{1ij}$  represents the initial linear slope or the yearly growth rate of child  $i$  in school  $j$ ;  $\pi_{2ij}$  captures acceleration-deceleration in growth;  $\pi_{3ij}$ ,  $\pi_{4ij}$ , and  $\pi_{5ij}$  represent the effects of time-varying school-based PI on the contemporaneous performance of child  $i$  in school  $j$  at time  $t$  (kindergarten and Grades 1, 3, and 5);  $\pi_{6ij}$ ,  $\pi_{7ij}$ , and  $\pi_{8ij}$  represent interactions between school-based PI and grade, enabling us to evaluate the relationship between growth rate and school-based PI; and  $\varepsilon_{tij}$  represents the time-specific error of child  $i$  in school  $j$  at time  $t$ .

Level 2:

$$\begin{aligned}
 \pi_{0ij} = & \beta_{00j} + \beta_{01j}(\text{Family SES})_{ij} \dots + \beta_{0pj}(X_{0pj}) + r_{0ij} \\
 \pi_{1ij} = & \beta_{10j} + \beta_{11j}(\text{Family SES})_{ij} \dots + \beta_{1pj}(X_{1pj}) \\
 \pi_{2ij} = & \beta_{20j} \\
 \pi_{3ij} = & \beta_{30j} + \beta_{31j}(\text{Family SES})_{ij} \\
 \pi_{4ij} = & \beta_{40j} + \beta_{41j}(\text{Family SES})_{ij} \\
 \pi_{5ij} = & \beta_{50j} + \beta_{51j}(\text{Family SES})_{ij} \\
 \pi_{6ij} = & \beta_{60j} \\
 \pi_{7ij} = & \beta_{70j} \\
 \pi_{8ij} = & \beta_{80j}
 \end{aligned}$$

The Level 2 model represents variation in growth parameters across children from different families within the same school. It adds controls for family characteristics and cross-level interaction terms among the three types of school-based PI and family SES. The term  $\beta_{00j}$  represents the mean intercept or average outcome scores within school  $j$  at the initial assessment when the covariates are zero;  $\beta_{0pj}$  represents the strength and the direction of association between the family level control variables ( $X_{0pj}$ ) and outcomes of students in school  $j$  at the initial assessment;  $\beta_{10j}$  represents the mean linear slope or the rate of growth of students in school  $j$ ;  $\beta_{1pj}$  represents the influences of family level control variables ( $X_{1pj}$ ) on linear growth rates of students in school  $j$  during the 6 focal school years; and  $r_{0ij}$  represents school  $j$ 's deviation from the average outcome

scores predicted by the model. Except for  $\beta_{00j}$ , all other parameters in the Level 2 model were treated as fixed.  $\beta_{31j}$ ,  $\beta_{41j}$ , and  $\beta_{51j}$  represent the interaction effects between the three school-based PI variables and family SES.

Level 3:

$$\begin{aligned}
 \beta_{00j} = & \gamma_{000} \dots + \gamma_{00p}(W_{00p}) + u_{00j} \\
 \beta_{10j} = & \gamma_{100} \\
 \beta_{20j} = & \gamma_{200} \\
 \beta_{30j} = & \gamma_{300} \quad \beta_{31j} = \gamma_{310} \\
 \beta_{40j} = & \gamma_{400} \quad \beta_{41j} = \gamma_{410} \\
 \beta_{50j} = & \gamma_{500} \quad \beta_{51j} = \gamma_{510} \\
 \beta_{60j} = & \gamma_{600} \\
 \beta_{70j} = & \gamma_{700} \\
 \beta_{80j} = & \gamma_{800}
 \end{aligned}$$

The Level 3 model adds controls for school-level factors.  $\gamma_{000}$  represents the population mean outcome scores at the initial assessment across schools when the covariates are zero;  $\gamma_{00p}$  represents the strength and the direction of association between school-level control variables ( $W_{00p}$ ) and mean initial outcome scores across schools. Except for the intercept ( $\gamma_{000}$ ), all other parameters at Level 3 are treated as fixed.  $u_{00j}$  represents the overall deviation across schools for the outcome scores predicted by the model.

### School-level model

In the school-level modeling, the unit of analysis was a school, not an individual. Thus, after each parent's report regarding school PI was aggregated to school-level scores, models were built to investigate how time-varying school-mean PI was associated with changes in school achievement during the elementary years. The design consists of a two-level hierarchical linear model (HLM) with school-mean PI and school achievement at each wave (kindergarten and Grades 1, 3, and 5) nested within schools.

Level 1:

$$\begin{aligned}
 Y_{tj} = & \beta_{0j} + \beta_{1j}(\text{Public})_{tj} + \beta_{2j}(\text{Private})_{tj} + \beta_{3j}(\text{Network})_{tj} + \varepsilon_{tj} \\
 \varepsilon_{tj} | X \sim & N(0, \theta)
 \end{aligned}$$

In this model, school achievement in a particular year ( $t$ ) for a particular school ( $j$ ) is modeled as a function of a school-specific intercept ( $\beta_{0j}$ ), and the time-specific effects of school mean public-good PI ( $\beta_{1j}$ ), private-good PI ( $\beta_{2j}$ ), and parent network ( $\beta_{3j}$ ); and  $\varepsilon_{tj}$  represents the within-school error term that contributes to the variance unexplained by the covariates.



Level 2:

$$\begin{aligned}\beta_{0j} &= \gamma_{00} + \gamma_{01}(\text{SchoolPov})_j + \gamma_{0p}(\text{School Controls})_j \\ &\quad + \mu_{0j}, \mu_{0j} \sim N(0, \psi) \\ \beta_{1j} &= \gamma_{10} + \gamma_{11}(\text{SchoolPov})_j \\ \beta_{2j} &= \gamma_{20} + \gamma_{21}(\text{SchoolPov})_j \\ \beta_{3j} &= \gamma_{30} + \gamma_{31}(\text{SchoolPov})_j\end{aligned}$$

At the between-school level, school characteristics (school poverty, percentage of minority students, and school size) were included to explain between-school variability in school outcomes. The first equation is for the school-specific intercept  $\beta_{0j}$  from the Level 1 equation. It is modeled as a function of grand mean outcome scores of the sample ( $\gamma_{00}$ ), school poverty ( $\gamma_{01}$ ), and other school level covariates ( $\gamma_{0p}$ ). And  $\mu_{0j}$  represents the between-school error term. The subsequent three equations indicate that the within-school parameters— $\beta_{1j}$ ,  $\beta_{2j}$ , and  $\beta_{3j}$ —are treated as fixed effects.  $\gamma_{11}$ ,  $\gamma_{21}$ , and  $\gamma_{31}$  represent the interaction effects between school-mean PI and school poverty.

## Results

### Descriptive analyses

Descriptive statistics regarding the sample characteristics and student outcomes are provided in Table 2. Just over half the students were male, and 54% were non-Hispanic White. Public-good and private-good PI scores reached their peak at Grade 3 and then slightly decreased in Grade 5, whereas parent network size increased over the 6 years. Mathematics and reading achievement scores also improved across the 6 years. School administrators' reports of school-level achievement displayed

slight changes across waves, but did not constitute a growth pattern.

The descriptive statistics displayed in Table 3 indicate how the time-varying continuous measures varied within and between the individual level and the school level. Each aspect of school-based PI varied more between individuals than within an individual, indicating that individual parents tended to maintain a similar level of school-based PI over time. Conversely, students' scores in mathematics and reading varied more within an individual than between individuals. At the school-mean level, all three aspects of PI varied more between schools than within schools over time. School-wide achievement varied more between schools than within schools. There were stark SES differences at both the family and school levels. The higher SES families and schools showed more evidence of school-based PI than their lower SES counterparts, and higher SES students performed better than lower SES students on the mathematics and reading assessments.

### Findings from individual academic development models

For these analyses, the predictors were grouped into three categories: (a) priority predictors (public-good PI, private-good PI, and parent network) in Level 1, (b) family-level controls (family SES, parents' marital status, and non-English speaking household measured at base year) in Level 2, and (c) school-level controls (school poverty, percentage of minority students in the school, and school enrollment measured at base year) in Level 3.

Model 1 investigated variability in the intercepts and slopes of the trajectories for the outcome variables without including any predictors. Model 2 expanded on the unconditional growth model by investigating the effects of the priority predictors on academic development. Model 3 allowed evaluation of these associations while controlling for the

Table 2. Descriptive statistics.

|                          | Kindergarten |         | Grade 1 |         | Grade 3 |         | Grade 5 |         | Total |              |              |             |
|--------------------------|--------------|---------|---------|---------|---------|---------|---------|---------|-------|--------------|--------------|-------------|
|                          | M or %       | (SD)    | M       | (SD)    | M       | (SD)    | M       | (SD)    | M     | Overall (SD) | Between (SD) | Within (SD) |
| Time-invariant variables |              |         |         |         |         |         |         |         |       |              |              |             |
| Child characteristics    |              |         |         |         |         |         |         |         |       |              |              |             |
| Male                     | 51.47        |         |         |         |         |         |         |         |       |              |              |             |
| White                    | 54.20        |         |         |         |         |         |         |         |       |              |              |             |
| Black                    | 17.03        |         |         |         |         |         |         |         |       |              |              |             |
| Latino                   | 18.09        |         |         |         |         |         |         |         |       |              |              |             |
| Asian                    | 2.89         |         |         |         |         |         |         |         |       |              |              |             |
| Family SES               | −0.08        | (0.76)  |         |         |         |         |         |         |       |              |              |             |
| Non-English at home      | 12.43        |         |         |         |         |         |         |         |       |              |              |             |
| Single-parent family     | 37.65        |         |         |         |         |         |         |         |       |              |              |             |
| School characteristics   |              |         |         |         |         |         |         |         |       |              |              |             |
| Free/reduced lunch       | 55.92        |         |         |         |         |         |         |         |       |              |              |             |
| Minority students        | 61.26        |         |         |         |         |         |         |         |       |              |              |             |
| School enrollment size   | 1,456.84     |         |         |         |         |         |         |         |       |              |              |             |
| Time-varying variables   |              |         |         |         |         |         |         |         |       |              |              |             |
| Parent involvement       |              |         |         |         |         |         |         |         |       |              |              |             |
| Public-good PI           | 1.43         | (1.01)  | 1.62    | (1.02)  | 1.68    | (1.02)  | 1.63    | (1.00)  | 1.57  | (1.02)       | (0.87)       | (0.55)      |
| Private-good PI          | 2.24         | (0.87)  | 2.42    | (0.80)  | 2.56    | (0.72)  | 2.50    | (0.75)  | 2.41  | (0.81)       | (0.70)       | (0.47)      |
| Parent-network           | 2.25         | (3.00)  | 2.71    | (3.38)  | 3.07    | (3.87)  | 3.27    | (3.91)  | 2.75  | (3.51)       | (2.74)       | (2.16)      |
| Academic achievement     |              |         |         |         |         |         |         |         |       |              |              |             |
| Math achievement         | 25.90        | (9.09)  | 61.26   | (18.09) | 98.72   | (24.71) | 123.68  | (24.79) | 73.64 | (38.44)      | (24.62)      | (31.40)     |
| Reading achievement      | 35.21        | (10.19) | 77.35   | (23.87) | 126.66  | (28.04) | 150.09  | (26.39) | 93.11 | (46.31)      | (29.16)      | (38.50)     |
| School-wide achievement  | 64.35        | (22.71) | 64.65   | (23.03) | 65.79   | (22.92) | 65.25   | (22.29) | 65.39 | (22.20)      | (20.35)      | (12.30)     |

**Table 3.** Key study variables by family and school SES indicators (Grade 5 data only).

|                                                                 | Family SES                  |                             |                             |                             |                              | F-value   |
|-----------------------------------------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|-----------|
|                                                                 | 20 <sup>th</sup> percentile | 40 <sup>th</sup> percentile | 60 <sup>th</sup> percentile | 80 <sup>th</sup> percentile | 100 <sup>th</sup> percentile |           |
|                                                                 | M (SD)                      | M (SD)                      | M (SD)                      | M (SD)                      | M (SD)                       |           |
| Outcomes                                                        |                             |                             |                             |                             |                              |           |
| Math achievement                                                | 107.04 (25.35)              | 118.23 (23.78)              | 123.67 (22.08)              | 129.30 (21.35)              | 138.07 (19.06)               | 559.86*** |
| Reading achievement                                             | 130.29 (25.65)              | 143.93 (24.54)              | 150.62 (23.27)              | 157.21 (21.83)              | 166.43 (20.10)               | 713.23*** |
| Parent involvement                                              |                             |                             |                             |                             |                              |           |
| Public-good PI                                                  | 1.13 (0.95)                 | 1.41 (0.96)                 | 1.57 (0.98)                 | 1.82 (0.96)                 | 2.03 (0.92)                  | 265.85*** |
| Private-good PI                                                 | 2.03 (0.96)                 | 2.38 (0.77)                 | 2.51 (0.72)                 | 2.66 (0.59)                 | 2.77 (0.50)                  | 311.54*** |
| Parental network                                                | 2.00 (3.06)                 | 2.56 (3.34)                 | 3.06 (3.70)                 | 3.86 (4.12)                 | 4.69 (4.41)                  | 142.06*** |
| Percentage of students eligible for free or reduced-price lunch |                             |                             |                             |                             |                              |           |
| Outcomes                                                        |                             |                             |                             |                             |                              |           |
| School achievement                                              | 77.98 (17.62)               | 71.41 (19.95)               | 65.43 (20.60)               | 62.84 (21.44)               | 54.08 (23.58)                | 258.34*** |
| Parent involvement                                              |                             |                             |                             |                             |                              |           |
| School-mean public-good PI                                      | 1.65 (0.51)                 | 1.48 (0.50)                 | 1.45 (0.50)                 | 1.25 (0.59)                 | 1.19 (0.51)                  | 223.00*** |
| School-mean private-good PI                                     | 2.59 (0.39)                 | 2.45 (0.43)                 | 2.34 (0.48)                 | 2.15 (0.50)                 | 2.15 (0.57)                  | 296.38*** |
| School-mean parental network                                    | 3.23 (1.97)                 | 2.75 (1.71)                 | 2.18 (1.49)                 | 2.13 (1.80)                 | 2.11 (1.47)                  | 161.35*** |

Note. \*\*\* $p < .001$ .

effects of family and school-level factors. In addition, interaction terms between family SES and the priority predictors were included in Model 3 to test the potential moderating effects of family SES on the relationship between school-based PI and student achievement.

### Mathematics achievement trajectories

Table 4 displays estimates for the fitted multilevel growth models pertaining to mathematics achievement. The unconditional growth model (Model 1) indicated that a quadratic specification of mathematics achievement as a function of grade best described mathe-

**Table 4.** Fitted multilevel models for changes in child math and reading achievement.

|                              | Mathematics |            |            | Reading    |            |            |
|------------------------------|-------------|------------|------------|------------|------------|------------|
|                              | Model 1     | Model 2    | Model 3    | Model 1    | Model 2    | Model 3    |
| Fixed effects                |             |            |            |            |            |            |
| Intercept                    | 35.92***    | 34.90***   | 37.58***   | 44.50***   | 44.92***   | 48.36***   |
| Grade                        | 26.14***    | 25.54***   | 26.06***   | 35.06***   | 34.25***   | 34.59***   |
| Grade <sup>2</sup>           | -1.76***    | -1.81***   | -1.82***   | -2.97***   | -3.02***   | -2.97***   |
| Public-good PI               |             | 0.62***    | 0.34***    |            | 0.47***    | 0.17       |
| Public-good PI × Grade       |             | 0.03       | -0.04      |            | 0.21***    | 0.08       |
| Public-good PI × Family SES  |             |            | 0.27**     |            |            | 0.20       |
| Private-good PI              |             | 0.13       | 0.04       |            | -0.25**    | -0.51***   |
| Private-good PI × Grade      |             | 0.29***    | 0.21***    |            | 0.54***    | 0.40***    |
| Private-good PI × Family SES |             |            | 0.41***    |            |            | 0.26       |
| Parent network               |             | 0.11***    | 0.12***    |            | 0.05       | 0.06       |
| Parent network × Grade       |             | 0.01       | 0.01       |            | 0.03**     | 0.01       |
| Parent network × Family SES  |             |            | -0.02      |            |            | 0.01       |
| Family SES                   |             |            | 3.67***    |            |            | 5.16***    |
| Single parent family         |             |            | -1.65***   |            |            | -2.50***   |
| Non-English at home          |             |            | -2.90***   |            |            | -3.39***   |
| School F/R lunch             |             |            | -0.02***   |            |            | -0.05***   |
| Percentage of minority       |             |            | -0.77***   |            |            | -0.08      |
| School size                  |             |            | 0.45**     |            |            | 0.40       |
| Random effects (SD)          |             |            |            |            |            |            |
| Level 1                      | 10.81***    | 8.59***    | 8.55***    | 13.35***   | 11.43***   | 11.23***   |
| Level 2 intercept            | 13.69***    | 9.67***    | 9.24***    | 15.50***   | 12.33***   | 11.73***   |
| Slope of grade               |             | 3.24***    | 3.04***    |            | 3.82***    | 3.23***    |
| Correlation                  |             | .73***     | .73***     |            | 0.47***    | .47***     |
| Level 3                      | 7.93***     | 5.91***    | 3.48***    | 9.74***    | 9.19***    | 4.38***    |
| Model fit statistics         |             |            |            |            |            |            |
| 2 log-likelihood             | -23,7301.8  | -21,2916.7 | -13,1724.4 | -24,3785.7 | -21,8909.8 | -13,6660.3 |

Note. Model 1 is an unconditional growth model. Model 2 adds the main effect of school-based PI as well as school-based PI × Grade interaction effects. Model 3 added family and school-level covariates. F/R lunch refers to the percentage of students eligible for free or reduced-price lunch.

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

matics achievement. The mathematics achievement trajectories displayed a curvilinear pattern; they tended to increase with grade ( $\beta_1 = 26.14, p < .001$ ), but at a decelerating rate ( $\beta_2 = -1.76, p < .001$ ). The variance components for initial status and rates of change were statistically significant, suggesting that it is reasonable to explore the effects of family and school-specific predictors on academic growth. In successive models, the decrease in the deviance statistic was significant at  $p < .001$ , indicating that Model 3 provided the best fit of all the models.

In Model 3, the time-varying indicators of public-good PI ( $\beta_3 = 0.34, p < .001$ ) and parent network ( $\beta_4 = 0.12, p < .001$ ) were positively associated with contemporaneous mathematics achievement, while time-varying private-good PI was not associated with contemporaneous mathematics achievement. Private-good PI interacted significantly with grade ( $\beta_5 = 0.21, p < .001$ ), indicating that the effect of private-good PI on mathematics achievement became stronger as children moved into the higher grades. The indicators of public-good PI ( $\beta_9 = 0.27, p < .001$ ) and private-good PI ( $\beta_{10} = 0.41, p < .001$ ) displayed significant, positive interactions with family SES. This result indicates that with respect to mathematics, children from high-SES families benefitted more from their parents' public-good and private-good PI than did children from low-SES families. In contrast, the positive relation of parent network to mathematics achievement worked uniformly across high- and low-SES families.

As seen in Table 4, Models 2 and 3 demonstrated successive reductions in all variance components when compared with the unconditional growth model. Specifically, in Model 2, after adding the three types of school-based PI, variances at Level 1 (within-person) and Level 2 (between-person) were substantially reduced. In Model 3, the inclusion of school-level controls reduced Level 3 (between-school) variances. Significant and positive correlations between intercepts and slopes ( $r = .73$ ) suggested that children with initially higher mathematics scores relative to their peers improved more rapidly over time.

### Reading achievement trajectories

Table 4 displays estimates of fitted multilevel growth models for reading trajectories. As was true of the mathematics trajectories, the reading trajectories tended to increase with grade ( $\beta_1 = 35.06, p < .001$ ), but at a decelerating rate ( $\beta_2 = -2.97, p < .001$ ). Comparisons between successive models revealed a significant change in the deviance statistics at  $p < .001$ , indicating that Model 3 provided the best fit of all the models. Time-varying private-good PI had a significant, but negative, association with contemporaneous reading scores ( $\beta_4 = -0.51, p < .001$ ), and a positive association with reading growth ( $\beta_7 = 0.40, p < .001$ ). This indicates that children of parents who were highly involved in private-good activities tended to score *lower* in reading at each assessment. However, the influence of private-good PI on reading scores became stronger in the later grades, and children of highly involved parents ultimately surpassed their peers at the end of their elementary years. In contrast, public-good PI and parent network displayed no association with contemporaneous reading scores or reading growth.

No interaction effect between the three school-based PI indicators and family SES was significant. Variance components in the reading achievement models display patterns similar to

those observed in the mathematics models; after adding the three types of school-based PI, variances at Level 1 (within-person) and Level 2 (between-person) were substantially reduced, while the inclusion of school-level controls reduced Level 3 (between-school) variances. The correlation between intercept and slope was positive, but the strength of the relation was smaller ( $r = .43$ ) in reading than in mathematics ( $r = .73$ ).

### Findings from models of school-wide achievement

To examine the effects of school-mean PI on school-level achievement, the predictors were grouped into two categories: (a) priority predictors (school-mean public-good PI, school-mean private-good PI, and school-mean parent network) and (b) school-level controls (school poverty, percentage of minority students in the school, and school enrollment size). The analysis began with an unconditional model (Model 1). Model 2 expanded the unconditional model to evaluate the relations of the three school-mean indicators of PI to school-level achievement. Model 3 tested the relations of the three school-mean indicators of PI to school-level achievement, net the effects of school-level controls. In addition, interactions between the three school-mean PI indicators and school poverty were included in the final model.

Table 5 displays estimates of the fitted multilevel models for school-wide achievement. Significant within- and between-school variations were found with respect to mean school achievement, which justified the use of HLM analysis. The intraclass correlation was 0.71, indicating that 71% of the total variation in school-wide achievement was between schools. Model-fit statistics (deviances) suggested that Model 3 was the best fitting model.

The intercept in Model 3 represents the average school-wide percentage of students meeting national standards when all

Table 5. Fitted multilevel models for school-level academic achievement.

|                                    | School academic achievement |            |            |
|------------------------------------|-----------------------------|------------|------------|
|                                    | Model 1                     | Model 2    | Model 3    |
| Fixed effects                      |                             |            |            |
| Intercept                          | 61.78***                    | 56.28***   | 75.32***   |
| Public-good PI                     |                             | 0.88***    | 0.61*      |
| Public-good PI $\times$ F/R lunch  |                             |            | 0.00       |
| Private-good PI                    |                             | 1.30***    | 0.41       |
| Private-good PI $\times$ F/R lunch |                             |            | 0.03**     |
| Parent network                     |                             | 0.56***    | 0.81***    |
| Parent network $\times$ F/R lunch  |                             |            | 0.00       |
| F/R lunch                          |                             |            | -0.27***   |
| Percentage of minority             |                             |            | -3.25***   |
| School size                        |                             |            | 0.30       |
| Random effects (SD)                |                             |            |            |
| Level 1                            | 12.31***                    | 12.16***   | 12.16***   |
| Level 2                            | 19.36***                    | 18.96***   | 14.58***   |
| Model fit statistics               |                             |            |            |
| -2 log-likelihood                  | -14,4843.8                  | -14,3045.7 | -10,4308.4 |

Note. Model 1 is an unconditional growth model. Model 2 adds the main effect of school-mean PI. Model 3 added school-mean PI  $\times$  School F/R lunch interaction effects and school-level covariates. F/R lunch refers to the percentage of students eligible for free or reduced-price lunch.

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .



other controls equal zero. The school-level achievement intercept in Model 3 was 75.32, much higher than the population average in Model 1 (61.78). Two types of school-mean PI had positive associations with school-wide achievement: school-mean public-good PI ( $\beta_1 = 0.61, p < .05$ ) and school-mean parent network ( $\beta_3 = 0.81, p < .001$ ). School-mean private-good PI was significantly associated with school-level achievement in Model 2 but not Model 3. There was a positive interaction between school-mean private-good PI and school poverty ( $\beta_5 = 0.03, p < .01$ ), indicating that the effects of school-mean private-good PI on school-level achievement were stronger in schools with high concentration of poverty. Regarding random effects, the addition of predictors reduced Level 1 (within-school) and Level 2 (between-school) variances, particularly the inclusion of school-level controls.

## Discussion

School-based PI has been identified in federal laws as well as state and federal education policy as an important lever of school reform and educational equality. However, previous studies have not been uniformly supportive of the effectiveness of school-based PI. In this study, we employed several conceptual and methodological strategies that enabled us to explore the efficacy of school-based PI in a particularly powerful way. Specifically, we used the ECLS-K dataset to examine the relative impact of three dimensions of school-based PI on individual student academic achievement over time in mathematics and reading: parents' involvement directed at their own child (private-good PI), involvement to improve the school as a whole (public-good PI), and involvement in a parent network. In addition, we examined whether achievement at the school level was affected when a greater percentage of parents was involved in these three aspects of PI. We also investigated whether family- and school-level SES moderated the effects of school-based PI on educational outcomes.

### *Does school-based PI boost student-level academic achievement?*

Overall, we found strong evidence of an association between various types of school-based PI and student-level achievement. As expected, private-good PI was more strongly associated with individual achievement than was public-good PI, predicting reading as well as mathematics achievement. Private-good PI was also distinctive in that there was no contemporaneous effect on mathematics achievement, but the relationship became stronger across time. Furthermore, private-good PI was actually negatively associated with reading achievement in terms of the contemporaneous relationship, but became strongly and positively associated with reading achievement over time. Private-good PI was more strongly associated with student-level achievement for high-SES than low-SES students. Thus, these findings point to a significant effect of parents' efforts to support their own child's achievement, particularly for high-SES families.

The effects of public-good PI were somewhat less robust. Parent efforts directed at the school were associated with student-level mathematics achievement overall, but the association remained constant across the grades rather than intensifying as

was the case with private-good PI. Like private-good PI, public-good PI was more strongly related to mathematics achievement in high-SES than low-SES families. However, public-good PI showed no relation to student-level reading achievement after controlling for family and school characteristics. The third type of PI, parent networking, was associated with mathematics but not reading achievement. The effects of parent networking on mathematics achievement did not increase over time, nor were they associated with family SES.

These findings raise a number of important questions about the factors that appear to boost achievement at the student level. One question is why private-good effects on student-level achievement intensify over time. As noted previously, we found that private-good PI became more strongly related to mathematics and reading achievement as children move through the elementary grades. Based on a skill development model (Epstein, 1995), we would argue that as the curriculum becomes more challenging, parents who are engaged at the school site are able to gain a better understanding of the concepts and pace of what is being taught, and thus obtain a comparatively bigger advantage over their less-engaged counterparts than they had in the early grades. Another possibility is that parents' active participation in activities during these years may be particularly influential because it is in the last years of elementary school that student engagement in school typically experiences as sharp decline and thus the job of supporting them becomes more challenging (Grolnick & Slowiaczek, 1994; Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean, 2006).

The findings with respect to change over time are further complicated by the fact that, in terms of reading achievement, the contemporary association with private-good PI is not merely nonsignificant, but rather it is significant and negative. This may be an example of reactive involvement (McNeal, 2012), in which parents of children who are having trouble in school are more likely to schedule meetings with teachers, or otherwise become involved in school activities to address their concerns about low achievement. Furthermore, the fact that parents tend to become more reactively involved with respect to reading may reflect the general tendency of schools to focus more directly on reading than mathematics achievement in the early grades, thus increasingly the likelihood that achievement gaps will be more salient to teachers as well as parents (Pianta, Belsky, Houts, & Morrison, 2007).

Another question raised by our findings regarding student-level performance is why there is a differential effect for reading versus mathematics achievement. Our analyses showed that while private-good PI was related to mathematics and reading achievement over time, public-good PI was related to mathematics but not to reading achievement. It is possible that parents need more information from the school about how to support children's mathematics performance than they do regarding reading performance. Indeed, one study of elementary school children found substantial variation among mothers in their ability to provide accurate and developmentally appropriate assistance when they were helping their children with mathematics homework (Hyde, Else-Quest, Alibali, Knuth, & Romberg, 2006). Mothers with less mathematics preparation, and less confidence about their mathematics skills were less likely to participate effectively in tutoring

sessions, prompting the study authors to suggest that some parents receive assistance at the school site to remedy this inequality. Indeed, there is evidence that schools can boost parent effectiveness and student-level mathematics achievement by actively encouraging public-good PI (Hindman, Skibbe, & Morrison, 2010). Additional research is needed to explore the ways that parents' public-good efforts promote student-level achievement so that teachers can better leverage parent volunteer efforts to support student achievement in all subject areas.

### ***Does school-based PI boost school-wide achievement?***

Our second research objective was to examine whether the three types of school-mean PI were related to overall achievement at the level of the school. We found that public-good PI had a beneficial effect on the school community as a whole. School-wide academic achievement was higher in schools characterized by high levels of parent participation in the PTA or parent-teacher organization and other volunteer activities. It appears that even students of less involved parents can benefit academically if other parents in the school community are generally involved in school activities (Sui-Chu & Willms, 1996). While our study did not address the specific processes by which public-good PI boosts student achievement, previous work suggests that when parents volunteer at the school, they enrich the overall learning environment by supplementing teachers' time and efforts, which eventually contribute to raise school-wide achievement (Brent, 2000). Furthermore, parent participation in the PTA and other school organizations can increase staff accountability (McMillan, 2000) and promote a safe and orderly school environment with an enriched curriculum (Bryk et al., 2010). In this relational cycle, strong PI plays an initiating role in creating core resources for maintaining a high-quality school environment.

There is no shortage of theory suggesting that parent networking can be an effective tool for boosting school quality (Bronfenbrenner, 1986; Coleman, 1988). However, in spite of the theoretical importance accorded the peer relationships of parents, few empirical studies have investigated their effects on school-wide achievement. As noted previously, a number of analysts have examined the role of parents' social networks using nationally representative datasets (i.e., ELS:2002; NELS:88), but the findings were surprisingly mixed at the student level of analysis (i.e., Carbonaro, 1988; Morgan & Sørensen, 1999; Morgan & Todd, 2009). In our study, we found a significant but small effect for parent networking on student-level mathematics achievement. The findings from the school-level analysis were even stronger, with parent networking being the most strongly related of the three PI measures to school-wide achievement. One question that should be asked is whether more participation in parent networks is associated with overall school achievement because the students whose parents are more extensively networked are higher achieving, and thus affect the overall performance of their school, with no spillover to students whose parents do not engage in networking. In the future, more work is needed to identify the ways in which parent networks exert their effects, including promoting group norms and facilitating coordinated actions (Putnam, 2000).

### ***What is the moderating effect of SES on individual and school-level achievement outcomes?***

The third overall goal of our study was to examine whether various types of school-based PI had a different effect for higher versus lower SES students. Previous studies have yielded conflicting findings about the moderating effect of SES on student achievement. While Lareau (2003) in an influential qualitative study described how school-based PI conferred particular benefits to students from high-SES families, recent quantitative studies have found that global measures of school-based PI matter more for low-SES students (Dearing, Kreider, Simpkins, & Weiss, 2006), or are equally important for high- and low-SES students (Lee & Bowen, 2006). However, when studies focused on specific aspects of school-based PI, they tend to find that public-good PI and parent networking are more prevalent and effective forms of school-based PI for high SES or White students (Desimone, 1999; McNeal, 1999; Yan & Lin, 2005).

Our analyses of achievement at the individual student level seem to confirm this latter set of findings. We found that high-SES families were more likely to participate in public-good activities and to form social networks with other parents than low-SES families did. And both public- and private-good PI were particularly effective in boosting the mathematics achievement of high-SES students. Although many low-SES parents want to be involved in their children's education, financial and time constraints may limit their involvement (C. E. Cooper, 2010). Moreover, previous research suggests that low-SES parents are less likely to be optimistic about their children's educational chances and confident about intervening on behalf of their children (C. E. Cooper, 2010; Crosnoe, Mistry & Elder, 2002; Lareau, 2003), which may undermine their effectiveness and limit the benefits gained from their school participation.

Interestingly, the school-level analyses told a different story. Specifically, they revealed that school-mean private-good PI was associated with higher achievement in the lower SES schools. Our data suggest that even though there was less private-good PI in schools serving low-SES families, there was nevertheless a substantial amount of variability in those schools (low-SES schools:  $M = 2.15$ ,  $SD = 0.57$ ; high-SES schools:  $M = 2.59$ ,  $SD = 0.39$ ). Thus, one possibility is that a mild ceiling effect for private-good PI in high-SES schools reduced the possible covariance with school-level achievement. In terms of a substantive explanation, it is possible that high private-good involvement in low-SES schools is part of a dynamic and multilateral process in which schools with effective leadership are able to support teachers who in turn create trusting relationships with parents. Many parents in low-resource, urban schools are likely to lack a sense of trust in school staff because they themselves may have experienced discrimination, neglect, or failure in school (Jackson & Cooper, 1989). However, effective urban schools build relational trust among parents, teachers, and students, which is a cause and an outcome of their attempts to engage parents at home and at the school site (Bryk & Schneider, 2002). And, to the extent that

private-good PI involves one-to-one interactions between parents and teachers, it may be a particularly powerful mechanism for building trust. In contrast, public-good PI may yield skills and information on the part of parents, but may be less likely to lead to close relationships. At this point, few studies have been done to examine the relation between school SES and school-mean private-good PI, so further research is needed to determine whether this is a robust finding in other datasets and to explore the processes that lie behind it.

### ***Does school-based PI deserve the resources that policymakers have invested in it?***

Urban school reform initiatives frequently include a recommendation that local schools connect and form partnerships with the parents they serve (Bryk et al., 2010). Our study provides substantial support for the use of PI to improve education as well as pointing to several ways of strengthening current policies so that PI can be more powerful in low-SES communities. First, our study suggests that parent networking should be considered an important form of PI that deserves support from the school. Currently, policy initiatives characterize school-based PI as consisting of communication between parents and school staff (No Child Left Behind Act of 2001, 2002). Second, it is clear that school-based PI programs need to be better suited to the needs of low-SES populations. Although the PI provision of the No Child Left Behind Act of 2001 and other legislative efforts aims to promote family-school connections as a means of reducing social and economic disparities in learning, policy guidelines for increasing the involvement of low-SES families are still vague (Epstein, 2005). For example, considering that an inflexible work schedule is one of the barriers to involvement among low-SES families (Lee & Bowen, 2006), more efforts are needed to protect parents' right to participate in their child's school activities. Presently, some states have a law on the books that allows parents or guardians to take time off from work to participate in field trips, volunteering, and school-sponsored events. Other states should consider implementing similar legislation, and all states should consider how to publicize these initiatives and encourage parents to take advantage of them.

In addition to addressing those structural barriers, it is important to consider the psychological barriers that may deter PI. Empirical research confirms that the most powerful predictor of PI, particularly for low-SES families, is the creation of a school environment where parents feel welcomed and valued by educators (Deslandes & Bertrand, 2005; Green, Walker, Hoover-Dempsey, & Sandler, 2007; Hoover-Dempsey, & Sandler, 1997; Park & Holloway, 2013). To improve school climate, school administrators can work with teachers to overcome their biases about low-income or racial/ethnic minority parents based on stereotypes and lack of information (Baquedano-López, Alexander, & Hernandez, 2013; C. W. Cooper, 2003). Research also suggests that providing information on how schools function, how to support learning, and how to access educational resources is another way to encourage low-SES parents to become more involved in school-based activities (Christenson & Sheridan, 2001; Park & Holloway, 2013; Simon, 2004). This type of information is particularly important for parents of children with intellectual or physical disabilities, as the

level of services that the child receives hinges in large part on parents' advocacy efforts (Ong-Dean, 2009).

### ***Study limitations***

Large datasets such as the ECLS-K permit longitudinal, multivariate investigation of important issues. However, the breadth of such databases can limit the depth of information collected on any specific construct of interest. If we had been able to look more deeply into the dynamics of school-based PI, we might have found even stronger results. For example, the ECLS-K dataset does not include information on parents' assessments of the quality of their school involvement, nor does it tap into diverse types of PI practices that may be particular to certain communities (Gonzales, Moll, & Amanti, 2005). Furthermore, our measure of parent networking was a basic assessment of its extensiveness, and did not delve into the nature of the interactions or the frequency with which the network was activated. Another limitation of the dataset is that the family demographic variables were assessed in the base year only, preventing us from accounting for the effects of changes in family structure or SES. With regard to outcome variables, we were unable to examine gains in such constructs as higher level thinking or self-regulation and engagement. In addition, school administrator estimates regarding the percentage of students meeting national standards on mathematics and reading assessments are relatively imprecise indicators as they are possibly susceptible to bias because of exaggeration and poor judgment on the part of school administrators. In future research, objective school-level academic performance scores should be used in school-level analyses. In addition, other school-level outcomes available in the ECLS, such as school climate or safety indicators, can be used to study the beneficial school-wide influences of school-based PI. And finally, we should note that even though longitudinal designs involving multiple waves of data are a powerful approach for testing causal processes, there is always a possibility of reciprocal causation (Singer & Willet, 2003).

### ***Conclusions***

The results of this study provide strong empirical evidence concerning the effectiveness of school-based PI and generally support the current federal and state-level policy focus on boosting school-based PI. By framing school-based PI as a multidimensional concept, we were able to show how each type of school-based PI contributed to academic outcomes at the student and school level. The use of three-level growth curve modeling allowed us to capture true growth in student achievement as well as the influences of school-based PI on that growth, controlling potential confounding family and school factors. We showed that private-good PI boosted students' mathematics and reading achievement, particularly in higher SES families. We also found that public-good PI was not strongly related to individual-level academic achievement, but that school-mean public-good PI was instrumental in boosting school-level achievement, particularly in the case of schools serving low-income students. And finally, we found that the size of parent network was a very powerful predictor of school-wide achievement. Taken together, these findings suggest that policies aimed at encouraging parents to become involved at the school site are



likely to boost the achievement of elementary school children. However, to maximize the benefits of PI, additional attention should be devoted to improving schools' ability to leverage the considerable social and cultural capital of low-income families.

## Acknowledgments

The research reported here was conducted when Sira Park was a doctoral student at the University of California, Berkeley.

## Funding

This research was supported by the Institute of Education Sciences, grant #R305B110017.

## References

- Baquedano-López, P., Alexander, R. A., & Hernandez, S. J. (2013). Equity issues in parental and community involvement in schools: What teacher educators need to know. *Review of Research in Education*, 37, 149–182.
- Brent, B. O. (2000). Do schools really need more volunteers? *Educational Policy*, 14, 494–510.
- Bronfenbrenner, U. (1986). Ecology of the family as a context for human development: Research perspectives. *Developmental Psychology*, 22, 723–742.
- Bryk, A. S., & Schneider, B. L. (2002). *Trust in schools: A core resource for improvement*. New York, NY: Russell Sage Foundation.
- Bryk, A. S., Sebring, P. B., Allensworth, E., Luppescu, S., & Easton, J. Q. (2010). *Organizing schools for improvement: Lessons from Chicago*. Chicago, IL: The University of Chicago Press.
- Carbonaro, W. J. (1998). A little help from my friend's parents: Intergenerational closure and educational outcomes. *Sociology of Education*, 71, 295–313.
- Carbonaro, W. J. (1999). Opening the debate on closure and schooling outcomes: Comment on Morgan and Sørensen. *American Sociological Review*, 64(5), 682–686.
- Child Trends. (2010). *Parent involvement in schools*. Retrieved from <http://www.childtrendsdatabank.org/?q=node/186>
- Christenson, S. L., & Sheridan, S. M. (2001). *Schools and families: Creating essential connections for learning*. New York, NY: Guilford Press.
- Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, 94, 95–120.
- Cooper, C. E. (2010). Family poverty, school-based parental involvement, and policy-focused protective factors in kindergarten. *Early Childhood Research Quarterly*, 25, 480–492.
- Cooper, C. W. (2003). The detrimental impact of teacher bias: Lessons learned from the standpoint of African American mothers. *Teacher Education Quarterly*, 30, 101–116.
- Crosnoe, R., & Cooper, C. E. (2010). Economically disadvantaged children's transitions into elementary school: Linking family and school contexts to inform policy. *American Educational Research Journal*, 47, 258–297.
- Crosnoe, R., Mistry, R. S., & Elder, G. H. (2002). Economic disadvantage, family dynamics, and adolescent enrollment in higher education. *Journal of Marriage and Family*, 64, 690–702.
- Cucchiar, M. B., & Horvat, E. M. (2009). Perils and promises: Middle-class parental involvement in urban schools. *American Educational Research Journal*, 46, 974–1004.
- Dearing, E., Kreider, H., Simpkins, S., & Weiss, H. B. (2006). Family involvement in school and low-income children's literacy: longitudinal associations between and within families. *Journal of Educational Psychology*, 98, 653–664.
- Desimone, L. (1999). Linking parent involvement with student achievement: Do race and income matter? *Journal of Educational Research*, 93, 11–30.
- Deslandes, R., & Bertrand, R. (2005). Motivation of parent involvement in secondary-level schooling. *The Journal of Educational Research*, 98, 164–175.
- Domina, T. (2005). Leveling the home advantage: Assessing the effectiveness of parental involvement in elementary school. *Sociology of Education*, 78, 233–249.
- Dominguez-Pareto, I. (2014). *Learning advocacy: Decentering parental involvement discourse through the experiences of Latina mothers of children with disabilities in Northern California* (Unpublished dissertation). Berkeley, University of California.
- El Nokali, N. E., Bachman, H. J., & Votruba-Drzal, E. (2010). Parent involvement and children's academic and social development in elementary school. *Child Development*, 81, 988–1005.
- Epstein, J. L. (1995). Family/school/community partnerships: Caring for the children we share. *Phi Delta Kappa*, 76, 701–712.
- Epstein, J. L. (2005). Attainable goals? The spirit and letter of the No Child Left Behind Act on parental involvement. *Sociology of Education*, 78, 179–182.
- Epstein, J. L., & Dauber, S. L. (1991). School programs and teacher practices of parent involvement in inner-city elementary and middle schools. *The Elementary School Journal*, 91(3), 289–305.
- Fan, X. T., & Chen, M. (2001). Parental involvement and students' academic achievement: A meta-analysis. *Educational Psychology Review*, 13, 1–22.
- Goddard, R. D. (2003). The impact of schools on teacher beliefs, influence, and student achievement: The role of collective efficacy. In J. Rath & A. McAninch (Eds.), *Advances in teacher education* (vol. 6, pp. 183–204). Westport, CT: Information Age.
- Gonzalez, N., Moll, L. C., & Amanti, C. (Eds.). (2005). *Funds of knowledge*. London, England: Routledge.
- Grady, S., & Bielick, S. (2010). *Trends in the use of school choice: 1993 to 2007* (NCES 2010-004). Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.
- Green, C. L., Walker, J. M. T., Hoover-Dempsey, K. V., & Sandler, H. M. (2007). Parents' motivations for involvement in children's education: An empirical test of a theoretical model of parental involvement. *Journal of Educational Psychology*, 99, 532–544.
- Grolnick, W. S., & Slowiaczek, M. L. (1994). Parents' involvement in children's schooling: A multidimensional conceptualization and motivational model. *Child Development*, 65, 237–252.
- Hallinan, M. T., & Kubitschek, W. N. (1999). Conceptualizing and measuring school social networks: Comment on Morgan and Sørensen. *American Sociological Review*, 64, 687–693.
- Haynes, N. M., Comer, J. P., & Hamilton-Lee, M. (1989). School climate enhancement through parental involvement. *Journal of School Psychology*, 27, 87–90.
- Hill, N. E., & Tyson, D. F. (2009). Parental involvement in middle school: A meta-analytic assessment of the strategies that promote achievement. *Developmental Psychology*, 45, 740–763.
- Hindman, A. H., Skibbe, L. E., & Morrison, F. J. (2010). Teacher outreach to families across the transition to school: An examination of teachers' practices and their unique contributions to children's early academic outcomes. *Early Childhood Education Journal*, 41, 391–399.
- Hoover-Dempsey, K. V., & Sandler, H. M. (1997). Why do parents become involved in their children's education? *Review of Educational Research*, 67, 3–42.
- Horvat, E. M., Weininger, E. B., & Lareau, A. (2003). From social ties to social capital: Class differences in the relations between schools and parent networks. *American Educational Research Journal*, 40, 319–351.
- Hyde, J. S., Else-Quest, N. M., Alibali, M. W., Knuth, E., & Romberg, T. (2006). Mathematics in the home: Homework practices and mother-child interactions doing mathematics. *The Journal of Mathematical Behavior*, 25, 136–152.
- Jackson, B. L., & Cooper, B. S. (1989). Parent choice and empowerment: New roles for parents. *Urban Education*, 24, 263–86.
- Jeynes, W. (2005). A meta-analysis of the relation of parental involvement to urban elementary school student academic achievement. *Urban Education*, 40, 237–269.
- Jeynes, W. (2007). The relationship between parental involvement and urban secondary school student academic achievement: A meta-analysis. *Urban Education*, 42, 82–110.
- Lareau, A. (2003). *Unequal childhoods: Class, race, and family life*. Berkeley, CA: University of California Press.

- Lee, J. S., & Bowen, N. K. (2006). Parent involvement, cultural capital, and the achievement gap among elementary school children. *American Educational Research Journal*, 43, 193–218.
- McMillan, R. (2000). Competition, parental involvement, and public school performance. *Proceedings of the Annual Conference on Taxation and Minutes of the Annual Meeting of the National Tax Association*, 93, 150–155.
- McNeal, R. B. (1999). Parental involvement as social capital: Differential effectiveness on science achievement, truancy, and dropping out. *Social Forces*, 78, 117–144.
- McNeal, R. B. (2012). Checking in or checking out? Investigating the parent involvement reactive hypothesis. *The Journal of Educational Research*, 105, 79–89.
- Morgan, S. L., & Sørensen, A. B. (1999). Parental networks, social closure, and mathematics learning: A test of Coleman's social capital explanation of school effects. *American Sociological Review*, 64, 661–681.
- Morgan, S. L., & Todd, J. (2009). Intergenerational closure and academic achievement in high school: A new evaluation of Coleman's conjecture. *Sociology of Education*, 82, 267–285.
- Muller, C. (1993). Parent involvement and academic achievement: An analysis of family resources available to the child. In B. S. Schneider & J. S. Coleman (Eds.), *Parents, their children, and schools* (pp. 77–113). San Francisco, CA: Westview Press.
- National Center for Education Statistics. (n.d.). *Early childhood longitudinal program*. Retrieved from <http://nces.ed.gov/ecls/>
- National Center for Education Statistics (NCES). (2002). *User's manual for the ECLS-K base year public-use data files and electronic codebook* (NCES 2001–029 Revised). Washington, DC: U.S. Department of Education.
- No Child Left Behind Act of 2001, Pub. L. No. 107–110, x 115, Stat. 1425 (2002).
- Okapala, C. O., Okapala, A. O., & Smith, F. E. (2001). Parental involvement, instructional expenditures, family socioeconomic attributes, and student achievement. *The Journal of Educational Research*, 95, 110–115.
- Ong-Dean, C. (2009). *Distinguishing disability: Parents, privilege, and special education*. Chicago, IL: University of Chicago Press.
- Park, S., & Holloway, S. D. (2013). No parent left behind: Predicting parental involvement in adolescents' education within a socio-demographically diverse population. *The Journal of Educational Research*, 106, 105–119.
- Pianta, R. C., Belsky, J., Houts, R., & Morrison, F. (2007). Opportunities to learn in America's elementary classrooms. *Science*, 315, 1795–1796.
- Pomerantz, E. M., Moorman, E. A., & Litwack, S. D. (2007). The how, whom, and why of parents' involvement in children's academic lives: More is not always better. *Review of Educational Research*, 77, 373–410.
- Pong, S. L. (1997). Family structure, school context, and eighth-grade math and reading achievement. *Journal of Marriage and the Family*, 59, 734–747.
- Putnam, R. D. (2000). *Bowling alone: The collapse and revival of American community*. New York, NY: Simon and Schuster.
- Rabe-Hesketh, S., & Skrondal, A. (2008). *Multilevel and longitudinal modeling using Stata* (2nd ed.). College Station, TX: Stata Press.
- Sheldon, S. B. (2002). Parents' social networks and beliefs as predictors of parent involvement. *Elementary School Journal*, 102, 301–316.
- Sheldon, S. B., & Epstein, J. L. (2005). Involvement counts: Family and community partnerships and mathematics achievement. *The Journal of Educational Research*, 98, 196–207.
- Sheridan, S. M., Knoche, L. L., Edwards, C. P., Bovaird, J. A., & Kupzyk, K. A. (2010). Parent engagement and school readiness: Effects of the Getting Ready intervention on preschool children's social–emotional competencies. *Early Education and Development*, 21, 125–156.
- Shumow, L., & Miller, J. D. (2001). Parents' at-home and at-school academic involvement with young adolescents. *The Journal of Early Adolescence*, 21, 68–91.
- Simon, B. S. (2004). High school outreach and family involvement. *Social Psychology of Education*, 7, 185–209.
- Singer, J. D., & Willett, J. B. (2003). *Applied longitudinal data analysis: Modeling change and event occurrence*. Oxford, England: Oxford University Press.
- Smith, T. W., Marsden, P., Hout, M., & Kim, J. (2014). *General social surveys, 1972–2014*. Chicago, IL: NORC at the University of Chicago. Retrieved from [gssdataexplorer.norc.org](http://gssdataexplorer.norc.umd.edu/).
- Sui-Chu, E. H., & Willms, J. D. (1996). Effects of parental involvement on eighth-grade achievement. *Sociology of Education*, 69, 126–141.
- Walsh, P. (2008). Are involved parents providing public goods or private goods? *Public Finance Review*, 36, 678–705.
- Walsh, P. (2010). Is parental involvement lower at larger schools? *Economics of Education Review*, 29, 959–970.
- Wellman, B., & Wortley, S. (1990). Different strokes from different folks: Community ties and social support. *American Journal of Sociology*, 558–588.
- Wigfield, A., Eccles, J. S., Schiefele, U., Roeser, R., & Davis-Kean, P. (2006). Development of achievement motivation. In N. Eisenberg, W. Damon, & R. M. Lerner (Eds.), *Handbook of child psychology* (vol. 3, 6th ed.), pp. 933–1002. Hoboken, NJ: Wiley.
- Xu, M., Kushner Benson, S. N., Mudrey-Camino, R., & Steiner, R. P. (2010). The relationship between parental involvement, self-regulated learning, and reading achievement of fifth graders: A path analysis using the ECLS-K database. *Social Psychology of Education*, 13, 237–269.
- Yamamoto, Y., & Holloway, S. D. (2010). Parental expectations and children's academic performance in sociocultural context. *Educational Psychology Review*, 22, 189–214.
- Yan, W., & Lin, Q. (2005). Parent involvement and mathematics achievement: Contrast across racial and ethnic groups. *The Journal of Educational Research*, 99, 116–127.

**Appendix A.** Types and description of study variables for individual-level analysis.

| Predictor      | Variables                                                        | Type                                  | Reporter                                     | Item <sup>a</sup>                                                                                                     | Item description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------|------------------------------------------------------------------|---------------------------------------|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Predictor      | PI for public-good                                               | Composite                             | Parent                                       | P(2/4/5/6)ATTENP<br>P(2/4/5/6)VOLUNT<br>P(2/4/5/6)FUNDERS<br>P(2/4/5/6)PARGRP<br>P(2/4/5/6)ATTENB<br>P(2/4/5/6)ATTENS | [Since the beginning of this school year, have you or other adults in your household...]<br>Attended a meeting of a PTA, PTO or parent-teacher-student organization?<br>Volunteered at the school or served on a committee?<br>Participated in fundraising for (child)'s school?<br>Gone to a regular parent-teacher conference or meeting with (child)'s teacher?<br>Attended an open house or a back-to-school night?<br>Attended a school or class event, such as a play, sports event, or science fair?<br>How many parents in (child)'s class do you talk with regularly, either in person or on the phone? |
|                | Parent network                                                   | Continuous                            | Parent                                       | P(2/4/5/6)PCLASS                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                | Math Reading                                                     | Continuous                            | Child (test)                                 | C(2/4/5/6)R4MSCL<br>C(2/4/5/6)R4RSCL                                                                                  | IRT score<br>IRT score                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                | Family SES<br>Parent type<br>Mom's employment<br>English at home | Continuous<br>Dummy<br>Dummy<br>Dummy | Parent<br>Parent<br>Parent<br>Screening      | W(K/1/3/5)SESL<br>P(K/1/3/5)HPARNT<br>P(K/1/3/5)HMEMP<br>C1 SCREEN                                                    | A composite of family income, parental education and occupation<br>Two biological parents = 0 (reference group); single or step parents = 1<br>Working mom 0 (reference group); stay-at-home mom = 1<br>Speaking English at home = 0 (reference group); non-English at home = 1                                                                                                                                                                                                                                                                                                                                  |
|                | School SES<br>% of minority                                      | Continuous<br>Continuous              | School administrator<br>School administrator | S(2/4/5/6)FLCHJ<br>S(2/4/5/6)MINOR                                                                                    | % of free or reduced lunch eligible students<br>Percentage of minority students at school<br>Less than 10; 10 to less than 25; 25 to less than 50; 50 to less than 75; 75 or more                                                                                                                                                                                                                                                                                                                                                                                                                                |
| School control | School size                                                      | Continuous                            | School administrator                         | S(2/4/5/6)ENRSL                                                                                                       | Total school enrollment<br>0–149 students; 150–299 students; 300–499 students; 500–749 students; 750 and above                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

Note. <sup>a</sup>Number in parentheses represents waves of data used.

**Appendix B.** Types and description of study variables for school-level analysis.

| Predictor | Variables                         | Type       | Reporter                                     | Item <sup>a</sup>                                         | Item description                                                                                                                                                                  |
|-----------|-----------------------------------|------------|----------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Predictor | School-mean PI for public-good    | Composite  | Parent                                       | P(2/4/5/6)ATTENP<br>P(2/4/5/6)VOLUNT<br>P(2/4/5/6)FUNDPRS | School mean scores of parent involvement for public-good                                                                                                                          |
|           | School-mean PI for private-good   | Composite  | Parent                                       | P(2/4/5/6)PARGRP<br>P(2/4/5/6)ATTENB<br>P(2/4/5/6)ATTENS  | School mean scores of parent involvement for private-good                                                                                                                         |
|           | School-mean Parent network        | Continuous | Parent                                       | P(2/4/5/6)PCLASS                                          | School mean scores of parent involvement for parent network good                                                                                                                  |
|           | School achievement                | Continuous | School administrator                         | S(2/4/5/6)PCTRD                                           | Based on recent standardized tests, approximately what percent of (K~8) grade students currently enrolled in this school tested at or above grade level on math/reading skills?   |
|           | School SES % of minority students | Continuous | School administrator<br>School administrator | S(2/4/5/6)FLCH_I<br>S(2/4/5/6)MINOR                       | % of free or reduced lunch eligible students<br>Percentage of minority students at school<br>Less than 10; 10 to less than 25; 25 to less than 50; 50 to less than 75; 75 or more |
| Outcomes  | School size                       | Continuous | School administrator                         | S(2/4/5/6)ENRSL                                           | Total school enrollment<br>0–149 students; 150–299 students; 300–499 students; 500–749 students; 750 and above                                                                    |

Note. <sup>a</sup> Number in parentheses represents waves of data used.



ARTICLES

## The effects of school-based parental involvement on academic achievement at the child and elementary school level: A longitudinal study

Sira Park<sup>a</sup> and Susan D. Holloway<sup>b</sup>

<sup>a</sup>Teaching Strategies, Bethesda, Maryland, USA; <sup>b</sup>Graduate School of Education, University of California, Berkeley, California, USA

### ABSTRACT

Policy makers view parental involvement (PI) as a crucial component of school reform efforts, but evidence of its effect on student achievement is equivocal. Using the Early Childhood Longitudinal Study–Kindergarten Cohort dataset, we examined the long-term impact on student- and school-level achievement of three types of school-based PI: PI to help an individual's own child (private-good PI), PI to improve the school (public-good PI), and PI through peer networking. Hierarchical linear modeling analyses indicated that all three types raised student-level achievement in mathematics but only private-good PI was associated with reading achievement. Public-good PI and parent networking boosted school-level achievement. Public- and private-good PI were more strongly associated with student-level mathematics achievement for high socioeconomic status (SES) students; aggregated private-good PI was more strongly related to school-level achievement in low-SES schools. These results provide empirical evidence about the effectiveness of school-based PI, but also suggest a need for schools to explore more effective ways to leverage the social capital of low-SES families.

### ARTICLE HISTORY

Received 13 May 2014  
Revised 12 November 2014  
Accepted 26 January 2015

### KEYWORDS

Growth curve analysis;  
mathematics achievement;  
parental involvement;  
reading achievement

Parents' involvement in children's education has long been believed to promote a range of academic outcomes, including higher achievement, greater engagement in schoolwork, and lower dropout rates (Fan & Chen, 2001; Hill & Tyson, 2009; Lee & Bowen, 2006). For many educators and policy makers, the focus has been on involvement at the school site rather than—or in addition to—involvement at home. Accordingly, there are provisions to strengthen school-based parental involvement (PI) in various pieces of federal legislation including the Goals 2000: Educate America Act, the No Child Left Behind Act, and the Race to the Top Fund. Additionally, many states grant parental leave time from work to attend parent–teacher conferences and other school activities (e.g., Family School Partnership Act in California, School Conference and Activity Leave in Illinois). Indeed, since the implementation of these policies, the percentage of parents reporting involvement at the school site has risen significantly (Child Trends, 2010). However, despite the significant political momentum behind this issue, the findings concerning the efficacy of school-based PI are complex and in some cases contradictory. We begin by providing an overview of this previous work, and then propose a new direction that addresses several problematic aspects of earlier studies.

While a number of studies demonstrate an association between school-based PI and student achievement, many of them draw on cross-sectional data (e.g., Pomerantz, Moorman, & Litwack, 2007; Sheldon & Epstein, 2005; Sheridan, Knoche, Edwards, Bovaird, & Kupzyk, 2010; Xu, Kushner Benson, Mudrey-Camino, & Steiner, 2010). As such they do not provide sufficient grounds for asserting strong claims regarding the causal effects of school-based PI. Moreover, a number of large-scale longitudinal studies have found no significant association between school-based PI and student

achievement after controlling for previous achievement (Domina, 2005; El Nokali, Bachman, & Votruba-Drzal, 2010). Furthermore, even among cross-sectional studies, the effect sizes for school-based PI are relatively modest, especially when compared with home-based activities and parental expectations (for reviews, see Jaynes, 2005; Yamamoto & Holloway, 2010).

In addition to the lack of firm evidence of a causal association between school-based PI and student achievement, the meaning of the available evidence is somewhat obscured in studies that treat PI as a unitary construct. In much of the extant research literature as well as in policy documents, school-based PI is conceptualized as engagement in activities aimed at boosting the achievement of an individual child but is operationalized to include activities such as fundraising that are likely to benefit the school as a whole (Epstein, 1995; Hill & Tyson, 2009; No Child Left Behind Act of 2001, 2002). PI directed at the school bears little theoretical or logical association to the subsequent academic performance of a particular student. In this article, drawing from the literature in economics as well as education, we differentiate the characteristics of private-good PI directed toward the benefit of a particular child from those of public-good PI directed toward all the students in a classroom or a school. We then examine whether each of these two dimensions of PI is associated with achievement at the individual as well as the institutional (i.e., school-wide) level.

In addition to exploring the distinctive affordances of private- and public-good PI in a longitudinal framework, we extend the notion of PI to include parent networking. Social ties to other parents, when activated, are instrumental to the allocation of educational resources from nonfamilial sources,

especially when within-family resources are limited (Wellman & Wortley, 1990). According to social capital theory, parents use peer networks to obtain information about school policies and practices and to help monitor the behavior and achievement of their children (Carbonaro, 1998; McNeal, 1999). Parents who participate in peer networks often develop shared norms and group solidarity, enabling them to organize and advocate for school improvement (Morgan & Sørensen, 1999). Despite these apparent benefits, the relative efficacy of parent networking in promoting individual and institutional-level academic achievement has rarely been compared to that of more conventional forms of PI, such as attending parent–teacher association (PTA) or parent–teacher organization meetings or parent–teacher conferences.

In summary, our study moves the field forward in four ways with respect to the association between school-based PI and student achievement. First, we examine the effects of two distinct types of school-based PI: involvement in activities that concern an individual child (private-good PI) and involvement in activities that target the improvement of a group of students in a classroom or a school (public-good PI). Second, we explore the association of a third and relatively unstudied aspect of PI—parent networking—to student achievement. Third, we examine the effects of these three aspects of school-based PI on individual student achievement as well as on school-wide achievement. Fourth, we used growth curve modeling techniques to examine the longitudinal links between school-based PI and individual and school-wide outcomes. With these statistically powerful analyses we can illuminate the role of school-based PI in fostering student achievement and thereby shed light on the efficacy of current policy efforts.

## Literature review

### Defining PI

In this study, we distinguish three types of parental involvement: Private-good PI, public-good PI, and parent networking. The concepts of private- and public-good activities derive from the field of economics but are increasingly being applied in the field of education (Cucchiara & Horvat, 2009; McMillan, 2000; Walsh, 2010). Descriptive analyses suggest that most parents are more likely to engage in private-good PI than public-good PI. Analyses conducted by the National Center for Education

Statistics (2001) found that 80% of parents of elementary students attend their child’s parent–teacher conference, whereas only 43% belong to the PTA or a similar organization. Furthermore, public-good PI appears to be more often stratified by socioeconomic status compared to private-good PI. For example, Shumow and Miller (2001) found that parents with college degrees were more likely than less educated parents to be involved in the PTA but found no effects of parent education on homework assistance. Similarly, in their analysis of the National Education Longitudinal Study of 1988 (NELS:88; National Center for Education Statistics [NCES], 2002) dataset, Sui-Chu and Willms (1996) found that parents’ membership in the PTA and other volunteer activities was higher in high socioeconomic status (SES) schools, but did not observe SES differences in parents’ likelihood of attending a parent–teacher conference.

In contrast with public- and private-good PI, parent networks are relatively informal groups based on trust, obligation, and shared identity, and as such are not initiated or supervised by the school (Goddard, 2003; Sheldon, 2002). As such, they constitute an important source of information about events or conditions that the school might prefer to conceal from parents. For instance, parents can discuss the reputation of particular teachers or compare strategies for gaining access to special education. This information can be used to benefit the academic outcomes of particular students whose parents are in the network—a matter of private good—or it can be used to identify and address institutional problems (Jackson & Cooper, 1989). In our study, we provide an initial exploration of the impact of network extensiveness on individual student achievement as well as the overall achievement level at a particular school. Table 1 provides a definition of each type of PI along with illustrative examples.

### Relationship of school-based PI and individual achievement

As noted previously, cross-sectional studies typically find a positive association between school-based PI and children’s academic achievement (e.g., Lee & Bowen, 2006; Sheldon & Epstein, 2005; Xu et al., 2010). For instance, using the Early Childhood Longitudinal Study–Kindergarten Cohort (ECLS-K; National Center for Education Statistics [NCES], 2001), Xu et al. (2010) measured school-based PI by averaging six items

**Table 1.** Three aspects of parent school-based involvement.

| Type            | Format           | Definition                                              | Example                                                   | Operationalization                                           | Expected benefits                                                                           |
|-----------------|------------------|---------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| Public-good PI  | School-sponsored | Involvement in school activities to benefit the school  | Fundraising, PTA membership, volunteering                 | Whether or not parents participate in each of the activities | Shared benefits to other families at the same school, possible private benefit              |
| Private-good PI | School-sponsored | Involvement in school activities to support own child   | Attending parent-teacher conference, back-to-school night | Whether or not parents participate in each of the activities | Private returns to the family involved, possible spill-over effects to the school community |
| Parent network  | Parent-initiated | Regular contact with parents in their children’s school | Sharing information about school policies                 | The extensiveness of parents’ network in their child’s class | Public and private returns                                                                  |

regarding private-good activities (attending the school's open house, back-to-school night, and parent-teacher conferences) and public-good activities (attending PTA meetings, volunteering in the classroom, and participating in fundraising). They found that this omnibus measure of school-based PI was associated with reading scores in Grade 5.

However, recent longitudinal studies have failed to find a link between global school-based PI and student achievement. For instance, a longitudinal study of within-family changes in PI did not find associated gains in reading and mathematics standardized scores during the elementary years (El Nokali et al., 2010). Similarly, using a time-lagged growth model, Domina (2005) found no association between parents' volunteer activities and children's academic achievement, net the effects of prior achievement.

Despite the lack of strong longitudinal evidence for school-based PI, it may be premature to conclude that school-based PI is an ineffective way to boost student achievement. Although treating school-based PI as a unitary construct offers the advantage of parsimony, it may obscure the distinctive benefits of particular types of school-based PI activities. In the remainder of this section, we revisit the literature on school-based PI, teasing apart the effects of public-good activities from those that are directed toward the private good. We also examine the literature on parent networking, which has not been fully integrated into the PI literature. Overall, our review suggests that each dimension of school-based PI may be differentially associated with particular domains of achievement. Therefore, we argue that it is worth developing models to test the unique effects of each dimension.

Several cross-sectional studies examining the effects of private-good PI on individual student achievement have found positive relationships (for a review, see Fan & Chen, 2001), while others have found that private-good PI—particularly parents' contact with schools—is negatively associated with academic outcomes (Desimone, 1999; Jeynes, 2005, 2007). Rather than interpreting this negative association as evidence of a harmful influence of PI, some researchers have argued that parents may react to low achievement by increasing their involvement (McNeal, 2012). A related explanation is that school staff may ask parents of academically underperforming children to attend additional conferences, thus accounting for a negative association between contact frequency and contemporaneous achievement. If the reactive hypothesis is correct, there is reason to believe that private-good PI can be helpful to individual children.

In contrast, there is less evidence that public-good PI confers particular benefits to the individual child whose parent is involved. For instance, Okpala, Okapala, and Smith (2001) found that the amount of time a parent volunteered in his or her child's classroom was not associated with that child's achievement in mathematics. And in a recent longitudinal study (Domina, 2005), parents' participation in the PTA showed no evidence of association with their own children's mathematics and reading scores, net of prior achievement. Although there appears to be little overall effect of public-good PI on individual child achievement, there is some evidence of effects from public-good PI on individual children from economically advantaged families (Brent, 2000; Crosnoe & Cooper, 2010; Desimone, 1999; McNeal, 1999).

A third type of PI—parent networking—shifts the focus from the school-parent partnership to the relationship among parents. Several studies drawing upon the NELS:88 data have found that the parents of higher achieving students were more likely to know the parents of their friends than were the parents of lower achieving students (e.g., Muller, 1993; Pong, 1997; Yan & Lin, 2005). Surprisingly, other studies using the same data have found a negative rather than a positive association between parent networks and student achievement. For instance, Morgan and Sørensen (1999) found that the density of parent network appears to depress mathematics learning in public schools, and suggested that these networks may have been reinforcing norms that were not as clearly linked to students' achievement. Several authors, including Carbonaro (1999) and Hallinan and Kubitschek (1999), have raised concerns over the conceptualization and measurement issues in Morgan and Sørensen's (1999) study, and the matter remains a matter of dispute (see Morgan & Todd, 2009).

Like the effects of public-good PI, the influence of parent networks on student achievement may also be conditioned by parents' socioeconomic status. On one hand, more highly educated parents bring more knowledge about the structure and content of the education system to the network and they can effectively deploy this pooled knowledge due to their sense of efficacy in interacting with school staff. In their qualitative work, Lareau (2003) and Horvat et al. (2003) found that middle class parents were more likely than working class parents to associate with the parents of their children's classmates, and that these networks more often included parents with professional skills relevant to addressing problems their children were experiencing in school. These middle-class families were able to react collectively when an issue arose at the school and to mobilize network members to provide needed information, expertise and authority. In contrast, the lower middle class families were more likely to associate with extended family members or community members who did not hold professional positions. While supportive, their networks did not constitute a bridge to access the capital possessed by higher SES parents.

Although lower SES parents may have less access to individuals with large amounts of social and cultural capital, there is evidence that they can create efficacious networks given support from the schools or the outside organizations. For instance, research conducted by Bryk, Sebring, Allensworth, Luppescu, and Easton (2010) in the Chicago Public Schools showed that low-SES parents who became classroom aides often formed relationships with other parents that eventually enabled them to pressure the district to make certain much-needed reforms. The same effect has been found in studies of parents who have a child in need of special education services. While higher SES parents are at an advantage in terms of advocating for their children, research suggests that low-SES and immigrant parents who participate in local support groups can learn these essential skills from experienced peers (Dominguez-Pareto, 2014; Ong-Dean, 2009).

In any case, the effects of parent networking merit further study, particularly as the recent proliferation of social media platforms has made it increasingly easy for parents to establish and maintain close communication regarding their children's schooling. By examining parent network size in addition to the more conventional forms of PI, we were able to investigate the independent contribution of this relatively unstudied but

potentially important activity. Moreover, we were particularly interested in exploring possible moderating effects of family and school-level SES on this relationship.

### ***Relationship of school-based PI to school-level outcomes***

To date, the majority of work on school-based PI has examined the effects on individual student outcomes. However, it is logical to expect that public-good PI, which by definition is aimed at the school rather than the individual, will also be associated with school-wide benefits. In fact, the research examining effects of public-good PI on school-level outcomes tends to find positive associations. For instance, the size of PTA membership in a particular school appears to be associated with indicators of school quality including administration effectiveness and the quality of instruction (Walsh, 2008) as well as with higher school-wide test scores (McMillan, 2000). Interviews with school principals suggest that when parents are active volunteers they gain a better understanding of how the schools operate and demonstrate greater respect for teachers and administrators (Brent, 2000). This shift in attitudes may in turn contribute to greater school effectiveness and increased student achievement.

In addition to the benefits of public-good PI, it is also possible for private-good PI to have a spillover effect on the school as a whole. When a large percentage of parents attend parent-teacher conferences, teachers are more likely to feel motivated and supported, which can result in more effective instruction and a better school climate (Epstein & Dauber, 1991; Haynes, Comer, & Hamilton-Lee, 1989). In the previously mentioned longitudinal study conducted within the Chicago public school system (Bryk et al., 2010), amount of private-good PI was strongly correlated with school safety, order, and a student-centered learning climate. Furthermore, schools with more private-good PI were four times more likely than to show school-wide improvement in reading and ten times more likely to show improvement in mathematics.

As we have already noted, parent networking can be used to influence school policy and thereby alter the learning opportunities of all students in the school. Using the Education Longitudinal Study of 2002 (ELS:2002; National Center for Education Statistics [NCES], 2004) dataset, Morgan and Todd (2009) found substantial associations between parental network closure (i.e., extensiveness of network with other parents) and high school student achievement at the school level, but not at the individual level. This finding is consistent with results obtained from analyses of the NELS:88 data, where net individual-level associations were small in comparison to school-level associations (Carbonaro, 1999; Morgan & Sørensen, 1999). Thus there is substantial evidence—primarily from cross-sectional studies—that parental networking is associated with student achievement, particularly at the level of the school. Our study builds on this work by investigating the question in a longitudinal dataset, thereby providing a clearer sense of the direction of these associations.

### **The present study**

Overall, our review suggests that private-good PI can be beneficial to individual student achievement, and may have a spillover effect at the school level particularly in schools serving

low-SES students. In contrast, public-good PI appears to be most likely to benefit the school as a whole rather than an individual student. In addition, preliminary evidence suggests that the extensiveness of parent networks, which can serve private- or public-good functions, is associated with individual level as well as school-level achievement. However, few studies have examined these various relationships in a longitudinal framework. In our study, we explored this multi-dimensional web of possible effects by examining the association of three aspects of school-based PI to individual and school-level achievement. The research questions addressed in this study are as follows:

1. Research Question 1. To what extent are three dimensions of school-based PI (public-good PI, private-good PI, and activation of parent network) related to individual children's mathematics and reading scores across kindergarten and Grades 1, 3, and 5?
2. Research Question 2. To what extent are these three dimensions of school-based PI aggregated at the school level related to school-wide academic achievement across kindergarten and Grades 1, 3, and 5?
3. Research Question 3. Do children from high-SES families benefit more from school-based PI than do children from low-SES families or vice versa?
4. Research Question 4. Do schools with a higher concentration of poverty benefit more from school-mean PI than do schools with a lower concentration of poverty or vice versa?

To address these questions, we drew on data from the ECLS-K. By using three-level growth curve modeling we were able to capture growth in student achievement as well as the influences of school-based PI on growth, controlling for potentially confounding family and school factors (Rabe-Hesketh & Skrondal, 2008; Singer & Willet, 2003).

## **Method**

### ***Data source***

The ECLS-K dataset traces the academic development of a nationally representative cohort of students entering kindergarten in the 1998–1999 school year. The sample was obtained by identifying 100 geographical sampling units and then randomly selecting 1,000 schools (public and private) within the selected units. An average of 23 students was randomly sampled within each school. In the base kindergarten year, the cohort consisted of 21,409 students in 992 schools. The analytic sample that we used includes a total of 17,385 students who were followed through Grade 5 and had one or more scores in reading and in mathematics.

Participating students were assessed on six occasions: Fall and spring of kindergarten, fall and spring of Grade 1, spring of Grade 3, and spring of Grade 5. Trained assessors administered child assessments in schools, and conducted parent interviews by telephone about family characteristics and PI in school activities. In the spring of each survey year, school administrators completed a survey concerning the school's physical, organizational, and learning environment. The ECLS-K sample design and data collection procedures are further described at the National Center for Education Statistics website (<http://nces.ed.gov/ecls>).



Rates of missing data were generally less than 4% for the demographic and child–parent characteristics. Approximately 6–13% of the data on school-level achievement was missing, as was 14–22% of the data (depending on the wave) on school-level percentage of students eligible for free or reduced-price lunch. To make use of all legitimate, available information without imputing values or excluding cases, we utilized full-information maximum likelihood estimation, which allows any child contributing one or more outcome scores to be included in the analyses and contribute to the within-person estimation (Rabe-Hesketh & Skrondal, 2008). We also specified the control variables as time invariant and fixed these to the average of the available values across waves, thus permitting any student with survey data from one or more waves to have an empirically based value for these variables. Subsequent to the application of these strategies, one percent of the students lacked data on student-level control variables, and 12% lacked data on school-level control variables.

### Measures

Appendixes A and B present detailed descriptions of all the variables used in the individual- and school-level models, respectively.

#### Time

Time was specified as the child's grade from kindergarten to Grade 5. Kindergarten was coded as 0; other grade levels (i.e., Grades 1, 3, and 5) were coded as the corresponding number. Thus, the intercept in the hypothesized individual growth trajectory represents the students' initial outcome status in the spring of kindergarten. Our analyses focused on the four spring waves when the children were in kindergarten and Grades 1, 3, and 5.

#### School-based PI

In each wave, parents rated their involvement in their children's schooling on seven dichotomous items. For the public-good PI composite, we used parents' report of whether or not they had participated in PTA meetings, volunteering, and fundraising (0 = no, 1 = yes). The interitem reliability of public-good PI was moderate (i.e., Cronbach's alpha ranged from .51 to .55 across the waves). For the private-good PI composite, we used parents' reported attendance at parent–teacher conferences, open house, back-to-school night, and other school events. The internal consistency of involvement for private-good PI was good (i.e., Cronbach's alpha ranged from .57 to .62 across waves). Parent network was represented by a single item, the parent's estimate of the number of other parents in the classroom that he or she regularly talked with in person or on the phone. For the student-level analyses, we used individual parents' responses on the relevant questions. For the school level, we computed the average level of involvement at the school for each of the relevant questions.

#### Mathematics and reading achievement

Individual academic achievement was represented by item response theory (IRT) scale scores on individually-administered reading and mathematics assessments in the spring of kindergarten and Grades 1, 3, and 5. In each subject area,

children took the assessments in two stages. The first stage was uniform across all children. In this stage, children received a 12- to 20-item routing test. Their performance on the routing items guided whether they took the low, medium, or high difficulty version at the second stage. IRT was used to calculate the predicted probability of each item being answered correctly by each student. The overall IRT scores thus represent the predicted number of items the student would have answered correctly at each measurement point if all questions from the first- and second-stage tests had been administered. These scores are comparable across students within wave and across waves.

#### School-level achievement

Academic achievement scores for participating schools are not available in the ECLS-K dataset. Instead, we used school administrators' estimates of overall achievement of their school. Specifically, as part of the survey administered in the spring of each year, school administrators were asked to report the percentage of currently enrolled students testing at or above grade level in reading or verbal skills and mathematics skills. The response rate was approximately 90% within each wave. For each school, a mean percentage score was calculated using estimated percentage of proficient students at verbal and mathematics skills.

#### Family characteristics

Child and family demographic information was collected through parent surveys during the base-year interview. Time-invariant family control variables included whether families spoke non-English (0) or English (1) at home, and whether the child lived in a two-biological parent family (0) or a single- or step-parent family (1). Family SES was a continuous measure computed by ECLS-K that included father or male and mother or female guardian's education; father or male and mother or female guardian's occupational prestige based on the 1989 General Social Survey; and household income.

#### School characteristics

Three time-invariant variables were used as school-level controls: School size, percentage of ethnic or racial minority students in the school, and percentage of students eligible to receive free or reduced-price lunch. These data were derived from administrator interviews.

#### Analytic techniques

The current study considers the possibility that school-based PI may affect both individual child- and school-level outcomes. Thus, we built two separate models of school-based PI that estimated both effects.

#### Individual-level model

Analyses were estimated with Level 1 as occasions (within-individual effects), Level 2 as families (between-family and within-school effects), and Level 3 as schools (between-school effects). Growth curve models were fitted by maximum likelihood using Stata 13's xtmixed (StataCorp, College Station, TX). Preliminary inspection of empirical growth plots as a function of grade suggested that the growth patterns were not linear. A quadratic growth specification was the most appropriate way of representing the individual

growth trajectories in mathematics/reading achievement. Thus the multilevel model for change was expressed in terms of grade and the quadratic term of grade. We used parents' report of their participation in school activities at every wave, making these variables time varying. Time-varying predictors predicted the contemporaneous value of outcomes. The three subscripts on the school PI variables signify their time-varying nature.

Level 1:

$$\begin{aligned}
 Y_{tij} = & \pi_{0ij} + \pi_{1ij}(\text{grade})_{tij} + \pi_{2ij}(\text{grade}^2)_{tij} \\
 & + \pi_{3ij}(\text{publicPI})_{tij} + \pi_{4ij}(\text{Private PI})_{tij} + \pi_{5ij}(\text{Network})_{tij} \\
 & + \pi_{6ij}(\text{PublicPI})(\text{grade})_{tij} + \pi_{7ij}(\text{PrivatePI})(\text{grade})_{tij} \\
 & + \pi_{8ij}(\text{Network})(\text{grade})_{tij} + \varepsilon_{tij}
 \end{aligned}$$

In this equation,  $\pi_{0ij}$  represents the performance of child  $i$  in school  $j$  at the initial assessment, when the three PI variables equal zero;  $\pi_{1ij}$  represents the initial linear slope or the yearly growth rate of child  $i$  in school  $j$ ;  $\pi_{2ij}$  captures acceleration-deceleration in growth;  $\pi_{3ij}$ ,  $\pi_{4ij}$ , and  $\pi_{5ij}$  represent the effects of time-varying school-based PI on the contemporaneous performance of child  $i$  in school  $j$  at time  $t$  (kindergarten and Grades 1, 3, and 5);  $\pi_{6ij}$ ,  $\pi_{7ij}$ , and  $\pi_{8ij}$  represent interactions between school-based PI and grade, enabling us to evaluate the relationship between growth rate and school-based PI; and  $\varepsilon_{tij}$  represents the time-specific error of child  $i$  in school  $j$  at time  $t$ .

Level 2:

$$\begin{aligned}
 \pi_{0ij} = & \beta_{00j} + \beta_{01j}(\text{Family SES})_{ij} \dots + \beta_{0pj}(X_{0pj}) + r_{0ij} \\
 \pi_{1ij} = & \beta_{10j} + \beta_{11j}(\text{Family SES})_{ij} \dots + \beta_{1pj}(X_{1pj}) \\
 \pi_{2ij} = & \beta_{20j} \\
 \pi_{3ij} = & \beta_{30j} + \beta_{31j}(\text{Family SES})_{ij} \\
 \pi_{4ij} = & \beta_{40j} + \beta_{41j}(\text{Family SES})_{ij} \\
 \pi_{5ij} = & \beta_{50j} + \beta_{51j}(\text{Family SES})_{ij} \\
 \pi_{6ij} = & \beta_{60j} \\
 \pi_{7ij} = & \beta_{70j} \\
 \pi_{8ij} = & \beta_{80j}
 \end{aligned}$$

The Level 2 model represents variation in growth parameters across children from different families within the same school. It adds controls for family characteristics and cross-level interaction terms among the three types of school-based PI and family SES. The term  $\beta_{00j}$  represents the mean intercept or average outcome scores within school  $j$  at the initial assessment when the covariates are zero;  $\beta_{0pj}$  represents the strength and the direction of association between the family level control variables ( $X_{0pj}$ ) and outcomes of students in school  $j$  at the initial assessment;  $\beta_{10j}$  represents the mean linear slope or the rate of growth of students in school  $j$ ;  $\beta_{1pj}$  represents the influences of family level control variables ( $X_{1pj}$ ) on linear growth rates of students in school  $j$  during the 6 focal school years; and  $r_{0ij}$  represents school  $j$ 's deviation from the average outcome

scores predicted by the model. Except for  $\beta_{00j}$ , all other parameters in the Level 2 model were treated as fixed.  $\beta_{31j}$ ,  $\beta_{41j}$ , and  $\beta_{51j}$  represent the interaction effects between the three school-based PI variables and family SES.

Level 3:

$$\begin{aligned}
 \beta_{00j} = & \gamma_{000} \dots + \gamma_{00p}(W_{00p}) + u_{00j} \\
 \beta_{10j} = & \gamma_{100} \\
 \beta_{20j} = & \gamma_{200} \\
 \beta_{30j} = & \gamma_{300} \quad \beta_{31j} = \gamma_{310} \\
 \beta_{40j} = & \gamma_{400} \quad \beta_{41j} = \gamma_{410} \\
 \beta_{50j} = & \gamma_{500} \quad \beta_{51j} = \gamma_{510} \\
 \beta_{60j} = & \gamma_{600} \\
 \beta_{70j} = & \gamma_{700} \\
 \beta_{80j} = & \gamma_{800}
 \end{aligned}$$

The Level 3 model adds controls for school-level factors.  $\gamma_{000}$  represents the population mean outcome scores at the initial assessment across schools when the covariates are zero;  $\gamma_{00p}$  represents the strength and the direction of association between school-level control variables ( $W_{00p}$ ) and mean initial outcome scores across schools. Except for the intercept ( $\gamma_{000}$ ), all other parameters at Level 3 are treated as fixed.  $u_{00j}$  represents the overall deviation across schools for the outcome scores predicted by the model.

### School-level model

In the school-level modeling, the unit of analysis was a school, not an individual. Thus, after each parent's report regarding school PI was aggregated to school-level scores, models were built to investigate how time-varying school-mean PI was associated with changes in school achievement during the elementary years. The design consists of a two-level hierarchical linear model (HLM) with school-mean PI and school achievement at each wave (kindergarten and Grades 1, 3, and 5) nested within schools.

Level 1:

$$\begin{aligned}
 Y_{tj} = & \beta_{0j} + \beta_{1j}(\text{Public})_{tj} + \beta_{2j}(\text{Private})_{tj} + \beta_{3j}(\text{Network})_{tj} + \varepsilon_{tj} \\
 \varepsilon_{tj} | X \sim & N(0, \theta)
 \end{aligned}$$

In this model, school achievement in a particular year ( $t$ ) for a particular school ( $j$ ) is modeled as a function of a school-specific intercept ( $\beta_{0j}$ ), and the time-specific effects of school mean public-good PI ( $\beta_{1j}$ ), private-good PI ( $\beta_{2j}$ ), and parent network ( $\beta_{3j}$ ); and  $\varepsilon_{tj}$  represents the within-school error term that contributes to the variance unexplained by the covariates.

Level 2:

$$\begin{aligned}\beta_{0j} &= \gamma_{00} + \gamma_{01}(\text{SchoolPov})_j + \gamma_{0p}(\text{School Controls})_j \\ &+ \mu_{0j}, \mu_{0j} \sim N(0, \psi) \\ \beta_{1j} &= \gamma_{10} + \gamma_{11}(\text{SchoolPov})_j \\ \beta_{2j} &= \gamma_{20} + \gamma_{21}(\text{SchoolPov})_j \\ \beta_{3j} &= \gamma_{30} + \gamma_{31}(\text{SchoolPov})_j\end{aligned}$$

At the between-school level, school characteristics (school poverty, percentage of minority students, and school size) were included to explain between-school variability in school outcomes. The first equation is for the school-specific intercept  $\beta_{0j}$  from the Level 1 equation. It is modeled as a function of grand mean outcome scores of the sample ( $\gamma_{00}$ ), school poverty ( $\gamma_{01}$ ), and other school level covariates ( $\gamma_{0p}$ ). And  $\mu_{0j}$  represents the between-school error term. The subsequent three equations indicate that the within-school parameters— $\beta_{1j}$ ,  $\beta_{2j}$ , and  $\beta_{3j}$ —are treated as fixed effects.  $\gamma_{11}$ ,  $\gamma_{21}$ , and  $\gamma_{31}$  represent the interaction effects between school-mean PI and school poverty.

## Results

### Descriptive analyses

Descriptive statistics regarding the sample characteristics and student outcomes are provided in Table 2. Just over half the students were male, and 54% were non-Hispanic White. Public-good and private-good PI scores reached their peak at Grade 3 and then slightly decreased in Grade 5, whereas parent network size increased over the 6 years. Mathematics and reading achievement scores also improved across the 6 years. School administrators' reports of school-level achievement displayed

slight changes across waves, but did not constitute a growth pattern.

The descriptive statistics displayed in Table 3 indicate how the time-varying continuous measures varied within and between the individual level and the school level. Each aspect of school-based PI varied more between individuals than within an individual, indicating that individual parents tended to maintain a similar level of school-based PI over time. Conversely, students' scores in mathematics and reading varied more within an individual than between individuals. At the school-mean level, all three aspects of PI varied more between schools than within schools over time. School-wide achievement varied more between schools than within schools. There were stark SES differences at both the family and school levels. The higher SES families and schools showed more evidence of school-based PI than their lower SES counterparts, and higher SES students performed better than lower SES students on the mathematics and reading assessments.

### Findings from individual academic development models

For these analyses, the predictors were grouped into three categories: (a) priority predictors (public-good PI, private-good PI, and parent network) in Level 1, (b) family-level controls (family SES, parents' marital status, and non-English speaking household measured at base year) in Level 2, and (c) school-level controls (school poverty, percentage of minority students in the school, and school enrollment measured at base year) in Level 3.

Model 1 investigated variability in the intercepts and slopes of the trajectories for the outcome variables without including any predictors. Model 2 expanded on the unconditional growth model by investigating the effects of the priority predictors on academic development. Model 3 allowed evaluation of these associations while controlling for the

Table 2. Descriptive statistics.

|                          | Kindergarten |         | Grade 1 |         | Grade 3 |         | Grade 5 |         | Total |              |              |             |
|--------------------------|--------------|---------|---------|---------|---------|---------|---------|---------|-------|--------------|--------------|-------------|
|                          | M or %       | (SD)    | M       | (SD)    | M       | (SD)    | M       | (SD)    | M     | Overall (SD) | Between (SD) | Within (SD) |
| Time-invariant variables |              |         |         |         |         |         |         |         |       |              |              |             |
| Child characteristics    |              |         |         |         |         |         |         |         |       |              |              |             |
| Male                     | 51.47        |         |         |         |         |         |         |         |       |              |              |             |
| White                    | 54.20        |         |         |         |         |         |         |         |       |              |              |             |
| Black                    | 17.03        |         |         |         |         |         |         |         |       |              |              |             |
| Latino                   | 18.09        |         |         |         |         |         |         |         |       |              |              |             |
| Asian                    | 2.89         |         |         |         |         |         |         |         |       |              |              |             |
| Family SES               | −0.08        | (0.76)  |         |         |         |         |         |         |       |              |              |             |
| Non-English at home      | 12.43        |         |         |         |         |         |         |         |       |              |              |             |
| Single-parent family     | 37.65        |         |         |         |         |         |         |         |       |              |              |             |
| School characteristics   |              |         |         |         |         |         |         |         |       |              |              |             |
| Free/reduced lunch       | 55.92        |         |         |         |         |         |         |         |       |              |              |             |
| Minority students        | 61.26        |         |         |         |         |         |         |         |       |              |              |             |
| School enrollment size   | 1,456.84     |         |         |         |         |         |         |         |       |              |              |             |
| Time-varying variables   |              |         |         |         |         |         |         |         |       |              |              |             |
| Parent involvement       |              |         |         |         |         |         |         |         |       |              |              |             |
| Public-good PI           | 1.43         | (1.01)  | 1.62    | (1.02)  | 1.68    | (1.02)  | 1.63    | (1.00)  | 1.57  | (1.02)       | (0.87)       | (0.55)      |
| Private-good PI          | 2.24         | (0.87)  | 2.42    | (0.80)  | 2.56    | (0.72)  | 2.50    | (0.75)  | 2.41  | (0.81)       | (0.70)       | (0.47)      |
| Parent-network           | 2.25         | (3.00)  | 2.71    | (3.38)  | 3.07    | (3.87)  | 3.27    | (3.91)  | 2.75  | (3.51)       | (2.74)       | (2.16)      |
| Academic achievement     |              |         |         |         |         |         |         |         |       |              |              |             |
| Math achievement         | 25.90        | (9.09)  | 61.26   | (18.09) | 98.72   | (24.71) | 123.68  | (24.79) | 73.64 | (38.44)      | (24.62)      | (31.40)     |
| Reading achievement      | 35.21        | (10.19) | 77.35   | (23.87) | 126.66  | (28.04) | 150.09  | (26.39) | 93.11 | (46.31)      | (29.16)      | (38.50)     |
| School-wide achievement  | 64.35        | (22.71) | 64.65   | (23.03) | 65.79   | (22.92) | 65.25   | (22.29) | 65.39 | (22.20)      | (20.35)      | (12.30)     |



**Table 3.** Key study variables by family and school SES indicators (Grade 5 data only).

|                                                                 | Family SES                  |                             |                             |                             |                              | F-value   |
|-----------------------------------------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|-----------|
|                                                                 | 20 <sup>th</sup> percentile | 40 <sup>th</sup> percentile | 60 <sup>th</sup> percentile | 80 <sup>th</sup> percentile | 100 <sup>th</sup> percentile |           |
|                                                                 | M (SD)                      | M (SD)                      | M (SD)                      | M (SD)                      | M (SD)                       |           |
| Outcomes                                                        |                             |                             |                             |                             |                              |           |
| Math achievement                                                | 107.04 (25.35)              | 118.23 (23.78)              | 123.67 (22.08)              | 129.30 (21.35)              | 138.07 (19.06)               | 559.86*** |
| Reading achievement                                             | 130.29 (25.65)              | 143.93 (24.54)              | 150.62 (23.27)              | 157.21 (21.83)              | 166.43 (20.10)               | 713.23*** |
| Parent involvement                                              |                             |                             |                             |                             |                              |           |
| Public-good PI                                                  | 1.13 (0.95)                 | 1.41 (0.96)                 | 1.57 (0.98)                 | 1.82 (0.96)                 | 2.03 (0.92)                  | 265.85*** |
| Private-good PI                                                 | 2.03 (0.96)                 | 2.38 (0.77)                 | 2.51 (0.72)                 | 2.66 (0.59)                 | 2.77 (0.50)                  | 311.54*** |
| Parental network                                                | 2.00 (3.06)                 | 2.56 (3.34)                 | 3.06 (3.70)                 | 3.86 (4.12)                 | 4.69 (4.41)                  | 142.06*** |
| Percentage of students eligible for free or reduced-price lunch |                             |                             |                             |                             |                              |           |
| Outcomes                                                        |                             |                             |                             |                             |                              |           |
| School achievement                                              | 77.98 (17.62)               | 71.41 (19.95)               | 65.43 (20.60)               | 62.84 (21.44)               | 54.08 (23.58)                | 258.34*** |
| Parent involvement                                              |                             |                             |                             |                             |                              |           |
| School-mean public-good PI                                      | 1.65 (0.51)                 | 1.48 (0.50)                 | 1.45 (0.50)                 | 1.25 (0.59)                 | 1.19 (0.51)                  | 223.00*** |
| School-mean private-good PI                                     | 2.59 (0.39)                 | 2.45 (0.43)                 | 2.34 (0.48)                 | 2.15 (0.50)                 | 2.15 (0.57)                  | 296.38*** |
| School-mean parental network                                    | 3.23 (1.97)                 | 2.75 (1.71)                 | 2.18 (1.49)                 | 2.13 (1.80)                 | 2.11 (1.47)                  | 161.35*** |

Note. \*\*\* $p < .001$ .

effects of family and school-level factors. In addition, interaction terms between family SES and the priority predictors were included in Model 3 to test the potential moderating effects of family SES on the relationship between school-based PI and student achievement.

### Mathematics achievement trajectories

Table 4 displays estimates for the fitted multilevel growth models pertaining to mathematics achievement. The unconditional growth model (Model 1) indicated that a quadratic specification of mathematics achievement as a function of grade best described mathe-

**Table 4.** Fitted multilevel models for changes in child math and reading achievement.

|                              | Mathematics |            |            | Reading    |            |            |
|------------------------------|-------------|------------|------------|------------|------------|------------|
|                              | Model 1     | Model 2    | Model 3    | Model 1    | Model 2    | Model 3    |
| Fixed effects                |             |            |            |            |            |            |
| Intercept                    | 35.92***    | 34.90***   | 37.58***   | 44.50***   | 44.92***   | 48.36***   |
| Grade                        | 26.14***    | 25.54***   | 26.06***   | 35.06***   | 34.25***   | 34.59***   |
| Grade <sup>2</sup>           | -1.76***    | -1.81***   | -1.82***   | -2.97***   | -3.02***   | -2.97***   |
| Public-good PI               |             | 0.62***    | 0.34***    |            | 0.47***    | 0.17       |
| Public-good PI × Grade       |             | 0.03       | -0.04      |            | 0.21***    | 0.08       |
| Public-good PI × Family SES  |             |            | 0.27**     |            |            | 0.20       |
| Private-good PI              |             | 0.13       | 0.04       |            | -0.25**    | -0.51***   |
| Private-good PI × Grade      |             | 0.29***    | 0.21***    |            | 0.54***    | 0.40***    |
| Private-good PI × Family SES |             |            | 0.41***    |            |            | 0.26       |
| Parent network               |             | 0.11***    | 0.12***    |            | 0.05       | 0.06       |
| Parent network × Grade       |             | 0.01       | 0.01       |            | 0.03**     | 0.01       |
| Parent network × Family SES  |             |            | -0.02      |            |            | 0.01       |
| Family SES                   |             |            | 3.67***    |            |            | 5.16***    |
| Single parent family         |             |            | -1.65***   |            |            | -2.50***   |
| Non-English at home          |             |            | -2.90***   |            |            | -3.39***   |
| School F/R lunch             |             |            | -0.02***   |            |            | -0.05***   |
| Percentage of minority       |             |            | -0.77***   |            |            | -0.08      |
| School size                  |             |            | 0.45**     |            |            | 0.40       |
| Random effects (SD)          |             |            |            |            |            |            |
| Level 1                      | 10.81***    | 8.59***    | 8.55***    | 13.35***   | 11.43***   | 11.23***   |
| Level 2 intercept            | 13.69***    | 9.67***    | 9.24***    | 15.50***   | 12.33***   | 11.73***   |
| Slope of grade               |             | 3.24***    | 3.04***    |            | 3.82***    | 3.23***    |
| Correlation                  |             | .73***     | .73***     |            | 0.47***    | .47***     |
| Level 3                      | 7.93***     | 5.91***    | 3.48***    | 9.74***    | 9.19***    | 4.38***    |
| Model fit statistics         |             |            |            |            |            |            |
| 2 log-likelihood             | -23,7301.8  | -21,2916.7 | -13,1724.4 | -24,3785.7 | -21,8909.8 | -13,6660.3 |

Note. Model 1 is an unconditional growth model. Model 2 adds the main effect of school-based PI as well as school-based PI × Grade interaction effects. Model 3 added family and school-level covariates. F/R lunch refers to the percentage of students eligible for free or reduced-price lunch.

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

mathematics achievement. The mathematics achievement trajectories displayed a curvilinear pattern; they tended to increase with grade ( $\beta_1 = 26.14, p < .001$ ), but at a decelerating rate ( $\beta_2 = -1.76, p < .001$ ). The variance components for initial status and rates of change were statistically significant, suggesting that it is reasonable to explore the effects of family and school-specific predictors on academic growth. In successive models, the decrease in the deviance statistic was significant at  $p < .001$ , indicating that Model 3 provided the best fit of all the models.

In Model 3, the time-varying indicators of public-good PI ( $\beta_3 = 0.34, p < .001$ ) and parent network ( $\beta_4 = 0.12, p < .001$ ) were positively associated with contemporaneous mathematics achievement, while time-varying private-good PI was not associated with contemporaneous mathematics achievement. Private-good PI interacted significantly with grade ( $\beta_5 = 0.21, p < .001$ ), indicating that the effect of private-good PI on mathematics achievement became stronger as children moved into the higher grades. The indicators of public-good PI ( $\beta_9 = 0.27, p < .001$ ) and private-good PI ( $\beta_{10} = 0.41, p < .001$ ) displayed significant, positive interactions with family SES. This result indicates that with respect to mathematics, children from high-SES families benefitted more from their parents' public-good and private-good PI than did children from low-SES families. In contrast, the positive relation of parent network to mathematics achievement worked uniformly across high- and low-SES families.

As seen in Table 4, Models 2 and 3 demonstrated successive reductions in all variance components when compared with the unconditional growth model. Specifically, in Model 2, after adding the three types of school-based PI, variances at Level 1 (within-person) and Level 2 (between-person) were substantially reduced. In Model 3, the inclusion of school-level controls reduced Level 3 (between-school) variances. Significant and positive correlations between intercepts and slopes ( $r = .73$ ) suggested that children with initially higher mathematics scores relative to their peers improved more rapidly over time.

### Reading achievement trajectories

Table 4 displays estimates of fitted multilevel growth models for reading trajectories. As was true of the mathematics trajectories, the reading trajectories tended to increase with grade ( $\beta_1 = 35.06, p < .001$ ), but at a decelerating rate ( $\beta_2 = -2.97, p < .001$ ). Comparisons between successive models revealed a significant change in the deviance statistics at  $p < .001$ , indicating that Model 3 provided the best fit of all the models. Time-varying private-good PI had a significant, but negative, association with contemporaneous reading scores ( $\beta_4 = -0.51, p < .001$ ), and a positive association with reading growth ( $\beta_7 = 0.40, p < .001$ ). This indicates that children of parents who were highly involved in private-good activities tended to score *lower* in reading at each assessment. However, the influence of private-good PI on reading scores became stronger in the later grades, and children of highly involved parents ultimately surpassed their peers at the end of their elementary years. In contrast, public-good PI and parent network displayed no association with contemporaneous reading scores or reading growth.

No interaction effect between the three school-based PI indicators and family SES was significant. Variance components in the reading achievement models display patterns similar to

those observed in the mathematics models; after adding the three types of school-based PI, variances at Level 1 (within-person) and Level 2 (between-person) were substantially reduced, while the inclusion of school-level controls reduced Level 3 (between-school) variances. The correlation between intercept and slope was positive, but the strength of the relation was smaller ( $r = .43$ ) in reading than in mathematics ( $r = .73$ ).

### Findings from models of school-wide achievement

To examine the effects of school-mean PI on school-level achievement, the predictors were grouped into two categories: (a) priority predictors (school-mean public-good PI, school-mean private-good PI, and school-mean parent network) and (b) school-level controls (school poverty, percentage of minority students in the school, and school enrollment size). The analysis began with an unconditional model (Model 1). Model 2 expanded the unconditional model to evaluate the relations of the three school-mean indicators of PI to school-level achievement. Model 3 tested the relations of the three school-mean indicators of PI to school-level achievement, net the effects of school-level controls. In addition, interactions between the three school-mean PI indicators and school poverty were included in the final model.

Table 5 displays estimates of the fitted multilevel models for school-wide achievement. Significant within- and between-school variations were found with respect to mean school achievement, which justified the use of HLM analysis. The intraclass correlation was 0.71, indicating that 71% of the total variation in school-wide achievement was between schools. Model-fit statistics (deviances) suggested that Model 3 was the best fitting model.

The intercept in Model 3 represents the average school-wide percentage of students meeting national standards when all

Table 5. Fitted multilevel models for school-level academic achievement.

|                                    | School academic achievement |            |            |
|------------------------------------|-----------------------------|------------|------------|
|                                    | Model 1                     | Model 2    | Model 3    |
| Fixed effects                      |                             |            |            |
| Intercept                          | 61.78***                    | 56.28***   | 75.32***   |
| Public-good PI                     |                             | 0.88***    | 0.61*      |
| Public-good PI $\times$ F/R lunch  |                             |            | 0.00       |
| Private-good PI                    |                             | 1.30***    | 0.41       |
| Private-good PI $\times$ F/R lunch |                             |            | 0.03**     |
| Parent network                     |                             | 0.56***    | 0.81***    |
| Parent network $\times$ F/R lunch  |                             |            | 0.00       |
| F/R lunch                          |                             |            | -0.27***   |
| Percentage of minority             |                             |            | -3.25***   |
| School size                        |                             |            | 0.30       |
| Random effects (SD)                |                             |            |            |
| Level 1                            | 12.31***                    | 12.16***   | 12.16***   |
| Level 2                            | 19.36***                    | 18.96***   | 14.58***   |
| Model fit statistics               |                             |            |            |
| -2 log-likelihood                  | -14,4843.8                  | -14,3045.7 | -10,4308.4 |

Note. Model 1 is an unconditional growth model. Model 2 adds the main effect of school-mean PI. Model 3 added school-mean PI  $\times$  School F/R lunch interaction effects and school-level covariates. F/R lunch refers to the percentage of students eligible for free or reduced-price lunch.

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

other controls equal zero. The school-level achievement intercept in Model 3 was 75.32, much higher than the population average in Model 1 (61.78). Two types of school-mean PI had positive associations with school-wide achievement: school-mean public-good PI ( $\beta_1 = 0.61, p < .05$ ) and school-mean parent network ( $\beta_3 = 0.81, p < .001$ ). School-mean private-good PI was significantly associated with school-level achievement in Model 2 but not Model 3. There was a positive interaction between school-mean private-good PI and school poverty ( $\beta_5 = 0.03, p < .01$ ), indicating that the effects of school-mean private-good PI on school-level achievement were stronger in schools with high concentration of poverty. Regarding random effects, the addition of predictors reduced Level 1 (within-school) and Level 2 (between-school) variances, particularly the inclusion of school-level controls.

## Discussion

School-based PI has been identified in federal laws as well as state and federal education policy as an important lever of school reform and educational equality. However, previous studies have not been uniformly supportive of the effectiveness of school-based PI. In this study, we employed several conceptual and methodological strategies that enabled us to explore the efficacy of school-based PI in a particularly powerful way. Specifically, we used the ECLS-K dataset to examine the relative impact of three dimensions of school-based PI on individual student academic achievement over time in mathematics and reading: parents' involvement directed at their own child (private-good PI), involvement to improve the school as a whole (public-good PI), and involvement in a parent network. In addition, we examined whether achievement at the school level was affected when a greater percentage of parents was involved in these three aspects of PI. We also investigated whether family- and school-level SES moderated the effects of school-based PI on educational outcomes.

### *Does school-based PI boost student-level academic achievement?*

Overall, we found strong evidence of an association between various types of school-based PI and student-level achievement. As expected, private-good PI was more strongly associated with individual achievement than was public-good PI, predicting reading as well as mathematics achievement. Private-good PI was also distinctive in that there was no contemporaneous effect on mathematics achievement, but the relationship became stronger across time. Furthermore, private-good PI was actually negatively associated with reading achievement in terms of the contemporaneous relationship, but became strongly and positively associated with reading achievement over time. Private-good PI was more strongly associated with student-level achievement for high-SES than low-SES students. Thus, these findings point to a significant effect of parents' efforts to support their own child's achievement, particularly for high-SES families.

The effects of public-good PI were somewhat less robust. Parent efforts directed at the school were associated with student-level mathematics achievement overall, but the association remained constant across the grades rather than intensifying as

was the case with private-good PI. Like private-good PI, public-good PI was more strongly related to mathematics achievement in high-SES than low-SES families. However, public-good PI showed no relation to student-level reading achievement after controlling for family and school characteristics. The third type of PI, parent networking, was associated with mathematics but not reading achievement. The effects of parent networking on mathematics achievement did not increase over time, nor were they associated with family SES.

These findings raise a number of important questions about the factors that appear to boost achievement at the student level. One question is why private-good effects on student-level achievement intensify over time. As noted previously, we found that private-good PI became more strongly related to mathematics and reading achievement as children move through the elementary grades. Based on a skill development model (Epstein, 1995), we would argue that as the curriculum becomes more challenging, parents who are engaged at the school site are able to gain a better understanding of the concepts and pace of what is being taught, and thus obtain a comparatively bigger advantage over their less-engaged counterparts than they had in the early grades. Another possibility is that parents' active participation in activities during these years may be particularly influential because it is in the last years of elementary school that student engagement in school typically experiences as sharp decline and thus the job of supporting them becomes more challenging (Grolnick & Slowiaczek, 1994; Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean, 2006).

The findings with respect to change over time are further complicated by the fact that, in terms of reading achievement, the contemporary association with private-good PI is not merely nonsignificant, but rather it is significant and negative. This may be an example of reactive involvement (McNeal, 2012), in which parents of children who are having trouble in school are more likely to schedule meetings with teachers, or otherwise become involved in school activities to address their concerns about low achievement. Furthermore, the fact that parents tend to become more reactively involved with respect to reading may reflect the general tendency of schools to focus more directly on reading than mathematics achievement in the early grades, thus increasingly the likelihood that achievement gaps will be more salient to teachers as well as parents (Pianta, Belsky, Houts, & Morrison, 2007).

Another question raised by our findings regarding student-level performance is why there is a differential effect for reading versus mathematics achievement. Our analyses showed that while private-good PI was related to mathematics and reading achievement over time, public-good PI was related to mathematics but not to reading achievement. It is possible that parents need more information from the school about how to support children's mathematics performance than they do regarding reading performance. Indeed, one study of elementary school children found substantial variation among mothers in their ability to provide accurate and developmentally appropriate assistance when they were helping their children with mathematics homework (Hyde, Else-Quest, Alibali, Knuth, & Romberg, 2006). Mothers with less mathematics preparation, and less confidence about their mathematics skills were less likely to participate effectively in tutoring

sessions, prompting the study authors to suggest that some parents receive assistance at the school site to remedy this inequality. Indeed, there is evidence that schools can boost parent effectiveness and student-level mathematics achievement by actively encouraging public-good PI (Hindman, Skibbe, & Morrison, 2010). Additional research is needed to explore the ways that parents' public-good efforts promote student-level achievement so that teachers can better leverage parent volunteer efforts to support student achievement in all subject areas.

### ***Does school-based PI boost school-wide achievement?***

Our second research objective was to examine whether the three types of school-mean PI were related to overall achievement at the level of the school. We found that public-good PI had a beneficial effect on the school community as a whole. School-wide academic achievement was higher in schools characterized by high levels of parent participation in the PTA or parent-teacher organization and other volunteer activities. It appears that even students of less involved parents can benefit academically if other parents in the school community are generally involved in school activities (Sui-Chu & Willms, 1996). While our study did not address the specific processes by which public-good PI boosts student achievement, previous work suggests that when parents volunteer at the school, they enrich the overall learning environment by supplementing teachers' time and efforts, which eventually contribute to raise school-wide achievement (Brent, 2000). Furthermore, parent participation in the PTA and other school organizations can increase staff accountability (McMillan, 2000) and promote a safe and orderly school environment with an enriched curriculum (Bryk et al., 2010). In this relational cycle, strong PI plays an initiating role in creating core resources for maintaining a high-quality school environment.

There is no shortage of theory suggesting that parent networking can be an effective tool for boosting school quality (Bronfenbrenner, 1986; Coleman, 1988). However, in spite of the theoretical importance accorded the peer relationships of parents, few empirical studies have investigated their effects on school-wide achievement. As noted previously, a number of analysts have examined the role of parents' social networks using nationally representative datasets (i.e., ELS:2002; NELS:88), but the findings were surprisingly mixed at the student level of analysis (i.e., Carbonaro, 1988; Morgan & Sørensen, 1999; Morgan & Todd, 2009). In our study, we found a significant but small effect for parent networking on student-level mathematics achievement. The findings from the school-level analysis were even stronger, with parent networking being the most strongly related of the three PI measures to school-wide achievement. One question that should be asked is whether more participation in parent networks is associated with overall school achievement because the students whose parents are more extensively networked are higher achieving, and thus affect the overall performance of their school, with no spillover to students whose parents do not engage in networking. In the future, more work is needed to identify the ways in which parent networks exert their effects, including promoting group norms and facilitating coordinated actions (Putnam, 2000).

### ***What is the moderating effect of SES on individual and school-level achievement outcomes?***

The third overall goal of our study was to examine whether various types of school-based PI had a different effect for higher versus lower SES students. Previous studies have yielded conflicting findings about the moderating effect of SES on student achievement. While Lareau (2003) in an influential qualitative study described how school-based PI conferred particular benefits to students from high-SES families, recent quantitative studies have found that global measures of school-based PI matter more for low-SES students (Dearing, Kreider, Simpkins, & Weiss, 2006), or are equally important for high- and low-SES students (Lee & Bowen, 2006). However, when studies focused on specific aspects of school-based PI, they tend to find that public-good PI and parent networking are more prevalent and effective forms of school-based PI for high SES or White students (Desimone, 1999; McNeal, 1999; Yan & Lin, 2005).

Our analyses of achievement at the individual student level seem to confirm this latter set of findings. We found that high-SES families were more likely to participate in public-good activities and to form social networks with other parents than low-SES families did. And both public- and private-good PI were particularly effective in boosting the mathematics achievement of high-SES students. Although many low-SES parents want to be involved in their children's education, financial and time constraints may limit their involvement (C. E. Cooper, 2010). Moreover, previous research suggests that low-SES parents are less likely to be optimistic about their children's educational chances and confident about intervening on behalf of their children (C. E. Cooper, 2010; Crosnoe, Mistry & Elder, 2002; Lareau, 2003), which may undermine their effectiveness and limit the benefits gained from their school participation.

Interestingly, the school-level analyses told a different story. Specifically, they revealed that school-mean private-good PI was associated with higher achievement in the lower SES schools. Our data suggest that even though there was less private-good PI in schools serving low-SES families, there was nevertheless a substantial amount of variability in those schools (low-SES schools:  $M = 2.15$ ,  $SD = 0.57$ ; high-SES schools:  $M = 2.59$ ,  $SD = 0.39$ ). Thus, one possibility is that a mild ceiling effect for private-good PI in high-SES schools reduced the possible covariance with school-level achievement. In terms of a substantive explanation, it is possible that high private-good involvement in low-SES schools is part of a dynamic and multilateral process in which schools with effective leadership are able to support teachers who in turn create trusting relationships with parents. Many parents in low-resource, urban schools are likely to lack a sense of trust in school staff because they themselves may have experienced discrimination, neglect, or failure in school (Jackson & Cooper, 1989). However, effective urban schools build relational trust among parents, teachers, and students, which is a cause and an outcome of their attempts to engage parents at home and at the school site (Bryk & Schneider, 2002). And, to the extent that



private-good PI involves one-to-one interactions between parents and teachers, it may be a particularly powerful mechanism for building trust. In contrast, public-good PI may yield skills and information on the part of parents, but may be less likely to lead to close relationships. At this point, few studies have been done to examine the relation between school SES and school-mean private-good PI, so further research is needed to determine whether this is a robust finding in other datasets and to explore the processes that lie behind it.

### ***Does school-based PI deserve the resources that policymakers have invested in it?***

Urban school reform initiatives frequently include a recommendation that local schools connect and form partnerships with the parents they serve (Bryk et al., 2010). Our study provides substantial support for the use of PI to improve education as well as pointing to several ways of strengthening current policies so that PI can be more powerful in low-SES communities. First, our study suggests that parent networking should be considered an important form of PI that deserves support from the school. Currently, policy initiatives characterize school-based PI as consisting of communication between parents and school staff (No Child Left Behind Act of 2001, 2002). Second, it is clear that school-based PI programs need to be better suited to the needs of low-SES populations. Although the PI provision of the No Child Left Behind Act of 2001 and other legislative efforts aims to promote family-school connections as a means of reducing social and economic disparities in learning, policy guidelines for increasing the involvement of low-SES families are still vague (Epstein, 2005). For example, considering that an inflexible work schedule is one of the barriers to involvement among low-SES families (Lee & Bowen, 2006), more efforts are needed to protect parents' right to participate in their child's school activities. Presently, some states have a law on the books that allows parents or guardians to take time off from work to participate in field trips, volunteering, and school-sponsored events. Other states should consider implementing similar legislation, and all states should consider how to publicize these initiatives and encourage parents to take advantage of them.

In addition to addressing those structural barriers, it is important to consider the psychological barriers that may deter PI. Empirical research confirms that the most powerful predictor of PI, particularly for low-SES families, is the creation of a school environment where parents feel welcomed and valued by educators (Deslandes & Bertrand, 2005; Green, Walker, Hoover-Dempsey, & Sandler, 2007; Hoover-Dempsey, & Sandler, 1997; Park & Holloway, 2013). To improve school climate, school administrators can work with teachers to overcome their biases about low-income or racial/ethnic minority parents based on stereotypes and lack of information (Baquedano-López, Alexander, & Hernandez, 2013; C. W. Cooper, 2003). Research also suggests that providing information on how schools function, how to support learning, and how to access educational resources is another way to encourage low-SES parents to become more involved in school-based activities (Christenson & Sheridan, 2001; Park & Holloway, 2013; Simon, 2004). This type of information is particularly important for parents of children with intellectual or physical disabilities, as the

level of services that the child receives hinges in large part on parents' advocacy efforts (Ong-Dean, 2009).

### ***Study limitations***

Large datasets such as the ECLS-K permit longitudinal, multivariate investigation of important issues. However, the breadth of such databases can limit the depth of information collected on any specific construct of interest. If we had been able to look more deeply into the dynamics of school-based PI, we might have found even stronger results. For example, the ECLS-K dataset does not include information on parents' assessments of the quality of their school involvement, nor does it tap into diverse types of PI practices that may be particular to certain communities (Gonzales, Moll, & Amanti, 2005). Furthermore, our measure of parent networking was a basic assessment of its extensiveness, and did not delve into the nature of the interactions or the frequency with which the network was activated. Another limitation of the dataset is that the family demographic variables were assessed in the base year only, preventing us from accounting for the effects of changes in family structure or SES. With regard to outcome variables, we were unable to examine gains in such constructs as higher level thinking or self-regulation and engagement. In addition, school administrator estimates regarding the percentage of students meeting national standards on mathematics and reading assessments are relatively imprecise indicators as they are possibly susceptible to bias because of exaggeration and poor judgment on the part of school administrators. In future research, objective school-level academic performance scores should be used in school-level analyses. In addition, other school-level outcomes available in the ECLS, such as school climate or safety indicators, can be used to study the beneficial school-wide influences of school-based PI. And finally, we should note that even though longitudinal designs involving multiple waves of data are a powerful approach for testing causal processes, there is always a possibility of reciprocal causation (Singer & Willet, 2003).

### ***Conclusions***

The results of this study provide strong empirical evidence concerning the effectiveness of school-based PI and generally support the current federal and state-level policy focus on boosting school-based PI. By framing school-based PI as a multidimensional concept, we were able to show how each type of school-based PI contributed to academic outcomes at the student and school level. The use of three-level growth curve modeling allowed us to capture true growth in student achievement as well as the influences of school-based PI on that growth, controlling potential confounding family and school factors. We showed that private-good PI boosted students' mathematics and reading achievement, particularly in higher SES families. We also found that public-good PI was not strongly related to individual-level academic achievement, but that school-mean public-good PI was instrumental in boosting school-level achievement, particularly in the case of schools serving low-income students. And finally, we found that the size of parent network was a very powerful predictor of school-wide achievement. Taken together, these findings suggest that policies aimed at encouraging parents to become involved at the school site are

likely to boost the achievement of elementary school children. However, to maximize the benefits of PI, additional attention should be devoted to improving schools' ability to leverage the considerable social and cultural capital of low-income families.

## Acknowledgments

The research reported here was conducted when Sira Park was a doctoral student at the University of California, Berkeley.

## Funding

This research was supported by the Institute of Education Sciences, grant #R305B110017.

## References

- Baquedano-López, P., Alexander, R. A., & Hernandez, S. J. (2013). Equity issues in parental and community involvement in schools: What teacher educators need to know. *Review of Research in Education*, 37, 149–182.
- Brent, B. O. (2000). Do schools really need more volunteers? *Educational Policy*, 14, 494–510.
- Bronfenbrenner, U. (1986). Ecology of the family as a context for human development: Research perspectives. *Developmental Psychology*, 22, 723–742.
- Bryk, A. S., & Schneider, B. L. (2002). *Trust in schools: A core resource for improvement*. New York, NY: Russell Sage Foundation.
- Bryk, A. S., Sebring, P. B., Allensworth, E., Luppescu, S., & Easton, J. Q. (2010). *Organizing schools for improvement: Lessons from Chicago*. Chicago, IL: The University of Chicago Press.
- Carbonaro, W. J. (1998). A little help from my friend's parents: Intergenerational closure and educational outcomes. *Sociology of Education*, 71, 295–313.
- Carbonaro, W. J. (1999). Opening the debate on closure and schooling outcomes: Comment on Morgan and Sørensen. *American Sociological Review*, 64(5), 682–686.
- Child Trends. (2010). *Parent involvement in schools*. Retrieved from <http://www.childtrendsdatabank.org/?q=node/186>
- Christenson, S. L., & Sheridan, S. M. (2001). *Schools and families: Creating essential connections for learning*. New York, NY: Guilford Press.
- Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, 94, 95–120.
- Cooper, C. E. (2010). Family poverty, school-based parental involvement, and policy-focused protective factors in kindergarten. *Early Childhood Research Quarterly*, 25, 480–492.
- Cooper, C. W. (2003). The detrimental impact of teacher bias: Lessons learned from the standpoint of African American mothers. *Teacher Education Quarterly*, 30, 101–116.
- Crosnoe, R., & Cooper, C. E. (2010). Economically disadvantaged children's transitions into elementary school: Linking family and school contexts to inform policy. *American Educational Research Journal*, 47, 258–297.
- Crosnoe, R., Mistry, R. S., & Elder, G. H. (2002). Economic disadvantage, family dynamics, and adolescent enrollment in higher education. *Journal of Marriage and Family*, 64, 690–702.
- Cucchiar, M. B., & Horvat, E. M. (2009). Perils and promises: Middle-class parental involvement in urban schools. *American Educational Research Journal*, 46, 974–1004.
- Dearing, E., Kreider, H., Simpkins, S., & Weiss, H. B. (2006). Family involvement in school and low-income children's literacy: longitudinal associations between and within families. *Journal of Educational Psychology*, 98, 653–664.
- Desimone, L. (1999). Linking parent involvement with student achievement: Do race and income matter? *Journal of Educational Research*, 93, 11–30.
- Deslandes, R., & Bertrand, R. (2005). Motivation of parent involvement in secondary-level schooling. *The Journal of Educational Research*, 98, 164–175.
- Domina, T. (2005). Leveling the home advantage: Assessing the effectiveness of parental involvement in elementary school. *Sociology of Education*, 78, 233–249.
- Dominguez-Pareto, I. (2014). *Learning advocacy: Decentering parental involvement discourse through the experiences of Latina mothers of children with disabilities in Northern California* (Unpublished dissertation). Berkeley, University of California.
- El Nokali, N. E., Bachman, H. J., & Votruba-Drzal, E. (2010). Parent involvement and children's academic and social development in elementary school. *Child Development*, 81, 988–1005.
- Epstein, J. L. (1995). Family/school/community partnerships: Caring for the children we share. *Phi Delta Kappa*, 76, 701–712.
- Epstein, J. L. (2005). Attainable goals? The spirit and letter of the No Child Left Behind Act on parental involvement. *Sociology of Education*, 78, 179–182.
- Epstein, J. L., & Dauber, S. L. (1991). School programs and teacher practices of parent involvement in inner-city elementary and middle schools. *The Elementary School Journal*, 91(3), 289–305.
- Fan, X. T., & Chen, M. (2001). Parental involvement and students' academic achievement: A meta-analysis. *Educational Psychology Review*, 13, 1–22.
- Goddard, R. D. (2003). The impact of schools on teacher beliefs, influence, and student achievement: The role of collective efficacy. In J. Rath & A. McAninch (Eds.), *Advances in teacher education* (vol. 6, pp. 183–204). Westport, CT: Information Age.
- Gonzalez, N., Moll, L. C., & Amanti, C. (Eds.). (2005). *Funds of knowledge*. London, England: Routledge.
- Grady, S., & Bielick, S. (2010). *Trends in the use of school choice: 1993 to 2007* (NCES 2010-004). Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.
- Green, C. L., Walker, J. M. T., Hoover-Dempsey, K. V., & Sandler, H. M. (2007). Parents' motivations for involvement in children's education: An empirical test of a theoretical model of parental involvement. *Journal of Educational Psychology*, 99, 532–544.
- Grolnick, W. S., & Slowiaczek, M. L. (1994). Parents' involvement in children's schooling: A multidimensional conceptualization and motivational model. *Child Development*, 65, 237–252.
- Hallinan, M. T., & Kubitschek, W. N. (1999). Conceptualizing and measuring school social networks: Comment on Morgan and Sørensen. *American Sociological Review*, 64, 687–693.
- Haynes, N. M., Comer, J. P., & Hamilton-Lee, M. (1989). School climate enhancement through parental involvement. *Journal of School Psychology*, 27, 87–90.
- Hill, N. E., & Tyson, D. F. (2009). Parental involvement in middle school: A meta-analytic assessment of the strategies that promote achievement. *Developmental Psychology*, 45, 740–763.
- Hindman, A. H., Skibbe, L. E., & Morrison, F. J. (2010). Teacher outreach to families across the transition to school: An examination of teachers' practices and their unique contributions to children's early academic outcomes. *Early Childhood Education Journal*, 41, 391–399.
- Hoover-Dempsey, K. V., & Sandler, H. M. (1997). Why do parents become involved in their children's education? *Review of Educational Research*, 67, 3–42.
- Horvat, E. M., Weininger, E. B., & Lareau, A. (2003). From social ties to social capital: Class differences in the relations between schools and parent networks. *American Educational Research Journal*, 40, 319–351.
- Hyde, J. S., Else-Quest, N. M., Alibali, M. W., Knuth, E., & Romberg, T. (2006). Mathematics in the home: Homework practices and mother-child interactions doing mathematics. *The Journal of Mathematical Behavior*, 25, 136–152.
- Jackson, B. L., & Cooper, B. S. (1989). Parent choice and empowerment: New roles for parents. *Urban Education*, 24, 263–86.
- Jeynes, W. (2005). A meta-analysis of the relation of parental involvement to urban elementary school student academic achievement. *Urban Education*, 40, 237–269.
- Jeynes, W. (2007). The relationship between parental involvement and urban secondary school student academic achievement: A meta-analysis. *Urban Education*, 42, 82–110.
- Lareau, A. (2003). *Unequal childhoods: Class, race, and family life*. Berkeley, CA: University of California Press.



- Lee, J. S., & Bowen, N. K. (2006). Parent involvement, cultural capital, and the achievement gap among elementary school children. *American Educational Research Journal*, 43, 193–218.
- McMillan, R. (2000). Competition, parental involvement, and public school performance. *Proceedings of the Annual Conference on Taxation and Minutes of the Annual Meeting of the National Tax Association*, 93, 150–155.
- McNeal, R. B. (1999). Parental involvement as social capital: Differential effectiveness on science achievement, truancy, and dropping out. *Social Forces*, 78, 117–144.
- McNeal, R. B. (2012). Checking in or checking out? Investigating the parent involvement reactive hypothesis. *The Journal of Educational Research*, 105, 79–89.
- Morgan, S. L., & Sørensen, A. B. (1999). Parental networks, social closure, and mathematics learning: A test of Coleman's social capital explanation of school effects. *American Sociological Review*, 64, 661–681.
- Morgan, S. L., & Todd, J. (2009). Intergenerational closure and academic achievement in high school: A new evaluation of Coleman's conjecture. *Sociology of Education*, 82, 267–285.
- Muller, C. (1993). Parent involvement and academic achievement: An analysis of family resources available to the child. In B. S. Schneider & J. S. Coleman (Eds.), *Parents, their children, and schools* (pp. 77–113). San Francisco, CA: Westview Press.
- National Center for Education Statistics. (n.d.). *Early childhood longitudinal program*. Retrieved from <http://nces.ed.gov/ecls/>
- National Center for Education Statistics (NCES). (2002). *User's manual for the ECLS-K base year public-use data files and electronic codebook* (NCES 2001–029 Revised). Washington, DC: U.S. Department of Education.
- No Child Left Behind Act of 2001, Pub. L. No. 107–110, x 115, Stat. 1425 (2002).
- Okapala, C. O., Okapala, A. O., & Smith, F. E. (2001). Parental involvement, instructional expenditures, family socioeconomic attributes, and student achievement. *The Journal of Educational Research*, 95, 110–115.
- Ong-Dean, C. (2009). *Distinguishing disability: Parents, privilege, and special education*. Chicago, IL: University of Chicago Press.
- Park, S., & Holloway, S. D. (2013). No parent left behind: Predicting parental involvement in adolescents' education within a socio-demographically diverse population. *The Journal of Educational Research*, 106, 105–119.
- Pianta, R. C., Belsky, J., Houts, R., & Morrison, F. (2007). Opportunities to learn in America's elementary classrooms. *Science*, 315, 1795–1796.
- Pomerantz, E. M., Moorman, E. A., & Litwack, S. D. (2007). The how, whom, and why of parents' involvement in children's academic lives: More is not always better. *Review of Educational Research*, 77, 373–410.
- Pong, S. L. (1997). Family structure, school context, and eighth-grade math and reading achievement. *Journal of Marriage and the Family*, 59, 734–747.
- Putnam, R. D. (2000). *Bowling alone: The collapse and revival of American community*. New York, NY: Simon and Schuster.
- Rabe-Hesketh, S., & Skrondal, A. (2008). *Multilevel and longitudinal modeling using Stata* (2nd ed.). College Station, TX: Stata Press.
- Sheldon, S. B. (2002). Parents' social networks and beliefs as predictors of parent involvement. *Elementary School Journal*, 102, 301–316.
- Sheldon, S. B., & Epstein, J. L. (2005). Involvement counts: Family and community partnerships and mathematics achievement. *The Journal of Educational Research*, 98, 196–207.
- Sheridan, S. M., Knoche, L. L., Edwards, C. P., Bovaird, J. A., & Kupzyk, K. A. (2010). Parent engagement and school readiness: Effects of the Getting Ready intervention on preschool children's social-emotional competencies. *Early Education and Development*, 21, 125–156.
- Shumow, L., & Miller, J. D. (2001). Parents' at-home and at-school academic involvement with young adolescents. *The Journal of Early Adolescence*, 21, 68–91.
- Simon, B. S. (2004). High school outreach and family involvement. *Social Psychology of Education*, 7, 185–209.
- Singer, J. D., & Willett, J. B. (2003). *Applied longitudinal data analysis: Modeling change and event occurrence*. Oxford, England: Oxford University Press.
- Smith, T. W., Marsden, P., Hout, M., & Kim, J. (2014). *General social surveys, 1972–2014*. Chicago, IL: NORC at the University of Chicago. Retrieved from [gssdataexplorer.norc.org](http://gssdataexplorer.norc.umd.edu/).
- Sui-Chu, E. H., & Willms, J. D. (1996). Effects of parental involvement on eighth-grade achievement. *Sociology of Education*, 69, 126–141.
- Walsh, P. (2008). Are involved parents providing public goods or private goods? *Public Finance Review*, 36, 678–705.
- Walsh, P. (2010). Is parental involvement lower at larger schools? *Economics of Education Review*, 29, 959–970.
- Wellman, B., & Wortley, S. (1990). Different strokes from different folks: Community ties and social support. *American Journal of Sociology*, 558–588.
- Wigfield, A., Eccles, J. S., Schiefele, U., Roeser, R., & Davis-Kean, P. (2006). Development of achievement motivation. In N. Eisenberg, W. Damon, & R. M. Lerner (Eds.), *Handbook of child psychology* (vol. 3, 6th ed.), pp. 933–1002. Hoboken, NJ: Wiley.
- Xu, M., Kushner Benson, S. N., Mudrey-Camino, R., & Steiner, R. P. (2010). The relationship between parental involvement, self-regulated learning, and reading achievement of fifth graders: A path analysis using the ECLS-K database. *Social Psychology of Education*, 13, 237–269.
- Yamamoto, Y., & Holloway, S. D. (2010). Parental expectations and children's academic performance in sociocultural context. *Educational Psychology Review*, 22, 189–214.
- Yan, W., & Lin, Q. (2005). Parent involvement and mathematics achievement: Contrast across racial and ethnic groups. *The Journal of Educational Research*, 99, 116–127.

**Appendix A.** Types and description of study variables for individual-level analysis.

| Predictor      | Variables                                                        | Type                                  | Reporter                                     | Item <sup>a</sup>                                                                                                     | Item description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------|------------------------------------------------------------------|---------------------------------------|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Predictor      | PI for public-good                                               | Composite                             | Parent                                       | P(2/4/5/6)ATTENP<br>P(2/4/5/6)VOLUNT<br>P(2/4/5/6)FUNDERS<br>P(2/4/5/6)PARGRP<br>P(2/4/5/6)ATTENB<br>P(2/4/5/6)ATTENS | [Since the beginning of this school year, have you or other adults in your household...]<br>Attended a meeting of a PTA, PTO or parent-teacher-student organization?<br>Volunteered at the school or served on a committee?<br>Participated in fundraising for (child)'s school?<br>Gone to a regular parent-teacher conference or meeting with (child)'s teacher?<br>Attended an open house or a back-to-school night?<br>Attended a school or class event, such as a play, sports event, or science fair?<br>How many parents in (child)'s class do you talk with regularly, either in person or on the phone? |
|                | Parent network                                                   | Continuous                            | Parent                                       | P(2/4/5/6)PCLASS                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                | Math Reading                                                     | Continuous                            | Child (test)                                 | C(2/4/5/6)R4MSCL<br>C(2/4/5/6)R4RSCL                                                                                  | IRT score<br>IRT score                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                | Family SES<br>Parent type<br>Mom's employment<br>English at home | Continuous<br>Dummy<br>Dummy<br>Dummy | Parent<br>Parent<br>Parent<br>Screening      | W(K/1/3/5)SESL<br>P(K/1/3/5)HPARNT<br>P(K/1/3/5)HMEMP<br>C1 SCREEN                                                    | A composite of family income, parental education and occupation<br>Two biological parents = 0 (reference group); single or step parents = 1<br>Working mom 0 (reference group); stay-at-home mom = 1<br>Speaking English at home = 0 (reference group); non-English at home = 1                                                                                                                                                                                                                                                                                                                                  |
|                | School SES<br>% of minority                                      | Continuous<br>Continuous              | School administrator<br>School administrator | S(2/4/5/6)FLCHJ<br>S(2/4/5/6)MINOR                                                                                    | % of free or reduced lunch eligible students<br>Percentage of minority students at school<br>Less than 10; 10 to less than 25; 25 to less than 50; 50 to less than 75; 75 or more                                                                                                                                                                                                                                                                                                                                                                                                                                |
| School control | School size                                                      | Continuous                            | School administrator                         | S(2/4/5/6)ENRLS                                                                                                       | Total school enrollment<br>0–149 students; 150–299 students; 300–499 students; 500–749 students; 750 and above                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

Note. <sup>a</sup>Number in parentheses represents waves of data used.

**Appendix B.** Types and description of study variables for school-level analysis.

| Predictor | Variables                         | Type       | Reporter             | Item <sup>a</sup>                                         | Item description                                                                                                                                                                  |
|-----------|-----------------------------------|------------|----------------------|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Outcomes  | School-mean PI for public-good    | Composite  | Parent               | P(2/4/5/6)ATTENP<br>P(2/4/5/6)VOLUNT<br>P(2/4/5/6)FUNDPRS | School mean scores of parent involvement for public-good                                                                                                                          |
|           | School-mean PI for private-good   | Composite  | Parent               | P(2/4/5/6)PARGRP<br>P(2/4/5/6)ATTENB<br>P(2/4/5/6)ATTENS  | School mean scores of parent involvement for private-good                                                                                                                         |
|           | School-mean Parent network        | Continuous | Parent               | P(2/4/5/6)PCLASS                                          | School mean scores of parent involvement for parent network good                                                                                                                  |
|           | School achievement                | Continuous | School administrator | S(2/4/5/6)PCTRD                                           | Based on recent standardized tests, approximately what percent of (K~8) grade students currently enrolled in this school tested at or above grade level on math/reading skills?   |
|           | School SES % of minority students | Continuous | School administrator | S(2/4/5/6)FLCH_I<br>S(2/4/5/6)MINOR                       | % of free or reduced lunch eligible students<br>Percentage of minority students at school<br>Less than 10; 10 to less than 25; 25 to less than 50; 50 to less than 75; 75 or more |
|           | School size                       | Continuous | School administrator | S(2/4/5/6)ENRSL                                           | Total school enrollment<br>0–149 students; 150–299 students; 300–499 students; 500–749 students; 750 and above                                                                    |

Note. <sup>a</sup> Number in parentheses represents waves of data used.

Copyright of Journal of Educational Research is the property of Taylor & Francis Ltd and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.



# What is Ethics in Research & Why is it Important?

by David B. Resnik, J.D., Ph.D.

December 1, 2015

*The ideas and opinions expressed in this essay are the author's own and do not necessarily represent those of the NIH, NIEHS, or US government.*

When most people think of ethics (or morals), they think of rules for distinguishing between right and wrong, such as the Golden Rule ("Do unto others as you would have them do unto you"), a code of professional conduct like the [Hippocratic Oath](https://www.nlm.nih.gov/hmd/greek/greek_oath.html)  ([https://www.nlm.nih.gov/hmd/greek/greek\\_oath.html](https://www.nlm.nih.gov/hmd/greek/greek_oath.html)) ("First of all, do no harm"), a religious creed like the Ten Commandments ("Thou Shalt not kill..."), or a wise aphorisms like the sayings of Confucius. This is the most common way of defining "ethics": **norms for conduct** that distinguish between acceptable and unacceptable behavior.

Most people learn ethical norms at home, at school, in church, or in other social settings. Although most people acquire their sense of right and wrong during childhood, moral development occurs throughout life and human beings pass through different stages of growth as they mature. Ethical norms are so ubiquitous that one might be tempted to regard them as simple commonsense. On the other hand, if morality were nothing more than commonsense, then why are there so many ethical disputes and issues in our society?

One plausible explanation of these disagreements is that all people recognize some common ethical norms but interpret, apply, and balance them in different ways in light of their own values and life experiences. For example, two people could agree that murder is wrong but disagree about the morality of abortion because they have different understandings of what it means to be a human being.

Most societies also have legal rules that govern behavior, but ethical norms tend to be broader and more informal than laws. Although most societies use laws to enforce widely accepted moral standards and ethical and legal rules use similar concepts, ethics and law are not the same. An action may be legal but unethical or illegal but ethical. We can also use ethical concepts and principles to criticize, evaluate, propose, or interpret laws. Indeed, in the last century, many social reformers have urged citizens to disobey laws they regarded as immoral or unjust laws. Peaceful civil disobedience is an ethical way of protesting laws or expressing political viewpoints.

Another way of defining 'ethics' focuses on the **disciplines that study** standards of conduct, such as philosophy, theology, law, psychology, or sociology. For example, a ["medical ethicist"](http://www.iep.utm.edu/bioethic/#SH3b)  (<http://www.iep.utm.edu/bioethic/#SH3b>) is someone who studies ethical standards in medicine. One may also define ethics as a **method, procedure, or perspective** for deciding how to act and for analyzing complex problems and issues. For instance, in considering a complex issue like [global warming](https://www.niehs.nih.gov/research/programs/geh/index.cfm) (<https://www.niehs.nih.gov/research/programs/geh/index.cfm>), one may take an economic, ecological, political, or ethical perspective on the problem. While an economist might examine the cost and benefits of various policies related to global warming, an environmental ethicist could examine the ethical values and principles at stake.

Many different disciplines, [institutions](#) 

(<https://gradschool.duke.edu/professional-development/programs/responsible-conduct-research/rcr-policies-and-resources>)

, and professions have standards for behavior that suit their particular aims and goals. These standards also help members of the discipline to coordinate their actions or activities and to establish the public's trust of the discipline. For instance, ethical standards govern conduct in medicine, law, engineering, and business. Ethical norms also serve the aims or goals of research and apply to [people who conduct scientific research](#)

(<https://www.niehs.nih.gov/careers/index.cfm>) or other scholarly or creative activities. There is even a specialized discipline, research ethics, which studies these norms. See [Glossary of Commonly Used Terms in Research Ethics](#) (<https://www.niehs.nih.gov/research/resources/bioethics/glossary/index.cfm>).

There are several reasons why it is important to adhere to ethical norms in research. First, norms **promote the [aims of research](#)** (<https://www.niehs.nih.gov/about/strategicplan/index.cfm>), such as knowledge, truth, and avoidance of error. For example, prohibitions against [fabricating](#)  (<https://ori.hhs.gov/federal-research-misconduct-policy>), falsifying, or misrepresenting research data promote the truth and minimize error.

Second, since research often involves a great deal of cooperation and coordination among many different people in different disciplines and institutions, ethical standards promote the **values that are essential to collaborative work**, such as trust, accountability, mutual respect, and fairness. For example, many ethical norms in research, such as [guidelines for authorship](#) 

(<http://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html>)

, copyright and [patenting policies](#) (<https://www.niehs.nih.gov/about/techtransfer/index.cfm>), data sharing policies, and confidentiality rules in peer review, are designed to protect intellectual property interests while encouraging collaboration. Most researchers want to receive credit for their contributions and do not want to have their ideas stolen or disclosed prematurely.

Third, many of the ethical norms help to ensure that researchers can be held **accountable to the public**. For instance, federal policies on research misconduct, conflicts of interest, the [human subjects protections](#) (<https://www.niehs.nih.gov/research/clinical/patientprotections/index.cfm>), and [animal care and use](#) (<https://www.niehs.nih.gov/health/topics/science/sya-iccvam/index.cfm>) are necessary in order to make sure that researchers who are funded by public money can be held accountable to the public.

Fourth, ethical norms in research also help to build **public support** for research. People are more likely to fund a research project if they can trust the quality and integrity of research.

Finally, many of the norms of research promote a variety of other important **moral and social values**, such as social responsibility, human rights, animal welfare, compliance with the law, and public health and safety. Ethical lapses in research can significantly harm human and animal subjects, students, and the public. For example, a researcher who fabricates data in a clinical trial may harm or even kill patients, and a researcher who fails to abide by regulations and guidelines relating to radiation or biological safety may jeopardize his health and safety or the health and safety of staff and students.

## Codes and Policies for Research Ethics

---

Given the importance of ethics for the conduct of research, it should come as no surprise that many different professional associations, government agencies, and universities have adopted specific codes, rules, and policies relating to research



**G**ethics. Many government agencies, such as the [National Institutes of Health \(NIH\)](https://ethics.od.nih.gov/default.htm)  (<https://ethics.od.nih.gov/default.htm>), the [National Science Foundation \(NSF\)](https://www.fda.gov/AboutFDA/WorkingatFDA/Ethics/)  , the [Food and Drug Administration \(FDA\)](https://www.fda.gov/AboutFDA/WorkingatFDA/Ethics/)  (<https://www.fda.gov/AboutFDA/WorkingatFDA/Ethics/>), the [Environmental Protection Agency \(EPA\)](https://nepis.epa.gov/Exe/ZyNET.exe/9101HELH.TXT?ZyActionD=ZyDocument&Client=EPA&Index=1981+Thru+1985&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C81thru85%5CTxt%5C00000024%5C9101HELH.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=p%7Cf&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL) 

([https://nepis.epa.gov/Exe/ZyNET.exe/9101HELH.TXT?](https://nepis.epa.gov/Exe/ZyNET.exe/9101HELH.TXT?ZyActionD=ZyDocument&Client=EPA&Index=1981+Thru+1985&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C81thru85%5CTxt%5C00000024%5C9101HELH.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=p%7Cf&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL)

[ZyActionD=ZyDocument&Client=EPA&Index=1981+Thru+1985&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C81thru85%5CTxt%5C00000024%5C9101HELH.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-](https://nepis.epa.gov/Exe/ZyNET.exe/9101HELH.TXT?ZyActionD=ZyDocument&Client=EPA&Index=1981+Thru+1985&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C81thru85%5CTxt%5C00000024%5C9101HELH.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=p%7Cf&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL)

[&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=p%7Cf&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL\)](https://nepis.epa.gov/Exe/ZyNET.exe/9101HELH.TXT?ZyActionD=ZyDocument&Client=EPA&Index=1981+Thru+1985&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C81thru85%5CTxt%5C00000024%5C9101HELH.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=p%7Cf&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL)

, and the [US Department of Agriculture \(USDA\)](https://www.ethics.usda.gov/)  (<https://www.ethics.usda.gov/>) have ethics rules for funded

researchers. Other influential research ethics policies include [Singapore Statement on Research Integrity](http://www.singaporestatement.org/) 

(<http://www.singaporestatement.org/>), the [American Chemical Society, The Chemist Professional's Code of Conduct](http://www.acs.org/content/acs/en/careers/career-services/ethics/the-chemical-professionals-code-of-conduct.html) 

(<http://www.acs.org/content/acs/en/careers/career-services/ethics/the-chemical-professionals-code-of-conduct.html>),

[Code of Ethics \(American Society for Clinical Laboratory Science\)](http://www.ascls.org/about-us/code-of-ethics)  (<http://www.ascls.org/about-us/code-of-ethics>)

[American Psychological Association, Ethical Principles of Psychologists and Code of Conduct](http://www.apa.org/ethics/code/index.aspx) 

(<http://www.apa.org/ethics/code/index.aspx>), [Statements on Ethics and Professional Responsibility \(American](http://www.aaanet.org/cmtes/ethics/AAA-Statements-on-Ethics.cfm)

[Anthropological Association\)](http://www.aaanet.org/cmtes/ethics/AAA-Statements-on-Ethics.cfm)  (<http://www.aaanet.org/cmtes/ethics/AAA-Statements-on-Ethics.cfm>), [Statement on](http://www.aaup.org/report/statement-professional-ethics)

[Professional Ethics \(American Association of University Professors\)](http://www.aaup.org/report/statement-professional-ethics) 

(<http://www.aaup.org/report/statement-professional-ethics>), the [Nuremberg Code](https://www.wma.net/en/30publications/10policies/b3/index.html)   and the [World Medical](https://www.wma.net/en/30publications/10policies/b3/index.html)

[Association's Declaration of Helsinki](https://www.wma.net/en/30publications/10policies/b3/index.html)  ([http://www.wma.net/en/30publications/10policies/b3/index.html](https://www.wma.net/en/30publications/10policies/b3/index.html)).

The following is a rough and general summary of some ethical principals that various codes address\*:

## Honesty

Strive for honesty in all scientific communications. Honestly report data, results, methods and procedures, and publication status. Do not fabricate, falsify, or misrepresent data. Do not deceive colleagues, research sponsors, or the public.

## Objectivity

Strive to avoid bias in experimental design, data analysis, data interpretation, peer review, personnel decisions, grant writing, expert testimony, and other aspects of research where objectivity is expected or required. Avoid or minimize bias or self-deception. Disclose personal or financial interests that may affect research.

## Integrity

Keep your promises and agreements; act with sincerity; strive for consistency of thought and action.

## Carefulness

Avoid careless errors and negligence; carefully and critically examine your own work and the work of your peers. Keep good records of research activities, such as data collection, research design, and correspondence with agencies or journals.

## Openness

Share data, results, ideas, tools, resources. Be open to criticism and new ideas.

## **Respect for Intellectual Property**

Honor patents, copyrights, and other forms of intellectual property. Do not use unpublished data, methods, or results without permission. Give proper acknowledgement or credit for all contributions to research. Never plagiarize.

## **Confidentiality**

Protect confidential communications, such as papers or grants submitted for publication, personnel records, trade or military secrets, and patient records.

## **Responsible Publication**

Publish in order to advance research and scholarship, not to advance just your own career. Avoid wasteful and duplicative publication.

## **Responsible Mentoring**

Help to educate, mentor, and advise students. Promote their welfare and allow them to make their own decisions.

## **Respect for colleagues**

Respect your colleagues and treat them fairly.

## **Social Responsibility**

Strive to promote social good and prevent or mitigate social harms through research, public education, and advocacy.

## **Non-Discrimination**

Avoid discrimination against colleagues or students on the basis of sex, race, ethnicity, or other factors not related to scientific competence and integrity.

## **Competence**

Maintain and improve your own professional competence and expertise through lifelong education and learning; take steps to promote competence in science as a whole.

## **Legality**

Know and obey relevant laws and institutional and governmental policies.

## **Animal Care**

Show proper respect and care for animals when using them in research. Do not conduct unnecessary or poorly designed animal experiments.

## **Human Subjects Protection**

When conducting research on human subjects, minimize harms and risks and maximize benefits; respect human dignity, privacy, and autonomy; take special precautions with vulnerable populations; and strive to

distribute the benefits and burdens of research fairly.

\* Adapted from Shamoo A and Resnik D. 2015. [Responsible Conduct of Research, 3rd ed.](https://global.oup.com/academic/product/responsible-conduct-of-research-9780199376025?cc=us&lang=en&)   
(<https://global.oup.com/academic/product/responsible-conduct-of-research-9780199376025?cc=us&lang=en&>)  
(New York: Oxford University Press).

## Ethical Decision Making in Research

---

**A**lthough codes, policies, and principals are very important and useful, like any set of rules, they do not cover every situation, they often conflict, and they require considerable interpretation. It is therefore important for researchers to learn how to interpret, assess, and apply various research rules and how to make decisions and to act ethically in various situations. The vast majority of decisions involve the straightforward application of ethical rules. For example, consider the following case,

### Case 1:

The research protocol for a study of a drug on hypertension requires the administration of the drug at different doses to 50 laboratory mice, with chemical and behavioral tests to determine toxic effects. Tom has almost finished the experiment for Dr. Q. He has only 5 mice left to test. However, he really wants to finish his work in time to go to Florida on spring break with his friends, who are leaving tonight. He has injected the drug in all 50 mice but has not completed all of the tests. He therefore decides to extrapolate from the 45 completed results to produce the 5 additional results.

Many different research ethics policies would hold that Tom has acted unethically by fabricating data. If this study were sponsored by a federal agency, such as the NIH, his actions would constitute a form of [research misconduct](https://ori.hhs.gov/federal-research-misconduct-policy)  (<https://ori.hhs.gov/federal-research-misconduct-policy>), which the government defines as "fabrication, falsification, or plagiarism" (or FFP). Actions that nearly all researchers classify as unethical are viewed as misconduct. It is important to remember, however, that misconduct occurs only when researchers **intend to deceive**: honest errors related to sloppiness, poor record keeping, miscalculations, bias, self-deception, and even negligence do not constitute misconduct. Also, **reasonable disagreements** about research methods, procedures, and interpretations do not constitute research misconduct. Consider the following case:

### Case 2:

Dr. T has just discovered a mathematical error in his paper that has been accepted for publication in a journal. The error does not affect the overall results of his research, but it is potentially misleading. The journal has just gone to press, so it is too late to catch the error before it appears in print. In order to avoid embarrassment, Dr. T decides to ignore the error.

Dr. T's error is not misconduct nor is his decision to take no action to correct the error. Most researchers, as well as many different policies and codes would say that Dr. T should tell the journal (and any coauthors) about the error and consider publishing a correction or errata. Failing to publish a correction would be unethical because it would violate norms relating to honesty and objectivity in research.

There are many other activities that the government does not define as "misconduct" but which are still regarded by most researchers as unethical. These are sometimes referred to as "[other deviations](https://www.ncbi.nlm.nih.gov/pubmed/14577424)" (<https://www.ncbi.nlm.nih.gov/pubmed/14577424>)" from acceptable research practices and include:

- Publishing the same paper in two different journals without telling the editors
- Submitting the same paper to different journals without telling the editors
- Not informing a collaborator of your intent to file a patent in order to make sure that you are the sole inventor
- Including a colleague as an author on a paper in return for a favor even though the colleague did not make a serious contribution to the paper
- Discussing with your colleagues confidential data from a paper that you are reviewing for a journal
- Using data, ideas, or methods you learn about while reviewing a grant or a papers without permission
- Trimming outliers from a data set without discussing your reasons in paper
- Using an inappropriate statistical technique in order to enhance the significance of your research
- Bypassing the peer review process and announcing your results through a press conference without giving peers adequate information to review your work
- Conducting a review of the literature that fails to acknowledge the contributions of other people in the field or relevant prior work
- Stretching the truth on a grant application in order to convince reviewers that your project will make a significant contribution to the field
- Stretching the truth on a job application or curriculum vita
- Giving the same research project to two graduate students in order to see who can do it the fastest
- Overworking, neglecting, or exploiting graduate or post-doctoral students
- Failing to keep good research records
- Failing to maintain research data for a reasonable period of time
- Making derogatory comments and personal attacks in your review of author's submission
- Promising a student a better grade for sexual favors
- Using a racist epithet in the laboratory
- Making significant deviations from the research protocol approved by your institution's Animal Care and Use Committee or Institutional Review Board for Human Subjects Research without telling the committee or the board
- Not reporting an adverse event in a human research experiment
- Wasting animals in research
- Exposing students and staff to biological risks in violation of your institution's biosafety rules
- Sabotaging someone's work
- Stealing supplies, books, or data
- Rigging an experiment so you know how it will turn out
- Making unauthorized copies of data, papers, or computer programs
- Owning over \$10,000 in stock in a company that sponsors your research and not disclosing this financial interest
- Deliberately overestimating the clinical significance of a new drug in order to obtain economic benefits

These actions would be regarded as unethical by most scientists and some might even be illegal in some cases. Most of these would also violate different professional ethics codes or institutional policies. However, they do not fall into the narrow category of actions that the government classifies as research misconduct. Indeed, there has been considerable debate about the definition of "research misconduct" and many researchers and policy makers are not satisfied with the government's narrow definition that focuses on FFP. However, given the huge list of potential offenses that might fall into the category "other serious

deviations," and the practical problems with defining and policing these other deviations, it is understandable why government officials have chosen to limit their focus.

Finally, situations frequently arise in research in which different people disagree about the proper course of action and there is no broad consensus about what should be done. In these situations, there may be good arguments on both sides of the issue and different ethical principles may conflict. These situations create difficult decisions for research known as [ethical or moral dilemmas](#) 

(<http://plato.stanford.edu/entries/moral-dilemmas/>). Consider the following case:

### **Case 3:**

Dr. Wexford is the principal investigator of a large, epidemiological study on the health of 10,000 agricultural workers. She has an impressive dataset that includes information on demographics, environmental exposures, diet, genetics, and various disease outcomes such as cancer, Parkinson's disease (PD), and ALS. She has just published a paper on the relationship between pesticide exposure and PD in a prestigious journal. She is planning to publish many other papers from her dataset. She receives a request from another research team that wants access to her complete dataset. They are interested in examining the relationship between pesticide exposures and skin cancer. Dr. Wexford was planning to conduct a study on this topic.

Dr. Wexford faces a difficult choice. On the one hand, the ethical norm of openness obliges her to share data with the other research team. Her funding agency may also have rules that obligate her to share data. On the other hand, if she shares data with the other team, they may publish results that she was planning to publish, thus depriving her (and her team) of recognition and priority. It seems that there are good arguments on both sides of this issue and Dr. Wexford needs to take some time to think about what she should do. One possible option is to share data, provided that the investigators sign a data use agreement. The agreement could define allowable uses of the data, publication plans, authorship, etc. Another option would be to offer to collaborate with the researchers.

The following are some steps that researchers, such as Dr. Wexford, can take to deal with ethical dilemmas in research:

### **What is the problem or issue?**

It is always important to get a clear statement of the problem. In this case, the issue is whether to share information with the other research team.

### **What is the relevant information?**

Many bad decisions are made as a result of poor information. To know what to do, Dr. Wexford needs to have more information concerning such matters as university or [funding agency](#) 

([https://grants.nih.gov/grants/about\\_grants.htm](https://grants.nih.gov/grants/about_grants.htm)) or journal policies that may apply to this situation, the team's intellectual property interests, the possibility of negotiating some kind of agreement with the other team, whether the other team also has some information it is willing to share, the impact of the potential publications, etc.

### **What are the different options?**

People may fail to see different options due to a limited imagination, bias, ignorance, or fear. In this case, there may be other choices besides 'share' or 'don't share,' such as 'negotiate an agreement' or 'offer to collaborate with the researchers.'

### How do ethical codes or policies as well as legal rules apply to these different options?

The university or funding agency may have policies on data management that apply to this case. Broader ethical rules, such as openness and respect for credit and intellectual property, may also apply to this case. Laws relating to intellectual property may be relevant.

### Are there any people who can offer ethical advice?

It may be useful to seek advice from a colleague, a senior researcher, your department chair, an ethics or compliance officer, or anyone else you can trust. In the case, Dr. Wexford might want to talk to her supervisor and research team before making a decision.

After considering these questions, a person facing an ethical dilemma may decide to ask more questions, gather more information, explore different options, or consider other ethical rules. However, at some point he or she will have to make a decision and then take action. Ideally, a person who makes a decision in an ethical dilemma should be able to **justify** his or her decision to himself or herself, as well as colleagues, administrators, and other people who might be affected by the decision. He or she should be able to articulate **reasons** for his or her conduct and should consider the following questions in order to explain how he or she arrived at his or her decision: .

- Which choice will probably have the best overall consequences for science and society?
- Which choice could stand up to further publicity and scrutiny?
- Which choice could you not live with?
- Think of the wisest person you know. What would he or she do in this situation?
- Which choice would be the most just, fair, or responsible?

After considering all of these questions, one still might find it difficult to decide what to do. If this is the case, then it may be appropriate to consider others ways of making the decision, such as going with a gut feeling or intuition, seeking guidance through prayer or meditation, or even flipping a coin. Endorsing these methods in this context need not imply that ethical decisions are irrational, however. The main point is that human reasoning plays a pivotal role in ethical decision-making but there are limits to its ability to solve all ethical dilemmas in a finite amount of time.

## Promoting Ethical Conduct in Science

Most academic institutions in the US require undergraduate, graduate, or postgraduate students to have some education in the [responsible conduct of research \(RCR\)](https://www.ncbi.nlm.nih.gov/pubmed/22836835)  (<https://www.ncbi.nlm.nih.gov/pubmed/22836835>). The [NIH](https://grants.nih.gov/grants/guide/notice-files/NOT-OD-10-019.html)  (<https://grants.nih.gov/grants/guide/notice-files/NOT-OD-10-019.html>) and [NSF](https://www.nsf.gov/bfa/dias/policy/rcr.jsp)  (<https://www.nsf.gov/bfa/dias/policy/rcr.jsp>) have both mandated training in research ethics for students and trainees. Many academic institutions outside of the US have also developed [educational curricula in research ethics](https://www.ncbi.nlm.nih.gov/pubmed/23555198)  (<https://www.ncbi.nlm.nih.gov/pubmed/23555198>)



Those of you who are taking or have taken courses in research ethics may be wondering why you are required to have education in research ethics. You may believe that you are highly ethical and know the difference between right and wrong. You would never fabricate or falsify data or plagiarize. Indeed, you also may believe that most of your colleagues are highly ethical and that there is no ethics problem in research..

If you feel this way, relax. No one is accusing you of acting unethically. Indeed, the evidence produced so far shows that misconduct is a very rare occurrence in research, although there is considerable variation among various estimates. The rate of misconduct has been estimated to be as low as 0.01% of researchers per year (based on confirmed cases of misconduct in federally funded research) to as high as 1% of researchers per year (based on self-reports of misconduct on anonymous surveys). See Shamoo and Resnik (2015), [cited above](#).

Clearly, it would be useful to have more data on this topic, but so far there is no evidence that science has become ethically corrupt, despite some highly publicized scandals. Even if misconduct is only a rare occurrence, it can still have a tremendous impact on science and society because it can compromise the integrity of research, erode the public's trust in science, and waste time and resources. Will education in research ethics help reduce the rate of misconduct in science? It is too early to tell. The answer to this question depends, in part, on how one understands the causes of misconduct. There are two main theories about why researchers commit misconduct. According to the "bad apple" theory, most scientists are highly ethical. Only researchers who are morally corrupt, economically desperate, or psychologically disturbed commit misconduct. Moreover, only a fool would commit misconduct because science's peer review system and self-correcting mechanisms will eventually catch those who try to cheat the system. In any case, a course in research ethics will have little impact on "bad apples," one might argue.

According to the "stressful" or "imperfect" environment theory, misconduct occurs because various institutional pressures, incentives, and constraints encourage people to commit misconduct, such as pressures to publish or obtain grants or contracts, career ambitions, the pursuit of profit or fame, poor supervision of students and trainees, and poor oversight of researchers (see Shamoo and Resnik 2015). Moreover, defenders of the stressful environment theory point out that science's peer review system is far from perfect and that it is relatively easy to cheat the system. Erroneous or fraudulent research often enters the public record without being detected for years. Misconduct probably results from environmental and individual causes, i.e. when people who are morally weak, ignorant, or insensitive are placed in stressful or imperfect environments. In any case, a course in research ethics can be useful in helping to prevent deviations from norms even if it does not prevent misconduct. Education in research ethics can help people get a better understanding of ethical standards, policies, and issues and improve ethical judgment and decision making. Many of the deviations that occur in research may occur because researchers simply do not know or have never thought seriously about some of the ethical norms of research. For example, some unethical authorship practices probably reflect traditions and practices that have not been questioned seriously until recently. If the director of a lab is named as an author on every paper that comes from his lab, even if he does not make a significant contribution, what could be wrong with that? That's just the way it's done, one might argue. Another example where there may be some ignorance or mistaken traditions is conflicts of interest in research. A researcher may think that a "normal" or "traditional" financial relationship, such as accepting stock or a consulting fee from a drug company that sponsors her research, raises no serious ethical issues. Or perhaps a university administrator sees no ethical problem in taking a large gift with strings attached from a pharmaceutical company. Maybe a physician thinks that it is perfectly appropriate to receive a \$300 finder's fee for referring patients into a clinical trial.

If "deviations" from ethical conduct occur in research as a result of ignorance or a failure to reflect critically on problematic traditions, then a course in research ethics may help reduce the rate of serious deviations by improving the researcher's understanding of ethics and by sensitizing him or her to the issues.

Finally, education in research ethics should be able to help researchers grapple with the ethical dilemmas they are likely to encounter by introducing them to important concepts, tools, principles, and methods that can be useful in resolving these dilemmas. Scientists must deal with a number of different controversial topics, such as human embryonic stem cell research, cloning, genetic engineering, and research involving animal or human subjects, which require ethical reflection and deliberation.

**David B. Resnik, J.D., Ph.D.**  
**Bioethicist and NIEHS IRB Chair**

Tel 919-541-5658

Fax 919-541-9854

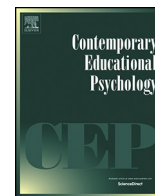
[resnikd@niehs.nih.gov](mailto:resnikd@niehs.nih.gov) (*mailto:resnikd@niehs.nih.gov*)

---

This page URL: <https://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm>

NIEHS website: <https://www.niehs.nih.gov/>

Email the Web Manager at [webmanager@niehs.nih.gov](mailto:webmanager@niehs.nih.gov)



# Dropping out of high school: The role of parent and teacher self-determination support, reciprocal friendships and academic motivation

Nathalie C. Ricard <sup>\*</sup>, Luc G. Pelletier

School of Psychology, University of Ottawa, 136 Jean Jacques Lussier, Ottawa, Ontario K1N 6N5, Canada



## ARTICLE INFO

### Article history:

Available online 7 January 2016

### Keywords:

Dropping out of high school  
Support for basic psychological needs  
Reciprocal friendships  
Academic motivation

## ABSTRACT

The purpose of this study was to examine whether parent and teacher support for basic psychological needs (i.e., autonomy, competence and relatedness), students' reciprocal friendships, and academic motivation assessed in Grade 10 ( $N = 624$ ) could predict dropping out of high school two years later in Grade 12. Results revealed that reciprocal friendships contributed to the prediction of dropping out of high school, above and beyond the effects of academic motivation, or parent and teacher support for basic psychological needs. Although parent support for basic psychological needs appeared to be the most significant predictor of academic motivation and dropping out of high school, results suggested that reciprocal friendships represented an important factor that affect both motivation and persistence. Most specifically, our findings demonstrated that a lack of reciprocal friendships had detrimental effects on these aforementioned processes, whereas having reciprocal friendships lead to favorable outcomes.

© 2015 Elsevier Inc. All rights reserved.

## 1. Introduction

It is well documented that one of the most critical issues facing the educational system in North America is the problem of students who leave school before they graduate from high school with a regular diploma. Dropping out of high school is an important problem that affects thousands of students each year. Statistics Canada's most recent report on the issue revealed that one out of 12 (8.5%) Canadian adults, aged 20 through 24 years, had not completed a high school diploma nor were they attending school in 2009–2010 (Center for Education Statistics, Statistics Canada, 2010). Similarly, in the United States, the status dropout rate for those aged 16 through 24 years was estimated at 7% in 2012 (National Center for Education Statistics, U.S. Department of Education, 2014). Compared with high school graduates, those who do not complete high school have greater chances of unemployment, which can lead to welfare dependency; higher levels of depression and alienation, which can result in physical and mental health problems; and an increased frequency of delinquency, which can lead to criminal activity and incarceration (Sum, Khatiwada, McLaughlin, & Palma, 2009). Clearly, the ramifications related to dropping out of high

school are far-reaching and significant, at both the individual and social levels.

The high prevalence of dropping out of high school, as well as its economic and personal costs, has prompted the development of a considerable body of research exploring prevention strategies for dropping out of high school (Chia, Keng, & Ryan, 2015). However, targeted prevention strategies are dependent on the identification of factors that predict dropping out of high school. As a result, the early identification of students who are likely to drop out of high school and monitoring of these students throughout their education represent critical factors.

In response to Canadian legislation that permits dropping out of school at the age of 16, some studies have focused on predicting such behavior starting when students are in grade nine (Alivernini & Lucidi, 2011; French & Conrad, 2001; Vallerand, Fortier, & Guay, 1997). This period of high school is one of significant transition, in which students, for the first time in their academic careers, are able to form intentions of dropping out upon which they can legally act. Vallerand et al. (1997) postulated that it is during this influential stage that students who have developed intentions of dropping out will eventually do so, while the others will go on to acquire their diplomas.

Beyond establishing when prevention programs should be initiated in order to maximize their effectiveness, identifying factors that predict dropping out of high school is another important prerequisite for its prevention. Some studies suggest that factors like students' academic performance (Battin-Pearson et al., 2000), history of absenteeism, and general disengagement (Archambault, Janosz,

<sup>\*</sup> Corresponding author. Département de psychoéducation et de psychologie, Université du Québec en Outaouais, 283 Alexandre-Taché Blvd, P. O. Box 1250, Station Hull, Gatineau, Québec J8X 3X7, Canada. Fax: +819 595 2250.

E-mail address: [nathalie.c.ricard@gmail.com](mailto:nathalie.c.ricard@gmail.com) (N.C. Ricard).

Fallu, & Pagani, 2009; Janosz, Archambault, Morizot, & Pagani, 2008) from school life represent proximal factors that are closely associated to dropping out of high school. However, other empirical evidence suggests that support from parents and teachers (Alivernini & Lucidi, 2011; Bowers & Sprott, 2012; Fall & Roberts, 2012; Legault, Green-Demers, & Pelletier, 2006), peers acceptance (Chen, Hughes, Liew, & Kwok, 2010; Kindermann, 2007; Kiuru, Aunola, Vuori, & Nurmi, 2007), and academic motivation (Fortier, Vallerand, & Guay, 1995; Hardre & Reeve, 2003; Skinner, Furrer, Marchand, & Kindermann, 2008; Vallerand & Bissonnette, 1992; Vallerand et al., 1997) are important and critical factors that could also predict dropping out of high school. Although factors like academic performance, absenteeism, and disengagement may represent reliable factors to identify students at risk of dropping out of school, we believe that factors such as support for students' basic psychological needs (i.e. autonomy, competence and relatedness; Deci & Ryan, 1985, 2000) from parents and teachers, reciprocal friendships with classmates, and academic motivation are critical because they may not only predict dropping out, but that could also be the reasons why students are absent, have lower grades, and are disengaged. Furthermore, these factors may serve as targeted intervention strategies that are more easily employed.

To our knowledge, no study has examined simultaneously how parent and teacher support for basic psychological needs (i.e. autonomy, competence and relatedness), reciprocal friendships, and academic motivation predict dropping out of high school. Drawing from past literatures on self-determination theory (Deci & Ryan, 1985, 2000; Ryan & Deci, 2009) and the influence of friendships on school engagement (Cillessen & Marks, 2011; Goulet, Cantin, Archambault, & Vitaro, 2015; Kindermann, 2007; Mayeux, Houser, & Dyches, 2011; Parker & Asher, 1993; Parkhurst & Hopmeyer, 1998), in this article, we propose to examine how these two areas of research can be merged to provide a clearer portrait of dropping out of high school.

### 1.1. Self-determination theory

Self-determination theory (SDT; Deci & Ryan, 1985, 2000) is a conceptual framework that proposes different types of motivation. It also stresses the importance of having three basic psychological needs (i.e. autonomy, competence and relatedness) satisfied in order to achieve optimal personal development and functioning. SDT portrays motivation as a multidimensional construct that suggests that different types of motivation are associated with different reasons underlying behavior (Deci & Ryan, 1985, 2000). It is theorized that the type of motivation is more important than the total amount of motivation in predicting outcomes (Deci & Ryan, 2008). SDT suggests that motivation varies along a continuum of self-determination. When motivation is more self-determined, behavior is carried out with a full sense of autonomy and choice. In contrast, when motivation is less self-determined, behavior is carried out under external constraints in order to attain specific outcomes (Deci & Ryan, 1985, 2000). Several studies have supported the validity of this continuum in education and a variety of other life domains (see Vallerand, 1997, for a review of these studies).

*Intrinsic motivation* represents the highest level of self-determination. When individuals are intrinsically motivated, they engage in behavior for the pleasure and satisfaction that they inherently experience with participation (Deci & Ryan, 1985). For example, a student who is intrinsically motivated will go to school for the enjoyment of learning new things. Conversely, when people are extrinsically motivated they perform an activity as a means to some other end (Deci & Ryan, 1985, 2000). Deci and Ryan proposed different forms of extrinsic regulatory styles that represent different levels of self-determination. From lowest to highest self-determination, the regulatory styles are: external regulation, introjected regulation, and identified regulation (Deci & Ryan, 1985,

2000). Behavior that is *externally regulated* is controlled by an outside source. For example, students who go to school because their parents or the law force them to, demonstrate behavior that is externally regulated. *Introjected regulation* occurs when the formerly external source of motivation is partially internalized, but has not yet been fully accepted by the individual. Students demonstrate this type of regulation when they go to school to avoid the guilt associated with dropping out. *Identified regulation*, a higher form of self-determined extrinsic motivation, occurs when an activity has been judged to have personal value and importance. Students who go to school because they want to pursue a career that requires an education demonstrate identified regulation.

*Amotivation* occurs when participation is perceived as not having any impact on the desired result. This regulatory style is consistent with the concept of learned helplessness (Abramson, Seligman, & Teasdale, 1978), and is displayed when students do not know why they are going to school. Amotivated students see no point in their attendance, or they are not able to foresee the consequences of their behavior. They have a pervasive sense that their behaviors are caused by external forces beyond their control. When students are amotivated, they experience feelings of incompetence and lack of control (Deci & Ryan, 1985). These amotivated students once had good reasons for going to school, but now wonder whether they should continue with their education.

#### 1.1.1. Basic psychological needs

SDT posits that individuals take an active role in their own lives and in the fulfillment of three innate psychological needs: the need for autonomy, competence, and relatedness. Although human development is naturally inclined toward more autonomy, behaviors must be nurtured by experiences of autonomy, competence, and relatedness. The concept of needs as proposed in SDT refers to the innate psychological drives that must be fulfilled in order to promote growth, integrity, and personal well-being (Ryan & Deci, 2000). The need for *autonomy* refers to the experience of psychological freedom and volition; to being the source of one's own behavior (deCharms, 1968; Deci & Ryan, 1985). The need for *competence* refers to the experience of effectance and a sense of confidence in one's interaction with the physical and social environment (Deci & Ryan, 2002). Finally, the need for *relatedness* refers to the experience of reciprocal care and feeling connected to others; to having a sense of belongingness with others and with one's community (Deci & Ryan, 2002).

People grow and flourish in environments that facilitate the satisfaction of the three basic psychological needs. Environment that satisfy these needs favor internalization and healthy psychological functioning, whereas thwarting of these needs leads to negative consequences. More specifically, autonomy supportive (as opposed to controlling) contexts support autonomy, well-structured (as opposed to unorganized and chaotic) contexts favor competence, and caring and responsive (as opposed to distant and neglectful) contexts facilitate relatedness (Deci & Ryan, 2002; Vansteenkiste, Niemiec, & Soenens, 2010). In sum, when basic psychological needs are less satisfied (or when they are thwarted), behaviors are more likely to be carried out for non-self-determined reasons (i.e. controlled regulation), whereas when the needs are satisfied, behaviors will be carried out for self-determined reasons (i.e. autonomous regulation). Behaviors that are engaged in autonomously are associated with better functioning and persistence, while controlled behaviors often lead to self-regulation problems and failures. According to SDT, motivation plays a mediating role amid the satisfaction of basic psychological needs and the behavior or outcome that will result from it (Deci & Ryan, 1985, 2002). Thus, from an applied perspective, students who are provided with an environment that foster the satisfaction of the three basic psychological needs should theoretically increase their academic motivation. In turn, this should lead to academic persistence over time.

### 1.1.2. SDT and dropping out of school

The first study to examine dropping out of school from a motivational perspective was conducted in 1992 by Vallerand and Bissonnette. This prospective study looked at the academic motivation and persistence of 1042 college students enrolled in a compulsory French course. Academic motivation was measured in September and behavioral persistence (i.e. successful completion of the course) was evaluated five months later in January. Results revealed that students who persisted in the course had previously reported higher levels of self-determined regulation (intrinsic and identified regulation) and lower levels of non-self-determined regulation (external and amotivated regulation) than students who had dropped out. The significance of this study was in showing that experimental findings on motivation could be generalized into real-life academic settings and that SDT could be used to predict academic persistence. However, the results were limited by the relatively short predictive time frame and the cross-sectional design, as opposed to a longitudinal design and by the fact that the study focused on the persistence in a single course.

To improve on these limitations, Vallerand et al. (1997) conducted a second study that once again applied SDT to academic persistence. In this study, a motivational model of dropping out of school was tested with 4537 participants, in grades 9 and 10, in a 1-year prospective design. Results revealed that the students who perceived their teachers, parents and school administration as less autonomy supportive, reported lower levels of self-determined motivation. In turn, low levels of self-determined motivation significantly predicted students' intentions to drop out, which predicted dropping out of school one year later. Although this study was the first of its kind to show the contribution of SDT in predicting dropping out of school, its results were limited by the fact that students were only followed for one year.

In sum, the research presented above provides support for the effects of teachers and parents autonomy supportive behaviors on students' self-determined motivation and the role of self-determined motivation in the prediction of students' school engagement and persistence. However, this research has examined exclusively the role played by teachers and parents in the support of one need, the need for autonomy. Furthermore, it did not examine the role that friends could play in the prediction of students' motivation and persistence in school.

## 1.2. Influence of friendships, parents and teachers on school engagement and persistence

There is a vast empirical literature examining the influence of reciprocal friendships with classmates on school adjustment and engagement (Buhs, Ladd, & Herald, 2006; Chen et al., 2010; Goulet et al., 2015; Kindermann, 2007; Kiuru et al., 2007; Parker & Asher, 1987, 1993). Indeed, a considerable amount of research has shown that a lack of reciprocal friendships with classmates results in school adjustment difficulties (Buhs et al., 2006; Ladd, 1990, 2003; Parker & Asher, 1987, 1993). Significant differences in behavioral, cognitive and social skills have been demonstrated between students who have reciprocal friendships and those without reciprocal friendships (Kindermann, 2007; Parker & Asher, 1993; Parker & Seal, 1996).

Some studies have also examined the combined effects that parents, teachers, and relationships with classmates have on a student's academic motivation and persistence in school (Flook, Repetti, & Ullman, 2005; Furrer & Skinner, 2003; Guay, Boivin, & Hodges, 1999; Ryan, Stiller, & Lynch, 1994). Within this area of research, studies have found that a student's relationships to parents and teachers can significantly predict their academic motivation and educational outcomes (i.e. school adjustment, persistence, performance, etc.). The findings on the effects of classmate relationships

on academic motivation and persistence in school are, nonetheless, unclear, as past research has produced mixed results.

Ryan et al. (1994) examined the impact of student's relationships to parents, teachers, and classmates as predictors of academic motivation and self-esteem. Areas of specific interest were students' feelings of security, as well as emotional and school utilization (i.e. utilization of others in respect to school problems). Findings indicated that students' relationships to parents and teachers were significantly and positively interrelated to students' motivation and school adjustment, while relationships to classmates were not. As well, it is noteworthy that students who indicated that they emulated parents and teachers showed more positive school adjustment, motivation, and self-esteem in comparison to students who emulated classmates. In a study examining students' relationships to parents, teachers, and classmates as potential factors that could predict academic engagement and performance, Furrer and Skinner (2003) found that when students had quality relationships with parents and teachers, classmate relationships did not significantly impact academic engagement and performance. However, it is worth mentioning that students' emotional experience in the classroom was affected by low peer acceptance. Flook et al. (2005) found opposing results when looking at the classmate variable in isolation. Their study looked at the longitudinal effects of classroom social experiences as predictors of academic performance in 677 fourth grade students. Flook and colleagues used teacher reports, student self-reports, and report card grades for math and reading in order to measure students' peer acceptance and academic performance. Their results indicated that there was a significant association between peer acceptance and academic performance. In addition, they found that low peer acceptance was negatively associated with academic performance, self-concept, and mental health. Similarly, a study by Guay et al. (1999) which examined whether the quality of students' relationships with classmates affects students' perceptions of academic competence showed that low peer acceptance hampered students' academic achievement.

## 1.3. Objectives and hypotheses

Previous research has shown that the influence of reciprocal friendships yields different outcomes when examined in isolation than when it is combined with the influence of parents and teachers. In the present study, the reciprocal friendships variable was isolated from the parents and teachers variables in order to examine whether reciprocal friendships represented a significant predictor of students' academic motivation and persistence in school, beyond the joint influence of parents and teachers. Therefore, the purpose of this study was to examine the complimentary roles of parent and teacher support for basic psychological needs, and reciprocal friendships in the prediction of academic motivation and dropping out of high school. The first hypothesis pertained to the prediction of academic motivation. Past research on SDT suggests that parent and teacher support for basic psychological needs are of primary importance in the prediction of academic motivation. Therefore, it was hypothesized that reciprocal friendship would be a significant predictor of academic motivation, but not as strong of a predictor as parent and teacher basic psychological needs support. The second hypothesis pertained to the prediction of dropping out of high school. We examined whether reciprocal friendships contributed to the prediction of dropping out directly, beyond what can be explained by academic motivation and parent and teacher basic psychological needs support. It was hypothesized that reciprocal friendships would be a significant predictor of dropping out above and beyond the role played by parents and teachers support for basic psychological needs.



## 2. Method

### 2.1. Participants and procedure

A total of 624 students of the possible total 657 students registered (95%) in nine different French-speaking schools from a Canadian school district were initially tested in grade 10, and their files were re-evaluated two years later with regards to their academic status. Mean age of students was 15 years. The sample consisted of 308 females, 308 males, and 8 students who did not declare their gender. A number of students had one or both of their parents who at least completed a college degree (29% of fathers and 35% of mothers), and 69% of the students were living with both parents.

With consent from both the school district office and parents obtained prior to testing, students were invited to complete the questionnaire via the schools' intranet system during a class period. Students were assured that the testing was not an academic evaluation, would not influence their grades, that the information would remain confidential and that there were no right or wrong answers. The questionnaire took approximately 45 minutes to complete, and students answered the questions individually. Two years after the data collection, a representative of the school district office informed us of the students who obtained their high school diploma and those who had not. Thus, in agreement with the criteria used by the school district, students were considered as having dropped out of school if they did not complete their high school degree without any interruptions.

### 2.2. Measures

#### 2.2.1. Support for basic psychological needs by parents and teachers

A short version of the Interpersonal Behavior Questionnaire (IBQ; Otis & Pelletier, 2005) was used to measure students' perceived support for basic psychological needs by their parents and teachers. Based on SDT, the original scale was designed to measure the extent to which participants perceived various members of their social network (e.g. best friend, employer, parents, romantic partner, etc.) to be supportive of their basic needs for autonomy, competence, and relatedness. For the purpose of this study, the items only pertained to students' perceptions of the support received from their parents and teachers. Sample items with Cronbach's alpha reliability coefficients in parentheses are as follows: Autonomy support – My parents/teachers encourage me to be myself (items for parents  $\alpha = 0.63$ , items for teachers  $\alpha = 0.62$ ); Competence support – The feedback I receive from my parents/teachers makes me doubt my abilities (inverse coding – items for parents  $\alpha = 0.73$ , items for teachers  $\alpha = 0.73$ ); Relatedness support – My parents/teachers seem to really be interested in what I do (items for parents  $\alpha = 0.67$ , items for teachers  $\alpha = 0.69$ ). Responses ranged from 1 (never) to 5 (always). Items were computed in order to create two separate composite measures: one for parent support for basic psychological needs (12 items,  $\alpha = .79$ ), and another for teacher support for basic psychological needs (12 items,  $\alpha = .75$ ).

#### 2.2.2. Reciprocal friendships

Students' reciprocal friendships were identified using a sociometric nomination procedure (Cillessen & Marks, 2011; Mayeux et al., 2011; Parker & Asher, 1993; Parkhurst & Hopmeyer, 1998). Students were asked to write the full name of three students in their grade level whom they considered their "best friends." This procedure permitted us to identify students who did and did not have reciprocal friendships among their classmates. Students were considered to have reciprocal friendships if at least one of the classmates they named in turn named them as one of his/her best friend ( $n = 527$  versus  $n = 97$  whom did not have a reciprocal friendship). This

dichotomous variable was coded as follow:  $-1$  = no reciprocal friendship,  $1$  = reciprocal friendships<sup>1</sup>.

#### 2.2.3. Academic motivation

The French version of the Academic Motivation Scale for High School (Grouzet, Otis, & Pelletier, 2006; Otis, Grouzet, & Pelletier, 2005; Vallerand & Bissonnette, 1992; Vallerand, Blais, Brière, & Pelletier, 1989; Vallerand et al., 1992, 1993) was used to measure students' motivational orientation toward academic activities. This scale comprises 20 items ranked on a five-point Likert scale in which four items represent each of the five SDT motivational types. The items offer various answers to the question, "Why do you go to school?". Students were asked to rank their responses from 1 (does not correspond at all) to 5 (corresponds exactly).

Past research has demonstrated the validity and reliability of this scale, including its invariance in measurement across gender and grade level (Grouzet et al., 2006; Otis et al., 2005; Otis & Pelletier, 2005; Vallerand et al., 1993). Sample items are as follows: intrinsic motivation – "Because I experience pleasure and satisfaction while learning new things"; identified regulation – "Because I think that my studies will help me better prepare for the career I have chosen"; introjected regulation – "To show myself that I am an intelligent person"; External regulation – "To have a better salary later on"; and amotivation – "I can't see why I go to school and frankly I could not care less."

Students' responses were used to create a global score of academic motivation called the Self-Determination Index (SDI). The SDI weights the measures of the five regulatory styles according to the following formula:  $SDI = 2 \times IM + IDEN - (INTRO + ER)/2 - 2 \times AMO$ . Scores theoretically range from  $-12$ , representing low motivation, to  $+12$ , representing high motivation. In past research (Blais, Sabourin, Boucher, & Vallerand, 1990; Fortier et al., 1995; Grolnick & Ryan, 1987; Vallerand & Bissonnette, 1992), the SDI was found to be a valid and reliable measure of motivation, and it is commonly used in research (Blanchard, Pelletier, Otis, & Sharp, 2004; Green-Demers, Pelletier, & Menard, 1997). Cronbach's alpha for the combined items forming the self-determination index in this sample was .83.

#### 2.2.4. Academic status

Two years after the data collection, the school board informed us of which students had obtained their high school diploma and which students did not. The school board contacted students who did not graduate to ensure that they were not attending high school elsewhere and that they had indeed dropped out. This information was used to classify students who graduated ( $n = 536$ ), and students who dropped out ( $n = 88$ ). As mentioned earlier, for the purpose of this study, students were considered to have dropped out of high school if they did not complete their high school degree without any interruptions (not including a sickness or a death in the family). This dichotomous variable was coded as follows:  $-1$  = students who graduated,  $1$  = students who dropped out.

## 3. Results

### 3.1. Preliminary analyses

Preliminary analyses consisted of a set of screening procedures designed to ensure that the assumptions for multiple linear regressions and logistic regressions were met (Tabachnick & Fidell,

<sup>1</sup> It is noteworthy that studies taken place in schools are conducted under specific conditions determined by the school district and each of the schools involved. The measure of reciprocal friendships used in this study represented a simple strategy which permitted us to meet the study objectives, and which was judged as acceptable by each of the school principals and the school district.



**Table 1**  
Descriptive statistics and correlation matrix.

|                                                  | M    | SD   | Skewness | Kurtosis | 2     | 3     |
|--------------------------------------------------|------|------|----------|----------|-------|-------|
| 1. Academic motivation                           | 3.79 | 2.94 | −.94     | .98      | .37** | .40** |
| 2. Parent support for basic psychological needs  | 3.67 | .66  | −.67     | .28      |       | .27** |
| 3. Teacher support for basic psychological needs | 3.13 | .59  | −.21     | .35      |       |       |

\*  $p < .05$ , \*\*  $p < .01$ .

2001). Therefore, prior to analyses, the data were examined for missing and outlying values, as well as distribution normality, linearity, homogeneity of variance, and homogeneity of regression. The percentage of missing data was less than 5% and a missing values analysis confirmed that it was missing at random. Using a Malhanobis distance criterion of  $p < .001$ , no outliers were identified among the cases. Multicollinearity and singularity were also inspected. Values of skewness and kurtosis were considered satisfactory as they were all below |2|. Examination of the means and standard deviations of the continuous variables revealed that their values were plausible, falling within the expected theoretical range. Lastly, zero-order Pearson correlations were computed in order to examine the relations among the variables of interest. All the variables correlated with one another significantly and in the expected direction. Descriptive statistics and correlation coefficients are presented in Table 1.

3.2. Predictors of academic motivation

We first examined whether reciprocal friendships was a significant predictor of academic motivation, above and beyond support for basic psychological needs from parents and teachers. A hierarchical linear regression analysis was performed in which (a) parent and (b) teacher basic psychological needs support were first entered, adjusted  $R^2 = .23$ ,  $F(2, 620) = 96.19$ ,  $p < .001$ , and (c) reciprocal friendships was added in a second step, adjusted  $R^2 = .24$ ,  $F(3, 619) = 65.82$ ,  $p < .001$ .

There was a significant change in explained variance when considering reciprocal friendships in addition to parent and teacher support for basic psychological needs ( $p < .05$ ), showing that reciprocal friendships contributed something more to the variance in academic motivation than can be explained by parent and teacher support for basic psychological needs. However, it is noteworthy that parent support for basic psychological needs and teacher support for basic psychological needs remained highly significant even after reciprocal friendships was entered in the equation; only a very minor decrease in the beta weight was observed for each of the two predictors. Overall, the results showed that parent support for basic psychological needs, teacher support for basic psychological needs, and reciprocal friendships are all significant positive predictors of academic motivation; however parent support for basic psychological needs and teacher support for basic psychological needs remain the stronger predictors. The beta weights,  $t$ -statistics,  $p$ -values, and  $R^2$  change value are presented in Table 2.

**Table 2**  
Predictors of academic motivation.

| Steps | Predictors                                    | $\beta$ | $t$  | $p$  | $\Delta R^2$ |
|-------|-----------------------------------------------|---------|------|------|--------------|
| 1     | Parent support for basic psychological needs  | .28     | 7.71 | .001 | —            |
|       | Teacher support for basic psychological needs | .33     | 9.01 | .001 |              |
| 2     | Parent support for basic psychological needs  | .27     | 7.47 | .001 | .01*         |
|       | Teacher support for basic psychological needs | .32     | 8.89 | .001 |              |
|       | Reciprocal friendships                        | .07     | 2.03 | .043 |              |

\*  $p < .05$ , \*\*  $p < .001$ .

3.3. Predictors of dropping out of high school

We then examined whether reciprocal friendships contributed to the prediction of dropping out of high school, above and beyond what can be explained by SDT constructs (i.e. academic motivation, parent support for basic psychological needs, and teacher support for basic psychological needs). A hierarchical logistic regression analysis was performed in which academic motivation, parent basic psychological needs support, and teacher basic psychological needs support were entered in the first block of the equation. Examination of the Chi-square value and log-likelihood value for this first block suggested that this first model was statistically reliable and had a good fit,  $\chi^2_{(3)} = 30.87$ ,  $p < .001$ ,  $\log = 472.92$ . Academic motivation and teacher basic psychological needs support failed to be significant predictors of dropping out, while parent basic psychological needs support was found to be a highly significant negative predictor of that outcome, that is that the more parents were perceived to offer support for basic needs, the less students dropped out of high school.

Reciprocal friendships predictor was then entered in the second block of the equation. Examination of the Chi-square value and log-likelihood value revealed that the overall model was statistically reliable and fit the data well,  $\chi^2_{(4)} = 47.29$ ,  $p < .001$ ,  $\log = 456.50$ . Reciprocal friendships was found to be a significant negative predictor of dropping out, while parent support for basic psychological needs remained a highly significant negative predictor. Academic motivation and teacher support for basic psychological needs failed to significantly contribute to the overall prediction of dropping out, but their associations with the outcome followed the expected direction as they were both negatively related to dropping out of high school. The results from this hierarchical logistic regression analysis suggested that reciprocal friendships contributes to the prediction of dropping out, beyond what can be explained by SDT constructs. However, our analysis revealed that parent support for basic psychological needs plays an essential role in the prediction of dropping out of high school. Table 3 shows regression coefficients, Wald statistics, odds ratios,  $p$ -values, and 95% confidence intervals for odds ratio.<sup>2,3</sup>

4. Discussion

4.1. Summary of findings

The objective of the present study was to examine the simultaneous roles of parents and teacher support for basic psychological needs, and reciprocal friendships in the prediction of academic motivation and dropping out of high school. We tested the first hypothesis pertaining to the prediction of academic motivation. Results revealed that reciprocal friendships contributed to the prediction of academic motivation beyond what can be explained by parent support for basic psychological needs and teacher support

<sup>2</sup> Another set of regression analyses were performed in which an interaction term for reciprocal friendships and parent support for basic psychological needs and an interaction term for reciprocal friendships and teacher support for basic psychological needs were entered in the equation as a third step in order to examine whether parent and teacher support for basic psychological needs could be used to moderate the effect of reciprocal friendships on academic motivation and dropping out of school. These effects failed to be significant and to reduce the effect of reciprocal friendships on both academic motivation and dropping out of high school.

<sup>3</sup> The analyses were also performed while controlling for students' standardized test scores in French language competency, reading comprehension, and mathematical problem solving. Analyses using these covariables provided findings that were not significantly different from the global findings presented in this section. Statistical power was not sufficient for the analyses to be conducted separately for males and females due to a small overall sample of students without reciprocal friendships.

**Table 3**

Predictors of dropping out of high school.

| Steps | Predictors                                    | B     | Wald test<br>(z-ratio) | Odds<br>ratio | p    | 95% confidence<br>intervals for<br>odds ratio |       |
|-------|-----------------------------------------------|-------|------------------------|---------------|------|-----------------------------------------------|-------|
|       |                                               |       |                        |               |      | Lower                                         | Upper |
| 1     | Academic motivation                           | -.06  | 1.97                   | .94           | .161 | .87                                           | 1.02  |
|       | Parent support for basic psychological needs  | -.80  | 19.59                  | .45           | .001 | .32                                           | .64   |
|       | Teacher support for basic psychological needs | -.01  | .01                    | 1.01          | .984 | .65                                           | 1.56  |
| 2     | Academic motivation                           | -.05  | 1.05                   | .96           | .307 | .88                                           | 1.04  |
|       | Parent support for basic psychological needs  | -.75  | 16.41                  | .47           | .001 | .33                                           | .68   |
|       | Teacher support for basic psychological needs | -.03  | .02                    | 1.03          | .896 | .66                                           | 1.61  |
|       | Reciprocal friendships                        | -1.15 | 17.66                  | .32           | .001 | .19                                           | .54   |

for basic psychological needs, which were also significant positive predictors. This result is in accordance with findings from prior studies (Flook et al., 2005; Guay et al., 1999), which showed that peer acceptance was significantly associated with academic performance. Furthermore, in support of past research on SDT and findings by Furrer and Skinner (2003), our analysis showed that parent support for basic psychological needs and teacher support for basic psychological needs were the strongest predictors of academic motivation. What transpired overall is that reciprocal friendships have undoubtedly an important role to play in the prediction of academic motivation but, in further support of SDT and our hypothesis, support for basic psychological needs by parents and teachers represent the most considerable influences of students' school motivation.

Our second hypothesis pertained to the prediction of dropping out of high school. Results revealed that while academic motivation and teacher support for basic psychological needs failed to be significant predictors of dropping out, reciprocal friendships and parent support for basic psychological needs were highly significant negative predictors of this outcome. Overall, findings supported our hypothesis in showing that reciprocal friendships contribute to the prediction of dropping out, beyond what can be explained by SDT constructs. However, in support of past SDT research, parent support for basic psychological needs plays the most essential role in the prediction of students' likelihood of dropping out of high school.

#### 4.2. Theoretical implications

A primary theoretical contribution of the present study is integrating the views of complementary literatures (i.e. SDT and the influence of friends on school engagement) in order to address the proposed research questions and offer support to both areas of research. On the one hand, results revealing that reciprocal friendships significantly predicted dropping out of high school, which solidifies the argument that friends do play an important role in students' long-term engagement in school. On the other hand, our findings provided support for propositions from SDT in showing that support for the three basic psychological needs by all three figures of influence (i.e. parents, teachers, and friends) and self-determined motivation are important components in sustaining academic motivation. In sum, our assessment suggests that the two areas of research contributed differently to the quality of students experience in school.

Findings from this study also raise some interesting theoretical and methodological questions. One important point that needs to be mentioned is that our results failed to support previous studies that showed that academic self-determined motivation was a significant predictor of dropping out of high school (Vallerand & Bissonnette, 1992; Vallerand et al., 1997). It is possible that some

unknown participants' characteristics, or differences between this study and previous studies in the assessment of long-term persistence or the ways to identify student attrition, could explain the differences between our results and the ones observed by past studies. It is also possible that previous studies overstated the role of academic motivation in the long-term prediction of dropping out of high school and undervalued the contribution of other factors, such as reciprocal friendships and parent support for basic psychological needs, which were found to be highly significant predictors of dropping out of school in our investigation. The nonsignificant effect of teacher support for basic psychological needs on the prediction of dropping out of high school also needs to be addressed. Considering the role that teachers play in students' academic experience, one may be surprised with the present finding. However, this finding is in accordance with previous research which has shown that since teachers change from year to year, in contrast to parents and reciprocal friendships with classmates whom remain more stable influences in a student's life, teachers' impact on students' academic success may not be as important over a period that is longer than the school year (Grolnick, 2009; Grolnick, Kurowski, Dunlap, & Hevey, 2000). Our study also provided clear evidence of the effect of having reciprocal friendships on the satisfaction of basic psychological needs and self-determined motivation.

#### 4.3. Practical applications

The use of a longitudinal design represents a noteworthy practical application of the present study. This study also holds the significant strength of having been conducted in a real-life setting and population. It is notable to mention that close to 100% of the students in grade 10 within the schools, we targeted participated in our investigation. Our study adds to the existing body of literature which examined the long-term effects of the influence of having reciprocal friendships on students' behaviors and adjustment in school (Buhs et al., 2006; Goulet et al., 2015; Ladd, 1990, 2003; Ladd, Herald-Brown, & Reiser, 2008; Parker & Asher, 1987, 1993); thus contributing to this important area of research. Furthermore, this study contributed to the investigation of some of the factors involved in the early prediction of high school functioning and the role of these factors in predicting dropping out of high school in the long term. Our results suggested that interventions should aim at increasing students' academic motivation via the support of their basic psychological needs. Most importantly, our findings shed light on the key role played by all three influential figures (i.e. parents, teachers, and friends) in students' school adjustment.

Another major contribution is showing that not having reciprocal friendships with classmates in the 10th grade was significant enough to have a detrimental effect on students' school motivation and also that it could significantly predict a higher incidence of dropping out of school two years later. Based on our findings, it

is possible to argue that students who lack reciprocal friendships can be motivated to go to school, but the fact that their school environment does not provide them with this much needed sense of belongingness, they may not want to go to school and therefore end up dropping out. In other words, our results suggest that there could be a difference between being motivated to go to school and not wanting to be in school because you feel you don't belong.

How, then, could we encourage friendships among classmates? Recent studies suggest several strategies to facilitate the development of friendships among children. Feldman, Bamberger, and Kanat-Maymon (2013) have found that parents that teach social skills to their children (e.g., how to be an active listener, to make conversation, to trade information about what you like and dislike) have kids that have less trouble making friends. Some studies suggest that steering kids away from competitive games and leading them toward cooperative games creates less disruptive behaviors among unpopular kids and greater tolerance among popular kids (Gelb & Jacobson, 1988). Finally, coaching children on how to cope with tricky social situations by showing them how to do something relevant by observing what others are doing before trying to join, or by not being critical or trying to change a game, facilitate the integration of children into new groups (Finnie & Russell, 1998).

Perhaps most importantly, it is crucial to consider the role that schools play in encouraging parents and teachers to engage with and be more supportive of students that have difficulties forming relationships with their classmates. More specifically, when trying to increase their participation, schools need to pay careful attention to the rationale provided to parents (Bouchard, Lee, Asgary, & Pelletier, 2007; Grolnick, 2009, 2015) and teachers (Pelletier & Rocchi, 2015; Pelletier & Sharp, 2009) for why they should get involved. Strategies used to increase parents and teachers' engagement that involve pressure and coercion may in turn result in lower levels of support for basic psychological needs and self-determined motivation in students. When parents and teachers' involvement is due to more external and introjected reasons (e.g. guilt), they may perceive the experience negatively, resulting in a less positive experience for the students as well. In order to encourage parents and teachers to be more supportive of students, schools need to emphasize how important their involvement is to students' school engagement and achievement. Furthermore, schools may improve parents and teachers' participation by asking for their input regarding activities that could foster the development of better relationships and friendships among students. Efforts to coerce parents and teachers to participate in activities involving children may have adverse effects by creating more non-self-determined motivation in parents and teachers, which is likely to result in them becoming more controlling toward students and adhering to the minimal commitment required to foster sustained engagement over time. Therefore, these efforts are unlikely to help students develop friendships and a sense of belongingness in school.

#### 4.4. Limitations and suggestions for future research

Despite providing additional insight on the influence of friendships on school engagement, as well as the applications of SDT, this study has some noteworthy limitations. To begin with, there are a few methodological limitations that should be considered. This study was conducted in a population of junior high school students from the same school board. As our sample of students represents a specific sample with specific characteristics and thus not fully representative of the general population of students from other school boards, studies should be conducted on other types of samples in order to further validate the generalizability of the findings obtained from this sample of students. Nevertheless, considering that peer rejection is a widespread social phenomenon in youth

populations across North America (Leary, Kowalski, Smith, & Phillips, 2003), this current investigation is far from trivial.

Also, this study was unable to test for potential gender differences due to a small global sample of students with nonreciprocal friendships with classmates. Past developmental psychology research (Blyth, Hill, & Smith-Thiel, 1982; Furman & Buhrmester, 1992) has shown some distinctions between males and females, most notably in younger populations, regarding the importance they confer to their friendships; thus, gender differences should be investigated in future studies in order to take these findings into account. Along the same idea, national statistics (Center for Education Statistics, Statistics Canada, 2010) have shown that incidences for dropping out of school are much higher in the male population than the female population; therefore the possibility of observing an interaction between peer acceptance and gender when predicting dropping out of high school is most plausible, and thus should be considered for future research.

Some psychometric limitations also need to be mentioned. First, most of the tested variables were measured using self-report. It must be taken into account that any research using self-reported measures, whether it involves socially sensitive issues or not, could be limited by the occurrence of range restriction, self-selection bias, and social desirability bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). In order for self-report measures to be reliable, participants must respond honestly and accurately. We tried to minimize such biases by making the questionnaires confidential, as well as stating in the questionnaires that participants should answer the items as honestly as possible.

A further psychometric limitation relates to our measure of reciprocal friendships (i.e. asking students to write the name of their three best friends in their grade level). This measure does not account for the possibility that students may have friends who are in another grade level, as well as the likelihood that they have friends outside of school. However, a significant amount of time in a student's life is spent in school, even more so with students in their grade level; in this way, being an outcast in school, even though it is not the case in other contexts, will likely affect students' psychological functioning and general well-being. It is noteworthy that this study examined the effects of the influence of friendships on variables pertaining to academic success; therefore measuring students' reciprocal friendships with classmates is fitting. That being said, in order to minimize the impact of this possible limitation, future studies should consider including a measure of perceived support for basic psychological needs by friends in their life in general. This could provide further knowledge on whether students' reciprocal friendships and other classmates have a positive or negative influence on their academic motivation. Furthermore, other variables (such as problems at home, teen pregnancy, etc.), which have not been considered in our investigation, could influence students' persistence in school and thus should be considered in future studies.

From a theoretical standpoint, we recognize that this study yield some conflicting findings with prior research and/or propositions from SDT. These findings represent limitations and therefore some of the questions assessed would require further investigation. Such results concern the nonsignificant effect of self-determined academic motivation on the prediction of dropping out of high school.

To conclude, we believe that a few other interesting avenues of research could be the focus of future investigations. Future studies should also examine the specific motivational orientations and personality profiles of students who do not have reciprocal friendships with classmates, more precisely, what characterizes these individuals. It is possible that these students possess specific individual characteristics that make them less desirable to others. One could assume that students with less self-determined motivational orientations, or amotivated individuals, may be more likely to be having difficulties making friends, even more so in social contexts and settings that require social interactions.



## Acknowledgments

The preparation of this article was supported by a grant from the Social Science and Humanities Research Council of Canada (SSHRC 435-2013-0097).

## References

- Abramson, L. Y., Seligman, M. E. P., & Teasdale, J. D. (1978). Learned helplessness in humans: Critique and reformulation. *Journal of Abnormal Psychology, 87*, 49–74. doi:10.1037/0021-843X.87.1.49.
- Alivernini, F., & Lucidi, F. (2011). Relationship between social context, self-efficacy, motivation, academic achievement, and intention to drop out of high school: A longitudinal study. *The Journal of Educational Research, 104*, 241–252. doi:10.1080/00220671.2003.728062.
- Archambault, I., Janosz, M., Fallu, J. S., & Pagani, L. S. (2009). Student engagement and its relationship with early high school dropout. *Journal of Adolescence, 32*, 651–670. doi:10.1016/j.adolescence.2008.06.007.
- Battin-Pearson, S., Newcomb, M. D., Abbott, R. D., Hill, K. G., Catalano, R. F., & Hawkins, J. D. (2000). Predictors of early high school dropout: A test of five theories. *Journal of Educational Psychology, 92*, 568–582. doi:10.1037/0022-0663.92.3.568.
- Blais, M. R., Sabourin, S., Boucher, C., & Vallerand, R. J. (1990). Toward a motivational model of couple happiness. *Journal of Personality and Social Psychology, 59*, 1021–1031. doi:10.1037/0022-3514.59.5.1021.
- Blanchard, C. M., Pelletier, L. G., Otis, N., & Sharp, E. (2004). Rôle de l'autodétermination et des aptitudes scolaires dans la prédiction des absences scolaires et l'intention de décrocher. *Revue des Sciences de l'Éducation, 30*, 105–123.
- Blyth, D. A., Hill, J. P., & Smith-Thiel, K. (1982). Early adolescents' significant others: Grade and gender differences in perceived relationships with familial and nonfamilial adults and young people. *Journal of Youth and Adolescence, 11*, 479–492. doi:10.1007/BF01538805.
- Bouchard, G., Lee, C. M., Asgary, V., & Pelletier, L. G. (2007). Fathers' motivation for involvement with their children: A self-determination theory perspective. *Fathering, 5*, 23–40. doi:10.3149/fth.0501.25.
- Bowers, A. J., & Spratt, R. (2012). Examining the multiple trajectories associated with dropping out of high school: A growth mixture model analysis. *The Journal of Educational Research, 105*, 176–195. doi:10.1080/00220671.2011.552075.
- Buhs, E. S., Ladd, G. W., & Herald, S. L. (2006). Peer exclusion and victimization: Processes that mediate the relation between peer group rejection and children's classroom engagement and achievement? *Journal of Educational Psychology, 98*, 1–13. doi:10.1037/0022-0663.98.1.1.
- Center for Education Statistics, Statistics Canada. (2010). *Trends in dropout rates and the labour market outcomes of young dropouts*. Available from <http://www.statcan.gc.ca/daily-quotidien/101103/dq101103a-eng.htm> Accessed 10.06.15.
- Chen, Q., Hughes, J. N., Liew, J., & Kwok, O. (2010). Joint contributions of peer acceptance and peer academic reputation to achievement in academically at risk children: Mediating processes. *Journal of Applied Developmental Psychology, 31*, 448–459. doi:10.1016/j.appdev.2010.09.001.
- Chia, L. W., Keng, J. W. C., & Ryan, R. M. (2015). *Building autonomous learners—Perspectives from research and practice using self-determination theory*. Singapore: Springer. doi:10.1007/978-981-287-630-0\_6.
- Cillessen, A. H., & Marks, P. E. (2011). Conceptualizing and measuring popularity. In A. H. Cillessen, D. Schwartz, & L. Mayeux (Eds.), *Popularity in the peer system* (pp. 25–56). New York: Guilford Press.
- deCharms, R. (1968). *Personal causation*. New York: Academic Press.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum. doi:10.1007/978-1-4899-2271-7.
- Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*, 227–268.
- Deci, E. L., & Ryan, R. M. (2002). *Handbook of self-determination research*. Rochester, NY: The University of Rochester Press.
- Deci, E. L., & Ryan, R. M. (2008). Facilitating optimal motivation and psychological well-being across life's domains. *Canadian Psychology, 49*, 14–23.
- Fall, A. M., & Roberts, G. (2012). High school dropouts: Interactions between social context, self-perceptions, school engagement, and student dropout. *Journal of Adolescence, 35*, 787–798. doi:10.1016/j.adolescence.2011.11.004.
- Feldman, R., Bamberger, E., & Kanat-Maymon, Y. (2013). Parent-specific reciprocity from infancy to adolescence shapes children's social competence and dialogical skills. *Attachment and Human Development, 15*, 407–423.
- Finnie, V., & Russell, A. (1998). Preschool children's social status and their mothers' behavior and knowledge in the supervisory role. *Developmental Psychology, 24*, 789–801.
- Flook, L., Repetti, R. L., & Ullman, J. B. (2005). Classroom social experiences as predictors of academic performance. *Developmental Psychology, 41*, 319–327. doi:10.1037/0012-1649.41.2.319.
- Fortier, M. S., Vallerand, R. J., & Guay, F. (1995). Academic motivation and school performance: Toward a structural model. *Contemporary Educational Psychology, 20*, 257–274. doi:10.1006/ceps.1995.1017.
- French, D. C., & Conrad, J. (2001). School dropout as predicted by peer rejection and antisocial behavior. *Journal of Research on Adolescence, 11*, 225–244. doi:10.1111/1532-7795.00011.
- Furman, W., & Buhrmester, D. (1992). Age and sex differences in perceptions of networks of personal relationships. *Child Development, 63*, 103–115. doi:10.2307/1130905.
- Furrer, C., & Skinner, E. (2003). Sense of relatedness as a factor in children's academic engagement and performance. *Journal of Educational Psychology, 95*, 148–162. doi:10.1037/0022-0663.95.1.148.
- Gelb, R., & Jacobson, J. L. (1988). Popular and unpopular children's interactions during cooperative and competitive peer group activities. *Journal of Abnormal Child Psychology, 16*, 247–261.
- Goulet, M., Cantin, S., Archambault, I., & Vitaro, F. (2015). L'influence des amis sur l'engagement scolaire au secondaire: la popularité des élèves comme variable modératrice. *Revue canadienne des sciences du comportement, 47*, 141–152. doi:10.1037/a0038104.
- Green-Demers, I., Pelletier, L. G., & Menard, S. (1997). The impact of behavioural difficulty on the saliency of the association between self-determined motivation and environmental behaviours. *Canadian Journal of Behavioural Science, 29*, 157–166.
- Grolnick, W. S. (2009). The role of parents in facilitating autonomous self-regulation for education. *Theory and Research in Education, 7*, 164–173. doi:10.1177/1477878509104321.
- Grolnick, W. S. (2015). Mothers' motivation for involvement in their children's schooling: Mechanisms and outcomes. *Motivation and Emotion, 39*, 63–73. doi:10.1007/s11031-014-9423-4.
- Grolnick, W. S., Kurovski, C. O., Dunlap, K., & Hevey, C. (2000). Parental resources and the transition to junior high. *Journal of Research on Adolescence, 10*, 465–480. doi:10.1207/SJRA1004\_05.
- Grolnick, W. S., & Ryan, R. M. (1987). Autonomy in children's learning: An experimental and individual difference investigation. *Journal of Personality and Social Psychology, 52*, 890–898. doi:10.1037/0022-3514.52.5.890.
- Grouzet, F. M. E., Otis, N., & Pelletier, L. G. (2006). Longitudinal cross-gender factorial invariance of the academic motivation scale. *Structural Equation Modeling, 13*, 73–98. doi:10.1207/s15328007sem1301\_4.
- Guay, F., Boivin, M., & Hodges, E. V. E. (1999). Predicting change in academic achievement: A model of peer experiences and self-system processes. *Journal of Educational Psychology, 91*, 105–115. doi:10.1037/0022-0663.91.1.105.
- Hardre, P. L., & Reeve, J. (2003). A motivational model of rural students' intentions to persist in, versus drop out of, high school. *Journal of Educational Psychology, 95*, 347–356.
- Janosz, M., Archambault, I., Morizot, J., & Pagani, L. S. (2008). School engagement trajectories and their differential predictive relations to dropout. *Journal of Social Issues, 64*, 21–40. doi:10.1111/j.1540-4560.2008.00546.x.
- Kindermann, T. A. (2007). Effects of naturally existing peer groups on changes in academic engagement in a cohort of sixth graders. *Child Development, 78*, 1186–1203. doi:10.1111/j.1467-8624.2007.01060.x.
- Kiuru, N., Aunola, K., Vuori, J., & Nurmi, J. E. (2007). The role of peer groups in adolescents' educational expectations and adjustment. *Journal of Youth and Adolescence, 36*, 995–1009. doi:10.1007/s10964-006-9118-6.
- Ladd, G. W. (1990). Having friends, keeping friends, making friends and being liked by peers in the classroom: Predictors of children's early school adjustment? *Child Development, 61*, 1081–1100. doi:10.2307/1130877.
- Ladd, G. W. (2003). Probing the adaptive significance of children's behavior and relationships in the school context: A child-by-environment perspective. In R. Kail (Ed.), *Advances in child behavior and development* (pp. 43–104). New York: Wiley.
- Ladd, G. W., Herald-Brown, S. L., & Reiser, M. (2008). Does chronic classroom peer rejection predict the development of children's classroom participation during the grade school years? *Child Development, 79*, 1001–1015.
- Leary, M. R., Kowalski, R. M., Smith, L., & Phillips, S. (2003). Teasing, rejection, and violence: Case studies of the school shootings. *Aggressive Behavior, 29*, 202–214. doi:10.1002/ab.10061.
- Legault, L., Green-Demers, I., & Pelletier, L. G. (2006). Why do high school students lack motivation in the classroom? Toward an understanding of academic motivation and the role of social support. *Journal of Educational Psychology, 98*, 567–582. doi:10.1037/0022-0663.98.3.567.
- Mayeux, L., Houser, J. J., & Dyches, K. D. (2011). Social acceptance and popularity: Two distinct forms of peer status. In A. H. Cillessen, D. Schwartz, & L. Mayeux (Eds.), *Popularity in the peer system* (pp. 79–102). New York: Guilford Press.
- National Center for Education Statistics, U.S. Department of Education (2014). *The Condition of Education 2014 (NCES 2014-083), Status Dropout Rates*. Available from <https://nces.ed.gov/ipeds/data/ipedsreportgenerator.asp> Accessed 10.06.15.
- Otis, N., Grouzet, F. M. E., & Pelletier, L. G. (2005). Latent motivational change in academic setting: A 3-year longitudinal study. *Journal of Educational Psychology, 97*, 170–183. doi:10.1037/0022-0663.97.2.170.
- Otis, N., & Pelletier, L. G. (2005). A motivational model of daily hassles, physical symptoms, and future work intentions among police officers. *Journal of Applied Social Psychology, 35*, 2193–2214.
- Parker, J. G., & Asher, S. R. (1987). Peer relations and later personal adjustment: Are low-accepted children at risk? *Psychological Bulletin, 102*, 357–389. doi:10.1037/0033-2909.102.3.357.
- Parker, J. G., & Asher, S. R. (1993). Friendship and friendship quality in middle childhood: Links with peer group acceptance and feelings of loneliness and social dissatisfaction. *Developmental Psychology, 29*, 611–621. doi:10.1037/0033-2909.29.3.611.
- Parker, J. G., & Seal, J. (1996). Forming, losing, renewing, and replacing friendships: Applying temporal parameters to the assessment of children's friendship experiences. *Child Development, 67*, 2248–2268. doi:10.2307/1131621.

- Parkhurst, J. T., & Hopmeyer, A. (1998). Sociometric popularity and peer-perceived popularity: Two distinct dimensions of peer status. *The Journal of Early Adolescence*, 18, 125-144. doi:10.1177/0272431698018002001.
- Pelletier, L. G., & Rocchi, M. (2015). Teachers' motivation in the classroom. In L. W. Chia, J. W. C. Keng, & R. M. Ryan (Eds.), *Building autonomous learners—Perspectives from research and practice using self-determination theory*. Singapore: Springer. doi:10.1007/978-981-287-630-0\_6.
- Pelletier, L. G., & Sharp, E. C. (2009). Administrative pressures and teachers' interpersonal behaviour in the classroom. *Theory and Research in Education*, 7, 174-183. doi:10.1177/1477878509104322.
- Podsakoff, P. M., MacKenzie, S. M., Lee, J., & Podsakoff, N. P. (2003). Common method variance in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88, 879-903.
- Ryan, R. M., & Deci, E. L. (2000). The darker and brighter sides of human existence: Basic psychological needs as a unifying concept. *Psychological Inquiry*, 11, 319-338. doi:10.1207/S15327965PLI1104\_03.
- Ryan, R. M., & Deci, E. L. (2009). Promoting self-determined school engagement: Motivation, learning, and well-being. In K. R. Wentzel & A. Wigfield (Eds.), *Handbook on motivation at school* (pp. 171-196). New York: Routledge.
- Ryan, R. M., Stiller, J. D., & Lynch, J. H. (1994). Representations of relationships to teachers, parents, and friends as predictors of academic motivation and self-esteem. *Journal of Early Adolescence*, 14, 226-249. doi:10.1177/027243169401400207.
- Skinner, E., Furrer, C., Marchand, G., & Kindermann, T. (2008). Engagement and disaffection in the classroom: Part of a larger motivational dynamic? *Journal of Educational Psychology*, 100, 765-781. doi:10.1037/a0012840.
- Sum, A., Khatiwada, I., McLaughlin, J., & Palma, S. (2009). *The consequences of dropping out of high school*. Boston, MA: Center for Labor Market Studies, Northeastern University.
- Tabachnick, B., & Fidell, L. (2001). *Using multivariate statistics* (4th ed.). New York: Allyn & Bacon.
- Vallerand, R. J. (1997). Toward a hierarchical model of intrinsic and extrinsic motivation. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 29, pp. 271-360). San Diego, CA: Academic Press. doi:10.1016/S0065-2601(08)60019-2.
- Vallerand, R. J., & Bissonnette, R. (1992). Intrinsic, extrinsic, and amotivational styles as predictors of behavior: A prospective study. *Journal of Personality*, 60, 599-620. doi:10.1111/j.1467-6494.1992.tb00922.x.
- Vallerand, R. J., Blais, M. R., Brière, N. M., & Pelletier, L. G. (1989). Construction et validation de l'échelle de motivation en éducation (EME). *Revue canadienne des sciences du comportement*, 21, 323-349.
- Vallerand, R. J., Fortier, M. S., & Guay, F. (1997). Self-determination and persistence in a real-life setting: Toward a motivational model of high school dropout. *Journal of Personality and Social Psychology*, 72, 1161-1176. doi:10.1037/0022-3514.72.5.1161.
- Vallerand, R. J., Pelletier, L. G., Blais, M. R., Brière, N. M., Senécal, C., & Vallières, E. F. (1992). The academic motivation scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement*, 52, 1003-1017. doi:10.1177/0013164492052004025.
- Vallerand, R. J., Pelletier, L. G., Blais, M. R., Brière, N. M., Senécal, C., & Vallières, E. F. (1993). On the assessment of intrinsic, extrinsic, and motivation in education: Further evidence on the concurrent and construct validity of the academic motivation scale. *Educational and Psychological Measurement*, 35, 159-172.
- Vansteenkiste, M., Niemiec, C., & Soenens, B. (2010). The development of the five mini-theories of self-determination theory: An historical overview, emerging trends, and future directions. In T. Urdan & S. Karabenick (Eds.), *Advances in motivation and achievement*, vol. 16: *The decade ahead* (pp. 105-166). UK: Emerald Publishing. doi:10.1108/S0749-7423(2010)000016A007.



## The Differential Effects of Parental Involvement on High School Completion and Postsecondary Attendance

*Terris Ross*

U.S. Department of Education<sup>1</sup>  
United States

**Citation:** Ross, T. (2016). The differential effects of parental involvement on high school completion and postsecondary attendance. *Education Policy Analysis Archives*, 24(30).  
<http://dx.doi.org/10.14507/epaa.v24.2030>

**Abstract:** Previous studies have shown the impact of parental involvement on a number of student achievement, motivation, and engagement outcomes, but the extent to which parental involvement influences high school completion and postsecondary attendance has received less attention in the literature. Filling that gap, this study replicates and extends previous research (Fan & Williams, 2010) by examining the influence of various dimensions of parental involvement on high school completion and postsecondary attendance (with particular interest in dropouts who later earned GEDs and went on to college). Results show that parents' educational expectations for their children play a significant role in whether students from all backgrounds persist toward completion of high school and whether they attend a postsecondary institution. This study also finds parent participation in school functions to be a significant positive predictor of both high school completion and postsecondary enrollment, while communication between parent and school about

---

<sup>1</sup> This study is the result of the author's independent research and the views expressed in the study do not necessarily represent the views of the U.S. Department of Education or the United States.



children's school problems is negatively associated with both outcomes. The implications for expanding developmentally appropriate and culturally sensitive policies for family and school engagement are discussed.

**Keywords:** parental involvement; high school completion; postsecondary attendance

### **Los efectos diferenciales de la participación de los padres en la asistencia post-secundaria y la finalización de la escuela secundaria**

**Resumen:** Estudios previos han demostrado el impacto de la participación de los padres en una serie de logros de los estudiantes, motivación y resultados de la participación, pero el grado en que la participación de los padres influyen la finalización del secundario y post-secundaria ha recibido menos atención en la literatura. Para atender ese problema, este estudio replica y extiende la investigación anterior (Fan & Williams, 2010) mediante el examen de la influencia de diversas dimensiones de la participación de los padres en la terminación de los estudios y asistencia post-secundaria (con especial interés en los abandonos de estudiantes que más tarde obtuvieron el diploma de finalización GED y que fueron a la universidad). Los resultados muestran que las expectativas educativas de los padres sobre sus hijos tienen un papel importante para que estudiantes de todos los orígenes sociales persistan en la finalización de la escuela secundaria y asistan a una institución de educación superior. Este estudio también revela que la participación de los padres en las actividades escolares puede ser un predictor positivo significativo tanto de la finalización de la escuela secundaria y la matrícula de educación superior, mientras que la comunicación entre padres y escuelas acerca de problemas escolares de los niños se asocia negativamente con ambos resultados. Se discuten las implicaciones para la expansión de las políticas de desarrollo y culturalmente sensibles apropiadas para la participación familiar y escolar.

**Palabras clave:** participación de los padres; finalización de la preparatoria; asistencia post-secundaria

### **Os efeitos diferenciais de envolvimento dos pais na conclusão do Ensino Médio e na frequência no Ensino Superior**

**Resumo:** Estudos anteriores demonstraram o impacto do envolvimento dos pais no desempenho do aluno, na motivação e nos resultados da participação, mas em que medida a participação dos pais influenciam a conclusão do Ensino Médio e do Ensino Superior tem recebido menos atenção na literatura. Para resolver este problema, este estudo replica e estende a pesquisa anterior (Fan & Williams, 2010), examinando a influência de várias dimensões de envolvimento dos pais na realização de estudos e de frequência no Ensino Superior (com especial interesse em desistências de estudantes que mais tarde obtiveram certificação em exames supletivos e foram para a universidade). Os resultados mostram que as expectativas educacionais dos pais sobre seus filhos têm um lugar importante para que os estudantes de todas as origens sociais persistam em concluir o ensino médio e frequentem a universidade. Este estudo também revela que o envolvimento dos pais nas atividades escolares pode ser um elemento positivo significativo, tanto da conclusão do ensino médio quanto no ingresso no ensino superior, enquanto a comunicação entre pais e escolas sobre problemas escolares das crianças foi negativamente associado em ambos resultados. As implicações para a expansão das políticas de apropriadas e culturalmente sensíveis para participação familiar e escolar são discutidas nesse artigo.

**Palavras-chave:** envolvimento dos pais; conclusão do ensino; assistência pós-secundário

## Introduction

Guiding students toward high school completion and college enrollment are major goals of the U.S. education system. The individual and societal benefits of higher education, including higher earnings and employment rates, greater job satisfaction and social mobility, healthier lifestyles, and more active citizens, to name a few, are well documented in the literature (e.g., Baum, Ma, & Payea, 2013; Brand & Xie, 2010; Kenkel, 1991; Ou, 2008; Pew Research Center, 2014). For example, in a longitudinal study of high school sophomores in 2002, some 26% of those with less than high school completion in 2012 were unemployed, compared to 15% of those with a high school diploma or general educational development (GED) credential and 5% of those with a bachelor's degree or higher (Lauff & Ingels, 2013). In terms of income, 7% of those with less than high school completion earned an income of \$40,000 or more from employment, compared to 14% with a high school diploma or GED and 33% of those with a bachelor's degree or higher. Receiving public assistance also differentiated the three groups as 47% of cohort members with less than high school completion had received public assistance in 2011, compared to 32% of those with a high school diploma or GED and 5% of those with a bachelor's degree or higher. These statistics are not surprising, given that federal agencies, such as the Bureau of Labor Statistics (BLS) and the U.S. Department of Education, have reported similar patterns for many years (BLS, nd; Kena et al., 2015).

Given these large disparities by educational attainment, factors that lead to the decision to drop out of school have been studied extensively (e.g., Alexander, Entwisle, & Horsey, 1997; Battin-Pearson et al., 2000; Dynarski & Gleason, 1999; Fan & Wolters, 2014; Henry, Knight, & Thornberry, 2012; Neild, Stoner-Eby, & Furstenberg, 2008; Rumberger & Larson, 1998). Student risk factors include living in a single parent household, being economically disadvantaged, and experiencing grade retention, limited English proficiency, emotional and/or behavioral disorders, and learning disabilities, to name a few. However, studies have also found that, when asked, students cite a number of school, family, and work-related reasons for dropping out of school (e.g., Malkus & Sen, 2012), resulting in the need for multiple approaches to address this problem. In particular, the National Dropout Prevention Center/Network (NDPC/N), a well-known and respected clearinghouse for research in this area, promotes 15 strategies shown to be effective at reducing dropout behavior. These strategies range from early interventions, such as increasing preschool participation and family engagement, to making the most of instruction, by providing professional development for teachers of at-risk youth (for more information, see <http://dropoutprevention.org/effective-strategies/>).

Disengagement from school is not only of interest to researchers and practitioners, but also to policymakers who are working to both understand and find solutions to this problem, which disproportionately impacts some student populations (e.g., minorities and low-income students), compared to others. There is strong agreement among federal policymakers that an important part of any strategy to reduce dropout rates (overall and particularly among vulnerable subgroups), is for school leaders to improve family-school relations and increase parental involvement in education (e.g., deCastro & Catsambis, 2009; Hill & Chao, 2009; Hill, Tyson, & Bromell, 2009; Hoover-Dempsey, Ice, & Whitaker, 2009; 107<sup>th</sup> Congress, 2002). In particular, the 2002 reauthorization of the Elementary and Secondary Education Act (ESEA), better known as the No Child Left Behind Act (NCLB; 107<sup>th</sup> Congress, 2002), mandated that states seeking funding for Title I (i.e., low-income) schools identify and implement practices for involving parents that are “based on the most current research that meets the highest professional and technical standards, on effective parental

involvement that fosters achievement to high standards for all children.” (Section 1111.d). The 2015 reauthorization, known as the Every Student Succeeds Act, or ESSA, maintains this commitment to parent and family engagement activities (114<sup>th</sup> Congress, 2015). Hence, the effect of parental involvement on student achievement and dropout behavior is of continuing interest to practitioners and policymakers alike.

## Parental Involvement during the Adolescent Years

The belief that children benefit from their parents’ involvement in school-related activities is supported by research, particularly studies of the impact of parental involvement on students’ academic outcomes, behavior, motivation, engagement, and self-efficacy (e.g., Domina, 2005; Fan & Williams, 2010; Jeynes, 2005). However, research also shows a steady decline in parental involvement once children reach the middle and high school years (e.g., Eccles et al., 1993; Epstein & Dauber 1991; Spera, 2005; U.S. Department of Education, 1998). During this time, adolescents begin to express a desire for more independence and autonomy – feelings that are reinforced by the changes in school structure and expectations for independent work that students encounter in secondary school settings (Epstein & Sanders, 2002). Unfortunately, using developmentally appropriate strategies to help adolescents successfully transition from elementary to middle (or from middle to high) school does not appear to be a widespread practice. Rather, middle and high school programs aimed at increasing parental involvement are often uninformed by research and best practice for how to effectively collaborate with parents to support adolescent achievement (Hill & Chao, 2009). At the same time, there is less research evidence on the effects of parental involvement for secondary school outcomes than there is for elementary school outcomes. Thus, not only is it challenging to find ways to keep parents involved during these years, but a greater understanding of the relationship between parental involvement and secondary outcomes – such as high school completion and postsecondary attendance – is also needed.

## Parental Involvement and Student Outcomes

Studies have shown the positive impact of parental involvement on a number of proximal and distal student outcomes, including reading and mathematics achievement (Jeynes, 2005; Sheldon & Epstein, 2005; Sirvani, 2007; Sui-Chu & Willms, 1996; Yan & Lin, 2005), student behavior in school (Domina, 2005), school attendance, preparation for class, and course completion (Simon, 2001), student motivation, academic self-efficacy, and engagement (Fan & Williams, 2010; Gonzalez-DeHass et al, 2005), and middle school dropout behavior (Rumberger, 1995). However, not all parental involvement activities have positive effects (Domina, 2005; Fan, 2001; Izzo, Weissberg, Kasprow, & Fendrich, 1999). For example, in an early childhood education study, the quality of parent-teacher interactions predicted improvements in student achievement and behavior but frequent parent-teacher contact was associated with declines in acceptable classroom behavior (Izzo et al., 1999). In Fan’s (2001) study, parents’ aspirations for their children’s educational attainment exceeded all other aspects of parental involvement in predicting middle school students’ academic growth, even after controlling for socioeconomic status (SES). However, some parental involvement behaviors (e.g., education-related communication with child, volunteering at child’s school) were not as consistently predictive of student academic growth, and others (e.g., frequent contact with child’s school) had negative effects on student achievement. Another study on the influence of parental involvement on student achievement of elementary school children found that the statistically significant positive effects of activities such as volunteering at school, and checking

and helping children with homework actually become nonsignificant (and even negative), after controlling for children's prior academic achievement and school and family background characteristics (Domina, 2005). Clearly, more research is needed to replicate and extend the findings in this area and to examine outcomes (e.g., high school completion and postsecondary attendance) for students at higher levels of education than elementary and middle school, where much of the existing research is focused.

### **Parental Involvement Differences by Race/Ethnicity and SES**

Previous research has also examined parental involvement across racial/ethnic groups; however, the evidence is mixed at best. While overall, it may appear that parents of black and Hispanic youth are less involved than white parents (e.g., Yan & Lin, 2005), some studies show – after controlling for other background variables – that black and Hispanic parents may often be more involved than White parents in the education of their children (e.g., Sui-Chu & Willms, 1996). Still, other studies show no differences by race/ethnicity at all (e.g., Hill et al., 2004). Additionally, research on the effectiveness of parental involvement across different socioeconomic groups is also inconclusive. That is, well-educated and affluent parents tend to draw on their experiences and understanding of education processes and operations to both advocate for their children and engage in practices that align with school efforts. However, research has also shown those same practices may be observed among less-educated/lower-income parents, once they are taught how to navigate the complex system of American schools and how to support their children in ways that promote academic success (Nicolau & Ramos, 1990; Olivos, 2006; Smith, Robbins, Stagman, & Mahur, 2013). Further, varying cultural perceptions of parent and teacher roles, as well as language differences and school and community barriers to parental involvement, may also contribute to differences in parental involvement by race/ethnicity and SES. For example, in many Spanish-speaking countries, teachers and school leaders are viewed as education experts, and therefore many Hispanic parents in the U.S. (both native and foreign-born) may defer to, rather than question or oppose, school officials when making decisions for their children (deCastro & Catsambis, 2009). Unfortunately, this kind of behavior can be mistaken for apathy on the part of parents who may just be less comfortable than other parents when it comes to directing their children's education. In this, and possibly other ways, existing theory and research are somewhat limited in explaining apparent differences between racial/ethnic and socioeconomic groups, which can hinder efforts to develop positive parent-school relationships.

### **Dimensions and Types of Parental Involvement**

Another challenge to measuring parental involvement is that there is **no consistent definition** of what it entails. In general, researchers agree that **parental involvement encompasses a whole host of activities and behaviors** that promote the academic and social success of one's children (Fishel & Ramirez, 2005) and that it is better understood **as a multidimensional construct** (Epstein, 1995; Fan & Williams, 2010; Grolnick & Slowiaczek, 1994). Epstein (1995) – one of the most widely cited researchers to first suggest a multidimensional framework for parental involvement – ultimately conceptualized it as **six types of activities** that are essential to a comprehensive program of a family, school, and community partnership: (1) **parenting**, (2) **communicating**, (3) **volunteering**, (4) **learning at home**, (5) **decision making** and (6) **collaborating with the community**. According to Epstein, students are best served when schools help families establish **supportive home environments** for learning, provide two-way systems of communication about school programs and student progress,

actively recruit and organize help from parents, facilitate at-home learning, involve parents from all race and socioeconomic backgrounds as representatives and leaders on school committees, and identify and effectively integrate community resources to strengthen school programs. Obviously, these practices, when implemented, are meant to more deeply engage parents in the school community than simply providing information through newsletters and progress reports. Other researchers (e.g., Henderson, 2002; Olivos, 2006) share this perspective, noting that authentic programs for increasing school-family engagement will recognize and value differences in the ways that parents – especially those of diverse racial/ethnic groups – interact with their children’s schools.

While Epstein (1995) and others (e.g., Singh, Bickley, Trivette, Keith, & Keith, 1995) developed theories based either on their intuition about what should logically constitute parental involvement or by analyzing the content of questionnaire items, Fan (2001) was one of the first to empirically test these theories and demonstrate – through exploratory factor analysis and latent growth curve analysis – the existence of multiple and distinct dimensions of parental involvement and their effects on students’ academic growth in high school. Using 14 survey items related to parental involvement from NCES’ National Education Longitudinal Study of 1988 (NELS:88), Fan identified seven dimension of parental involvement: (1) TV rules, (2) Communication, (3) Contact with School, (4) PTA, (5) Volunteer, (6) Supervision, and (7) Education Aspiration. Fan’s study found comparable levels of parental involvement across racial/ethnic groups and that parents’ aspirations for their children’s educational attainment was a consistent and positive predictor of students’ academic growth in reading, mathematics, science and social studies from 1988 to 1992.

More recently, Fan and Williams (2010) used a similar approach as Fan (2001) in examining the differential effects of eight parental involvement dimensions on student motivation, academic self-efficacy, and engagement in a nationally representative sample of high school sophomores. The dimensions studied included: (1) parental aspirations for their children’s educational attainment, (2) parent participation in school functions, (3) family rules reflecting parental home supervision, (4) parental advising, (5) parent participation in their children’s extracurricular activities, (6) parent-school communication regarding children’s problems at school, (7) school-initiated contact with parents regarding benign school issues, and (8) parent-initiated contact with schools regarding benign school issues. In this later study, Fan and Williams (2010) separated parent-school communications regarding children’s problems at school from parent-school communications regarding benign issues in order to examine the negative relationship between parent-school communication and student academic outcomes (i.e., behavior and achievement) uncovered in earlier studies (Fan, 2001; Izzo et al., 1999). Also, Fan and Williams separately examined parent-initiated and school-initiated contact regarding benign school issues as a way of investigating the differential effects of each on student motivation, academic self-efficacy, and engagement. Their results demonstrated – once again – the powerful association between parents’ educational aspirations for their children and student academic outcomes. Parent aspirations and school-initiated contact with parents showed strong positive effects on students’ school engagement and their intrinsic motivation and self-efficacy towards mathematics and English. However, similar to previous research, parent-school contact regarding students’ school problems was negatively associated with all outcomes studied. Finally, parental advising positively predicted students’ academic self-efficacy and intrinsic motivation in English, while family rules for watching television positively predicted students’ intrinsic motivation and engagement towards mathematics and English.



## **Parental Involvement, High School Completion, and Postsecondary Attendance**

All of the above cited studies show the effects of parental involvement – whether positive or negative – on a number of student achievement, motivation, and engagement outcomes. However, the extent to which specific parental contact and involvement practices influence middle and high school completion and postsecondary attendance has received less attention in the literature. Rumberger's (1995) study on the differential effects of parental involvement activities on middle school dropout behavior is a notable exception. He found that the most powerful parental involvement factors – among those studied – were the extent to which parents participate in school parent-teacher organizations and act as volunteers at their child's school. Students with less academic support and supervision were 34% more likely to drop out than other students. Also, students whose parents had low educational expectations for them (i.e., only expecting high school graduation) were more than five times as likely as other students to drop out of school in the eighth grade. Additionally, Ross et al (2012) investigated the effects of a number of variables thought to impact immediate postsecondary enrollment after high school (e.g., GPA, mathematics achievement, previous grade retention, school absenteeism, participation in high school sports and extracurricular activities, discussing coursework with parents, working at a job more than 30 hours per week, and having close friends who dropped out of school). The study showed that, after controlling for various student and family background variables, students who often discussed school courses with their parents had 44% higher odds of immediate enrollment in postsecondary education, compared to those who never had these discussions with their parents. These few studies notwithstanding, more research is needed to understand how parental involvement positively influences secondary school outcomes and how education policies – such as Title I provisions under ESEA – can be leveraged to capitalize on those relationships.

### **Study Purpose**

This study replicates and extends previous research by examining the impact of various dimensions of parental involvement (as defined in Fan & Williams, 2010) on high school completion and postsecondary attendance (with particular interest in dropouts who later earned GEDs and went on to college). This study fills an important gap in the emerging literature on parental involvement and has implications for expanding developmentally appropriate and culturally sensitive policies for family and school engagement. The study answers the following research question:

Are specific dimensions of parental involvement previously shown to impact the likelihood of middle school dropout behavior (Rumberger, 1995) and/or shown to increase high school students' academic self-efficacy, engagement, and intrinsic motivation in mathematics and English (Fan & Williams 2010) similarly associated with high school completion and postsecondary attendance?

The answer to this question may depend – to some extent – on other factors, such as student and family background characteristics. In fact, among a nationally representative sample of high school sophomores in 2002, Malkus and Sen (2012) showed that high school completion status (in 2006) varied by a number of student characteristics. For example, male students and black, Hispanic, and low SES students were more often represented among dropouts than they were among high school graduates or GED recipients. More specifically, Malkus and Sen reported that 49% of high school graduates were male compared to 59% of GED recipients and 60% of dropouts. In terms of race/ethnicity, 13% of high school graduates were Black, compared to 16% of GED recipients and 18% of dropouts. The percentages for Hispanic/Latino high school graduates,



GED recipients, and dropouts were 14%, 16%, and 33%, respectively. That study also reported that 22% of high school graduates were from the lowest socioeconomic status quartile, compared to 35% of GED recipients and 55% of dropouts who also came from low-income families. Furthermore, parental involvement has been shown to vary by race/ethnicity, socioeconomic status, and family structure (Aston & McLanahan, 1991; Desimone, 1999; Zellman & Waterman, 1998). Given these findings, this study controls for the influence of student and family background variables (i.e., race/ethnicity, sex, and family income).

## **Methodology: Data, Measures, and Analysis**

### **Data**

To replicate and extend the analysis conducted in Fan & Williams (2010), I used data from the Education Longitudinal Study of 2002 (ELS: 2002), a nationally representative study of tenth graders in 2002 and 12th graders in 2004 and which followed the cohort through 2012, when most members would have been approximately 26 years old (Lauff & Ingels, 2013). ELS: 2002 – one of many school-based longitudinal studies conducted by the National Center for Education Statistics (NCES) – followed students as well as high school dropouts, monitoring their transitions to postsecondary education, the labor force, and family formation. The four rounds of data collection on this cohort of high school sophomores include the base year in 2002, the first follow-up in 2004, the second follow-up in 2006, and the third follow-up in 2012.

In addition to collecting information from the cohort, ELS includes data from questionnaires administered to the students' parents, teachers, librarians, and school administrators. The base year (2002) sample included 16,197 tenth graders, weighted to represent the approximately 3 million high school sophomores enrolled in U.S. schools. Among those sampled, 15,362 students and 13,488 parents completed questionnaires. In the weighted sample, 50.0% of students were female and 50.0% were male; 60.3% were White, 15.9% were Hispanic/Latino, 14.4% were Black, 4.2% were Asian/ Pacific Islander, 1.0% were American Indian/Alaska Native, and 4.3% were of two or more races (Ingels, Burns, Chen, Cataldi, & Charleston, 2005). All four rounds of data collection achieved weighted response rates of 84% and above. Nonresponse bias analyses were conducted at each round to adjust for nonresponse so that the data could be used with confidence. During this process, NCES identified 78 high-nonresponse student questionnaire variables in the dataset. Among these variables, the nonresponse bias analysis detected a bias of 5% or higher in less than one half of 1% of the observations. For more information on the nonresponse bias analysis, and other possible limitations of the dataset, see the ELS data file documentation (Ingels et al., 2014).

Similar to previous NCES longitudinal studies, ELS: 2002 surveyed parents about specific activities they engage in with their tenth grader. The availability of multiple items related to parental involvement makes it possible to examine how the various dimensions of parental involvement may affect student outcomes, including high school completion and postsecondary attendance.

### **Measures: Parental Involvement Variables**

The types of parental involvement I examine here include (1) parent participation in their children's extracurricular activities, (2) parental advising, (3) parent-school communication regarding children's problems at school, (4) school-initiated contact with parents regarding benign school issues, (5) parent-initiated contact with schools regarding benign school issues, (6) parent

participation in school functions, (7) parental aspirations for their children's educational attainment, and (8) family rules reflecting parental home supervision. In the base year of ELS: 2002, parents responded to questionnaire items asking about various activities that they had engaged in with their child or their child's school. The selected questionnaire items for this study are those used to represent the eight dimensions of parental involvement, as defined by Fan and Williams (2010). These items are similar to those used in a number of empirical studies and have been shown to have acceptable reliability and validity (e.g., Fan, 2001; Hill & Craft, 2003; Yan & Lin, 2005). Table 1 provides a list of the items I used to measure each parental involvement dimension (including the internal consistency estimates reported in Fan & Williams, 2010). The parental aspiration dimension is a composite variable that NCES created (and imputed using a weighted sequential hot deck procedure) for the ELS: 2002 dataset. Unfortunately, the family rules dimension, composed of items measuring the extent to which parents reported having four specific rules for their tenth-grader (i.e., maintaining a certain grade average, doing homework, doing household chores, and watching television) did not exhibit adequate internal consistency (Cronbach's  $\alpha = .59$ ) in the Fan and Williams (2010) study. Therefore, in this study, I – like Fan and Williams (2010) – treated the four variables separately in the analyses.

Table 1

*Selected ELS: 2002 Questionnaire Items Used to Measure 7 Dimensions of Parental Involvement*

| Dimension                                                                                                                     | Questionnaire Items                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Parent participation in extracurricular activities with children (Cronbach's alpha = .76)                                     | Looking back over the past year, how frequently did you and your tenth grader participate in the following activities together?<br>(1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Frequently)<br><br>Attending concerts, plays, or movies outside of school (BYP57C)<br>Attending sporting events outside of school (BYP57D)<br>Attending family social functions (party, wedding) (BYP57F)<br>Taking day trips or vacations (BYP57G)<br>Working on a hobby or playing sports (BYP57H)<br>Going to restaurants/eating out (BYP57J)<br>Doing something else fun together (BYP57L)                                                                                                                                      |
| Parental advising (Cronbach's alpha = .77)                                                                                    | In the first semester or term of this school year, how often have you and/or your spouse/partner provided advice or information about the following to your tenth grader? (1 = Never, 2 = Sometimes, 3 = Often)<br><br>Selecting courses or programs at school (BYP56A)<br>Plans and preparation for college entrance exams such as ACT, SAT, or ASVAB (BYP56B)<br>Applying to college or other schools after high school (BYP56C)<br>Specific jobs your tenth grader might apply for after high school (BYP56D)<br>Community, national, and world events (BYP56E)<br>Things that are troubling your tenth grader (BYP56F)                                                                                        |
| Parent-school communication concerning children's school problems (Cronbach's alpha = .76)                                    | Since your tenth grader's school opened last fall, how many times have you or your spouse/partner been contacted by the school (or you or your spouse/partner contacted the school) about the following? (1 = None, 2 = Once or twice, 3 = Three or four times, 4 = More than four times)<br><br>Your tenth grader's poor performance in school (BYP52A and BYP53A)<br>Your tenth grader's problem behavior in school (BYP52F and BYP53F)                                                                                                                                                                                                                                                                         |
| School-initiated contact with parents and Parent-initiated contact with school (Cronbach's alpha = .65 and .71, respectively) | Since your tenth grader's school opened last fall, how many times have you or your spouse/partner been contacted by the school (or you or your spouse/partner contacted the school) about the following?<br>(1 = None, 2 = Once or twice, 3 = Three or four times, 4 = More than four times)<br><br>Your tenth grader's school program for this year (BYP52B and BYP53B)<br>Your tenth grader's plans after leaving high school (BYP52C and BYP53C)<br>Your tenth grader's course selection for entry into college, vocational, or technical school after completing high school (BYP52D and BYP53D)<br>Information on how to help your tenth grader at home with specific skills or homework (BYP52I and BYP53I) |

Table 1 continued

*Selected ELS: 2002 Questionnaire Items Used to Measure 7 Dimensions of Parental Involvement*

| Dimension                                                            | Questionnaire Items                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Parent participation in school functions<br>(Cronbach's alpha = .72) | In this school year, do you or your spouse/partner do any of the following?<br>(0 = No, 1 = Yes)<br><br>Belong to the school's parent-teacher organization (BYP54A)<br>Attend meetings of the parent-teacher organization (BYP54B)<br>Take part in the activities of the parent-teacher organization (BYP54C)<br>Act as a volunteer at the school (BYP54D)<br>Belong to any other organization with several parents from your tenth grader's school (for example, neighborhood or religious organizations) (BYP54E) |
| Parental aspirations for children's postsecondary education          | How far in school the parent wants their tenth grader to go (BYPARASP)<br><br>1 = Less than high school graduation<br>2 = High school graduation or GED only<br>3 = Attend or complete 2-year college/school<br>4 = Attend college, 4-year degree incomplete<br>5 = Graduate from college<br>6 = Obtain master's degree or equivalent<br>7 = Obtain PhD, MD, or other advanced degree                                                                                                                               |
| Family Rules                                                         | Are there family rules that are enforced for your tenth grader about any of the following activities? (0 = No, 1 = Yes)<br><br>Maintaining a certain grade average (BYP69A)<br>Doing homework (BYP69B)<br>Doing household chores (BYP69C)<br>Watching television (BYP69D)                                                                                                                                                                                                                                           |

**Measures: Student and Family Background Variables**

The student and family background variables I used in this analysis include sex, race/ethnicity, and socioeconomic status (SES). For all three of these variables, missing values were imputed by NCES before releasing the ELS: 2002 dataset. Sex was constructed from the base-year student questionnaire and when missing, NCES determined sex using the school roster or by logical imputation using the student's first name. Race/ethnicity was also self-reported and imputed by NCES using similar procedures as for the sex variable. For the current study, I used the following six race categories: White, American Indian/Alaska Native, Asian/Pacific Islander, Black, Hispanic, and two or more races. With the exception of the Hispanic category, all race categories exclude students of Hispanic or Latino origin. The variable I used to describe students' SES is a composite variable within the ELS dataset that NCES constructed from five component variables: father's education level, mother's education level, family income, father's occupation, and mother's occupation. Data for all five components were collected on the parent questionnaire and imputed

when missing. For more information on NCES imputation procedures, see the ELS data file documentation (Ingels et al., 2014).

### Measures: Dependent Variables

In this study, I examine the effects of various parental involvement behaviors on two educational outcomes – high school completion (either through high school diploma or GED) and postsecondary attendance by 2006. High school completion was measured by NCES using self-reported data from the second follow-up student questionnaire in 2006. Where missing, data from transcripts or the first follow-up questionnaire in 2004 were used. Postsecondary attendance status was taken from the second follow-up student questionnaire, and is based on students' self-report of whether they had ever attended a postsecondary institution since high school. Where missing, NCES provides imputed data in the ELS: 2002 dataset.

### Analysis

Similar to Fan and Williams (2010), the current study accounts for the complex, two-stage (i.e., school selection, followed by student selection) sampling design employed by ELS: 2002. I applied the full sample weight (F2BYWT) to all estimates and used Taylor-linearized variance estimation (using primary sampling unit and strata weighting) to produce unbiased estimates of the standard errors reported in this paper. The Taylor series approximation technique makes appropriate adjustments for participant nonresponse and unequal probabilities of selection – two complex survey issues that can seriously affect variance estimation, if not adequately addressed. I conducted all of the analyses using complex survey (i.e., SVY) commands within the STATA 13 statistical software package (StataCorp, 2013) and I included appropriate weights (at the stratum, cluster, and student level) to adjust for nonresponse and the unequal probability of selection associated with ELS: 2002.

As is common with many large-scale data sets, ELS: 2002 contains missing data across a number of variables, including the parental involvement questionnaire items involved in this study. The amount of missing data (across all variables in this study) ranged between 0.2% and 25.9% (unweighted), which is large enough to warrant closer attention (Graham & Hofer, 2000). Fortunately, there are many options for addressing missing data, such as traditional methods of listwise or pairwise deletion, means substitution, etc. However, these approaches can result in drastic reductions in sample size and do not account for nonrandom missing data. The risks of producing biased estimates using these methods – and the advantages of other approaches, such as multiple imputations – are well-documented (Baraldi & Enders, 2010; Fichman & Cummings, 2003; Howell, 2007; Little & Rubin, 1987; Rubin, 1987).

To avoid some of the issues associated with these approaches, in this study I employed sequential regression multivariate imputation (SRMI) to generate five sets of imputed data for the analysis. SRMI is a flexible technique that can handle variables of different types (e.g., categorical, continuous) when selecting appropriate regression models to predict missing data. Another advantage is that SRMI makes use of all of the information in a dataset, when imputing data for each missing value. I conducted the SRMI method using the “mi impute chained” command in STATA 13, which supports multivariate imputation using chained equations (ICE). For more information on the SRMI procedure, see Raghunathan, Lepkowski, Van Hoewyk & Solenberger (2001).

After creating the parental dimension scales from the individual questionnaire items, I employed the mi impute chained procedure in STATA 13 to produce the five imputed datasets.

Then, I performed descriptive analyses to describe various characteristics and outcomes for the sample.

To study the effects of parental involvement on high school completion via diploma or GED certificate, I conducted logistic regression analyses using data for the entire cohort of sophomores in 2002 and then separately on the subpopulation of non-diploma recipients (primarily sophomores who dropped out of high school at some point between the base year and second follow up data collections in 2002 and 2006, respectively). To study the effects of parental involvement on college-going by 2006, I performed similar analyses for the sophomore cohort and the subpopulation of non-diploma recipients. Additionally, I conducted each logistic regression analysis across the five imputed datasets using the “mi estimate: svy” command in STATA 13. In the analyses, I controlled for student and family background variables, namely sex, race/ethnicity, and SES.

Unless otherwise indicated, study results are based on imputed data from the five generated datasets. Only statistically significant differences are highlighted in the comparisons. However, STATA’s mi estimate command does not support t-tests for comparing estimates with imputed data. Therefore, in the descriptive analysis of means and percentages, I compared the 95% confidence intervals for each of the parental involvement variable estimates. I present standardized regression coefficients for the multivariate analyses.

## Results

Table 2 shows the weighted, non-imputed, percentage of spring 2002 tenth graders, by high school completion status in 2006. Eighty-eight percent (88%) of sophomores in 2002 had earned a high school diploma by 2006, compared to 4% who dropped out of high school but later received a GED and 8% with less than high school completion.

Table 2

*Percentage of spring 2002 sophomores, by high school completion status in 2006*

| High school graduates |      | GED recipients |      | Non-completers <sup>1</sup> |      |
|-----------------------|------|----------------|------|-----------------------------|------|
| Percentage            | SE   | Percentage     | SE   | Percentage                  | SE   |
| 87.8                  | 0.45 | 3.9            | 0.22 | 8.2                         | 0.39 |

Note: Table values represent weighted, non-imputed data.

<sup>1</sup>Includes students receiving a certificate of attendance, and those still enrolled in high school in 2006. Students receiving certificates of attendance and those still enrolled in high school in 2006 represent approximately one percent of the unweighted study sample.

Table 3a presents the means and standard errors for each of the parental involvement variables, overall and by high school completion status. Among the four types of parental involvement that parents were asked to rate on a 4-point scale, overall (and across all high school completion categories) the highest averages were reported for parent participation in extracurricular activities with children ( $M = 3.06$ ,  $SE = .007$ ; see Appendix A-1 for 95% confidence intervals). That is, on average, parents reported being “sometimes” involved with their children’s extracurricular activities. Averages for the other 4-point composite variables follow: parent-school communication concerning children’s school problems ( $M = 1.32$ ,  $SE = .007$ ), school-initiated contact with parents ( $M = 1.33$ ,  $SE = .006$ ), and parent-initiated contact with school ( $M = 1.37$ ,  $SE = .006$ ). Overall, communication between parents and schools was infrequent (i.e., less than “once or twice” during



the school year). Parental advising – which was rated on a 3-point scale – averaged 2.27 points overall, with a standard error of .006.

Table 3a

*Means and standard errors for parental involvement variables, by high school completion status in 2006*

| Parental Involvement Variable                                     | Total |       | High School Diploma Recipients |       | GED recipients |       | Non-Completers <sup>1</sup> |       |
|-------------------------------------------------------------------|-------|-------|--------------------------------|-------|----------------|-------|-----------------------------|-------|
|                                                                   | M     | SE    | M                              | SE    | M              | SE    | M                           | SE    |
| Parent participation in extracurricular activities with children  | 3.06  | 0.007 | 3.08                           | 0.007 | 2.94           | 0.035 | 2.85                        | 0.027 |
| Parental advising                                                 | 2.27  | 0.006 | 2.28                           | 0.006 | 2.24           | 0.032 | 2.15                        | 0.028 |
| Parent-school communication concerning children's school problems | 1.32  | 0.007 | 1.26                           | 0.006 | 1.76           | 0.059 | 1.80                        | 0.041 |
| School-initiated contact with parents                             | 1.33  | 0.006 | 1.33                           | 0.007 | 1.34           | 0.032 | 1.38                        | 0.023 |
| Parent-initiated contact with school                              | 1.37  | 0.006 | 1.36                           | 0.007 | 1.50           | 0.036 | 1.43                        | 0.028 |
| Parent participation in school functions                          | 0.29  | 0.005 | 0.30                           | 0.005 | 0.21           | 0.015 | 0.19                        | 0.012 |
| Parental aspiration for children's postsecondary education        | 5.32  | 0.016 | 5.38                           | 0.156 | 4.97           | 0.075 | 4.83                        | 0.061 |
| Family rules for maintaining grade                                | 0.82  | 0.005 | 0.82                           | 0.005 | 0.81           | 0.027 | 0.81                        | 0.023 |
| Family rules for doing homework                                   | 0.93  | 0.004 | 0.93                           | 0.004 | 0.91           | 0.018 | 0.93                        | 0.012 |
| Family rules for doing household chores                           | 0.88  | 0.004 | 0.88                           | 0.004 | 0.93           | 0.015 | 0.92                        | 0.011 |
| Family rules for watching television                              | 0.65  | 0.007 | 0.64                           | 0.007 | 0.63           | 0.039 | 0.69                        | 0.021 |

Note: Table values represent averaged estimates from five imputed datasets.

<sup>1</sup>Includes students receiving a certificate of attendance, and those still enrolled in high school in 2006. Students receiving certificates of attendance and those still enrolled in high school in 2006 represent approximately one percent of the unweighted study sample.

Parents' educational aspirations for their children were measured using a seven-point scale (ranging from less than high school graduation to Ph.D., M.D., or other advanced degree). On average, parents aspired for their children to at least graduate from college ( $M = 5.32$ ), although this item appears to vary more across the sample ( $SE = .016$ ) than the other parental involvement dimensions. To further examine this finding, I calculated parents' educational aspirations for their children, by race/ethnicity and SES. Table 3b shows the resulting means and standard errors. Compared to other racial/ethnic groups, the parents of Asian/Pacific Islander ( $M = 5.76$ ,  $SE = .036$ ) and black ( $M = 5.55$ ,  $SE = .040$ ) students reported the highest expectations for their tenth-grader (see Appendix A-2 for 95% confidence intervals). Table 3c shows that, after combining categories 5 (graduate from college), 6 (obtain master's degree or equivalent), and 7 (obtain PhD, MD, or other advanced degree) into one category (bachelor's degree or higher), the highest percentage was also observed for Asian/Pacific Islander students (94%). The percentage for black students (89%) was not statistically different from White, American Indian/Alaska Native, Hispanic, or students of two or more races (see Appendix A-3 for 95% confidence intervals).

Table 3b

*Means and standard errors of parents' aspirations for their tenth grader's postsecondary education, by race/ethnicity and SES*

| Student Characteristic              | Parents' aspirations for their tenth grader's postsecondary education <sup>1</sup> |       |
|-------------------------------------|------------------------------------------------------------------------------------|-------|
|                                     | M                                                                                  | SE    |
| Race/ethnicity                      |                                                                                    |       |
| White                               | 5.23                                                                               | 0.021 |
| American Indian/Alaska Native       | 5.16                                                                               | 0.171 |
| Asian/Pacific Islander              | 5.76                                                                               | 0.036 |
| Black                               | 5.55                                                                               | 0.040 |
| Hispanic                            | 5.34                                                                               | 0.037 |
| Two or more races                   | 5.32                                                                               | 0.072 |
| Socioeconomic Status (SES) Quartile |                                                                                    |       |
| Lowest quartile                     | 5.03                                                                               | 0.034 |
| Second quartile                     | 5.18                                                                               | 0.029 |
| Third quartile                      | 5.39                                                                               | 0.023 |
| Highest quartile                    | 5.70                                                                               | 0.020 |

Note: Table values represent averaged estimates from five imputed datasets.

<sup>1</sup>Based on (BYPARASP) How far in school the parent wants their tenth grader to go, where

- 1 = Less than high school graduation
- 2 = High school graduation or GED only
- 3 = Attend or complete 2-year college/school
- 4 = Attend college, 4-year degree incomplete
- 5 = Graduate from college
- 6 = Obtain master's degree or equivalent
- 7 = Obtain PhD, MD, or other advanced degree

Table 3c

*Percentage of spring 2002 sophomores whose parents aspired for them to attain a bachelor's degree or higher, by race/ethnicity and SES*

| Student Characteristic              | Parents' aspirations for their tenth grader to attain a bachelor's degree or higher <sup>1</sup> |       |
|-------------------------------------|--------------------------------------------------------------------------------------------------|-------|
|                                     | Percentage                                                                                       | SE    |
| Total                               | 86.42                                                                                            | 0.451 |
| Race/ethnicity                      |                                                                                                  |       |
| White                               | 85.74                                                                                            | 0.601 |
| American Indian/Alaska Native       | 81.93                                                                                            | 4.597 |
| Asian/Pacific Islander              | 93.64                                                                                            | 0.910 |
| Black                               | 88.61                                                                                            | 0.953 |
| Hispanic                            | 85.93                                                                                            | 0.942 |
| Two or more races                   | 84.66                                                                                            | 2.025 |
| Socioeconomic Status (SES) Quartile |                                                                                                  |       |
| Lowest quartile                     | 77.77                                                                                            | 0.951 |
| Second quartile                     | 82.46                                                                                            | 0.863 |
| Third quartile                      | 89.94                                                                                            | 0.583 |
| Highest quartile                    | 96.04                                                                                            | 0.441 |

Note: Table values represent averaged estimates from five imputed datasets.

<sup>1</sup>Based on (BYPARASP) How far in school the parent wants their tenth grader to go.

Categories 5, 6, and 7 (see descriptions below) were combined to produce these estimates.

- 1 = Less than high school graduation
- 2 = High school graduation or GED only
- 3 = Attend or complete 2-year college/school
- 4 = Attend college, 4-year degree incomplete
- 5 = Graduate from college
- 6 = Obtain master's degree or equivalent
- 7 = Obtain PhD, MD, or other advanced degree

Regarding family rules, the majority of parents reported having rules for their child in terms of maintaining grades (82%), doing homework (93%), doing household chores (88%), and watching television (65%).

A quick comparison of the 95% confidence intervals (see table A-1) for each estimate in Table 3a yields a number of other findings, including that the parents of students who received a high school diploma by 2006 (compared to GED recipients and non-completers) reported (1) slightly higher levels of involvement in their children's extracurricular activities, (2) higher levels of involvement in school functions, (3) slightly higher educational expectations for their children, and (4) slightly fewer instances of parent-school communication concerning children's school problems.

### Intercorrelations among Study Variables

Table 4 presents estimates of the correlations between study variables. The two outcomes – high school completion and postsecondary attendance by 2006 – had a moderate positive correlation ( $r = .35, p < .01$ ). Among the parental involvement variables, parent-school communication concerning children's school problems was negatively correlated with both high school completion

( $r = -.19, p < .01$ ) and postsecondary attendance ( $r = -.24, p < .01$ ). Parental aspirations for their children's postsecondary education was positively correlated with both high school completion ( $r = .13, p < .01$ ) and postsecondary attendance ( $r = .27, p < .01$ ). The remaining parental involvement variables had weaker – although in some cases statistically significant – correlations with the two outcome variables. The student background variables (sex and SES) significantly correlated with a number of study variables. However, SES was more strongly correlated with postsecondary attendance ( $r = .34, p < .01$ ) than high school completion ( $r = .19, p < .01$ ). Regarding intercorrelations between the parental involvement variables, I found correlations similar to those reported in Fan and Williams (2010), and like their work, I observed these correlations to be no larger than .50, indicating minimal risk of multicollinearity.

Table 5 shows the weighted, non-imputed, percentage of spring 2002 tenth graders who ever attended a postsecondary institution (PSI), by high school completion status in 2006. Overall, 71% of sophomores in 2002 had attended a PSI by 2006. However, a higher percentage of high school graduates (77%) had attended a PSI, compared to GED recipients (37%) and non-completers (11%).

### **Multivariate Analysis: High School Completion**

The logistic regression models analyzing the effects of parental involvement, sex, race/ethnicity, and SES were significant in predicting high school completion by 2006 (via diploma or GED) both for the 2002 sophomore cohort overall ( $F(18, 243.1) = 32.58, p < .001$ ) and for the subpopulation of non-diploma recipients ( $F(18, 246.3) = 2.60, p < .001$ ). Specifically, table 6 shows that parent participation in extracurricular activities with children ( $\beta = .31, p = .02$ ), parent participation in school functions ( $\beta = .50, p = .03$ ), and parents' aspirations for their children's postsecondary education ( $\beta = .13, p < .001$ ) demonstrated positive influences on high school completion among 2002 sophomores overall. Additionally, parent-school communication concerning child's school problems ( $\beta = -.99, p < .001$ ) and family rules for doing household chores ( $\beta = -.40, p = .03$ ) both exhibited negative effects. However, in the second model, after controlling for sex, race/ethnicity, and SES, none of the parental involvement variables significantly predicted GED completion among non-diploma recipients.

Table 4

*Intercorrelations among study variables*

| Variable                                                             | 1       | 2       | 3       | 4      | 5       |
|----------------------------------------------------------------------|---------|---------|---------|--------|---------|
| 1. High school completion by 2006 <sup>1</sup>                       | -       |         |         |        |         |
| 2. Postsecondary attendance by 2006                                  | 0.35**  | -       |         |        |         |
| 3. Parent participation in extracurricular activities with children  | 0.11**  | 0.13**  | -       |        |         |
| 4. Parental advising                                                 | 0.06**  | 0.10**  | 0.44**  | -      |         |
| 5. Parent-school communication concerning children's school problems | -0.19** | -0.24** | -0.04** | 0.02*  | -       |
| 6. School-initiated contact with parents                             | 0.00    | 0.02    | 0.14**  | 0.16** | 0.15**  |
| 7. Parent-initiated contact with school                              | -0.01   | -0.01   | 0.19**  | 0.25** | 0.35**  |
| 8. Parent participation in school functions                          | 0.09**  | 0.18**  | 0.33**  | 0.24** | -0.03** |
| 9. Parental aspirations for children's postsecondary education       | 0.13**  | 0.27**  | 0.11**  | 0.19** | -0.16** |
| 10. Family rules for maintaining grade                               | 0.02    | 0.01    | 0.13**  | 0.13** | 0.04**  |
| 11. Family rules for doing homework                                  | 0.01    | 0.01    | 0.14**  | 0.14** | 0.02    |
| 12. Family rules for doing household chores                          | -0.02*  | -0.06** | 0.14**  | 0.11** | 0.04**  |
| 13. Family rules for watching television                             | -0.01   | -0.03** | 0.16**  | 0.16** | 0.05**  |
| 14. Sex                                                              | 0.03**  | 0.09**  | -0.01   | 0.01   | -0.13** |
| 15. SES                                                              | 0.19**  | 0.34**  | 0.23**  | 0.21** | -0.06** |

\*p &lt; .05; \*\* p &lt; .01

Note: Table values represent weighted, non-imputed data.

<sup>1</sup>Includes high school diploma recipients and GED recipients

Table 4 (Cont'd)

*Intercorrelations among study variables*

| Variable                                                             | 6       | 7       | 8      | 9      | 10     |
|----------------------------------------------------------------------|---------|---------|--------|--------|--------|
| 1. High school completion by 2006 <sup>1</sup>                       |         |         |        |        |        |
| 2. Postsecondary attendance by 2006                                  |         |         |        |        |        |
| 3. Parent participation in extracurricular activities with children  |         |         |        |        |        |
| 4. Parental advising                                                 |         |         |        |        |        |
| 5. Parent-school communication concerning children's school problems |         |         |        |        |        |
| 6. School-initiated contact with parents                             | -       |         |        |        |        |
| 7. Parent-initiated contact with school                              | 0.47*   | -       |        |        |        |
| 8. Parent participation in school functions                          | 0.24**  | 0.27**  | -      |        |        |
| 9. Parental aspirations for children's postsecondary education       | 0.03**  | 0.01    | 0.14** | -      |        |
| 10. Family rules for maintaining grade                               | 0.01    | 0.06**  | 0.05** | 0.06** | -      |
| 11. Family rules for doing homework                                  | 0.04**  | 0.06**  | 0.07** | 0.01   | 0.44** |
| 12. Family rules for doing household chores                          | 0.04**  | 0.06**  | 0.04** | -0.02  | 0.23** |
| 13. Family rules for watching television                             | 0.06**  | 0.10**  | 0.11** | 0.03** | 0.24** |
| 14. Sex                                                              | -0.04** | -0.04** | -0.01  | 0.06** | -0.02  |
| 15. SES                                                              | 0.14**  | 0.14**  | 0.31** | 0.25** | -0.03* |

\*p &lt; .05; \*\* p &lt; .01

Note: Table values represent weighted, non-imputed data.

<sup>1</sup>Includes high school diploma recipients and GED recipients



Table 4 (Cont'd)

*Intercorrelations among study variables*

| Variable                                                             | 11     | 12      | 13    | 14      | 15 |
|----------------------------------------------------------------------|--------|---------|-------|---------|----|
| 1. High school completion by 2006 <sup>1</sup>                       |        |         |       |         |    |
| 2. Postsecondary attendance by 2006                                  |        |         |       |         |    |
| 3. Parent participation in extracurricular activities with children  |        |         |       |         |    |
| 4. Parental advising                                                 |        |         |       |         |    |
| 5. Parent-school communication concerning children's school problems |        |         |       |         |    |
| 6. School-initiated contact with parents                             |        |         |       |         |    |
| 7. Parent-initiated contact with school                              |        |         |       |         |    |
| 8. Parent participation in school functions                          |        |         |       |         |    |
| 9. Parental aspirations for children's postsecondary education       |        |         |       |         |    |
| 10. Family rules for maintaining grade                               |        |         |       |         |    |
| 11. Family rules for doing homework                                  | -      |         |       |         |    |
| 12. Family rules for doing household chores                          | 0.29** | -       |       |         |    |
| 13. Family rules for watching television                             | 0.25** | 0.30**  | -     |         |    |
| 14. Sex                                                              | 0.01   | -0.01   | -0.02 | -       |    |
| 15. SES                                                              | 0.01   | -0.04** | 0.00  | -0.04** | -  |

\*p &lt; .05; \*\* p &lt; .01

Note: Table values represent weighted, non-imputed data.

<sup>1</sup>Includes high school diploma recipients and GED recipients

Table 5

*Percentage of spring 2002 sophomores who ever attended a postsecondary institution, by high school completion status in 2006*

| Total      |      | High school graduates |      | GED recipients |      | Non-completers <sup>1</sup> |      |
|------------|------|-----------------------|------|----------------|------|-----------------------------|------|
| Percentage | SE   | Percentage            | SE   | Percentage     | SE   | Percentage                  | SE   |
| 70.9       | 0.67 | 77.3                  | 0.58 | 37.3           | 2.71 | 10.7                        | 1.27 |

Note: Table values represent weighted, non-imputed data.

<sup>1</sup>Includes students receiving a certificate of attendance, and those still enrolled in high school in 2006. Students receiving certificates of attendance and those still enrolled in high school in 2006 represent approximately 1% of the unweighted study sample.

Table 6

*Summary of logistic regression analyses for parental involvement variables predicting high school completion (via diploma or GED) by 2006, overall and among non-diploma recipients*

| Variable                                                          | Overall <sup>1</sup> |     | Non-diploma recipients <sup>2</sup> |     |
|-------------------------------------------------------------------|----------------------|-----|-------------------------------------|-----|
| Parent participation in extracurricular activities with children  | 0.31                 | *   | 0.08                                |     |
| Parental advising                                                 | 0.10                 |     | 0.21                                |     |
| Parent-school communication concerning children's school problems | -0.99                | *** | -0.11                               |     |
| School-initiated contact with parents                             | -0.10                |     | -0.34                               |     |
| Parent-initiated contact with school                              | 0.17                 |     | 0.27                                |     |
| Parent participation in school functions                          | 0.50                 | *   | -0.12                               |     |
| Parental aspirations for children's postsecondary education       | 0.13                 | *** | 0.05                                |     |
| Family rules for maintaining grade                                | 0.22                 |     | 0.11                                |     |
| Family rules for doing homework                                   | -0.11                |     | -0.26                               |     |
| Family rules for doing household chores                           | -0.40                | *   | 0.20                                |     |
| Family rules for watching television                              | -0.14                |     | -0.26                               |     |
| Sex                                                               |                      |     |                                     |     |
| <i>Male</i>                                                       |                      |     |                                     |     |
| Female                                                            | 0.17                 |     | -0.81                               |     |
| Race/ethnicity                                                    |                      |     |                                     |     |
| <i>White</i>                                                      |                      |     |                                     |     |
| American Indian/Alaska Native                                     | -0.82                | *   | -0.13                               |     |
| Asian/Pacific Islander                                            | 0.19                 |     | -0.44                               |     |
| Black                                                             | -0.50                | **  | -0.50                               | *   |
| Hispanic                                                          | -0.48                | **  | -0.60                               | *   |
| Two or more races                                                 | -0.32                |     | -0.01                               |     |
| SES                                                               | 0.88                 | *** | 0.56                                | *** |

\*p < .05; \*\* p < .01; \*\*\*p < .001

Note: Table values (standardized regression coefficients) represent averaged estimates from five imputed datasets. Italics refer to reference categories.

<sup>1</sup>Among the entire cohort of tenth graders in 2002.

<sup>2</sup>Among students who did not earn a high school diploma by 2006 (includes GED recipients, students receiving certificates of attendance, and students still enrolled in high school in 2006). Students receiving certificates of attendance and those still enrolled in high school in 2006 represent approximately 1 % of the unweighted study sample.

Table 7

*Summary of logistic regression analyses for parental involvement variables predicting postsecondary attendance by 2006, overall and among non-diploma recipients*

| Variable                                                          | Overall <sup>1</sup> |     | Non-diploma recipients <sup>2</sup> |     |
|-------------------------------------------------------------------|----------------------|-----|-------------------------------------|-----|
| Parent participation in extracurricular activities with children  | 0.14                 |     | 0.00                                |     |
| Parental advising                                                 | 0.09                 |     | 0.15                                |     |
| Parent-school communication concerning children's school problems | -0.92                | *** | -0.37                               | *   |
| School-initiated contact with parents                             | -0.06                |     | -0.16                               |     |
| Parent-initiated contact with school                              | 0.03                 |     | 0.06                                |     |
| Parent participation in school functions                          | 0.79                 | *** | 0.95                                | *   |
| Parental aspirations for children's postsecondary education       | 0.28                 | *** | -0.01                               |     |
| Family rules for maintaining grade                                | 0.06                 |     | 0.18                                |     |
| Family rules for doing homework                                   | 0.14                 |     | 0.02                                |     |
| Family rules for doing household chores                           | -0.41                | **  | -0.44                               |     |
| Family rules for watching television                              | -0.23                | **  | -0.08                               |     |
| Sex                                                               |                      |     |                                     |     |
| <i>Male</i>                                                       |                      |     |                                     |     |
| Female                                                            | 0.36                 | *** | -0.06                               |     |
| Race/ethnicity                                                    |                      |     |                                     |     |
| <i>White</i>                                                      |                      |     |                                     |     |
| American Indian/Alaska Native                                     | -0.68                | *   | -0.51                               |     |
| Asian/Pacific Islander                                            | 0.62                 | *** | 0.16                                |     |
| Black                                                             | -0.18                | *   | 0.08                                |     |
| Hispanic                                                          | -0.10                |     | 0.10                                |     |
| Two or more races                                                 | -0.35                | *   | 0.16                                |     |
| SES                                                               | 1.01                 | *** | 0.77                                | *** |

\*p < .05; \*\* p < .01; \*\*\*p < .001

Note: Table values (standardized regression coefficients) represent averaged estimates from five imputed datasets. Italics refer to reference categories.

<sup>1</sup>Among the entire cohort of tenth graders in 2002.

<sup>2</sup>Among students who did not earn a high school diploma by 2006 (includes GED recipients, students receiving certificates of attendance, and students still enrolled in high school in 2006). Students receiving certificates of attendance and those still enrolled in high school in 2006 represent approximately 1% of the unweighted study sample.

### **Multivariate Analysis: Postsecondary Attendance**

The logistic regression models analyzing the effects of parental involvement, sex, race/ethnicity, and SES were also significant in predicting postsecondary attendance by 2006 both for the 2002 sophomore cohort overall ( $F(18, 306.0) = 66.14, p < .001$ ) and for the subpopulation of non-diploma recipients ( $F(18, 249.7) = 3.00, p < .001$ ). Similar to the high school completion model, parent participation in school functions ( $\beta = .79, p < .001$ ), and parents' aspirations for their children's postsecondary education ( $\beta = .28, p < .001$ ) positively influenced postsecondary attendance among 2002 sophomores overall (see table 7). However, parent participation in extracurricular activities with children ( $\beta = .14, p = .07$ ), was not a significant predictor. Also, among study variables, there were more statistically significant negative predictors of postsecondary attendance than for high school completion. Specifically, parent-school communication concerning children's school problems ( $\beta = -.92, p < .001$ ) and family rules for doing household chores ( $\beta = -.41, p < .01$ ) continued to show negative effects and another variable – family rules for watching television – also demonstrated a negative influence on postsecondary attendance for the cohort overall ( $\beta = -.23, p < .01$ ). Among non-diploma recipients, the only significant positive predictor of postsecondary attendance (other than SES) was parent participation in school functions ( $\beta = .95, p = .01$ ). The only significant negative predictor was parent-school communication concerning children's school problems ( $\beta = -.37, p = .01$ ).

### **Discussion**

In this study, I replicate the means and intercorrelations reported by Fan & Williams (2010) who also employed multiple imputation (mi) techniques to address missing data across the same ELS parental involvement, sex, and SES variables as used here. In their study, parental involvement was used to predict students' academic self-efficacy, engagement, and intrinsic motivation in English and mathematics. Although the Fan and Williams study used the MI Markov Chain Monte Carlo approach (available through the PROC MI command in the SAS 9.2 software package) and their analysis generated only three mi datasets (compared to the five mi datasets generated here), my results are similar to theirs for each of these variables (although Fan and Williams appear to have reported standard deviations, which differ from my weighted estimates of standard error).

The current study further extends the literature by examining how different aspects of parental involvement influence other educational outcomes, namely, high school completion and postsecondary attendance. The findings I report here suggest that explanations for student persistence through secondary school and on to college that depend solely on race, ethnicity, socioeconomic status, or other background characteristics are incomplete and miss other important factors (such as parental involvement) that also contribute to these outcomes. Similar to studies that examined the relationship between parental involvement dimensions and other outcomes – such as middle school dropout behavior (Rumberger, 1995) and students' self-efficacy and engagement in mathematics and English (Fan & Williams, 2010) – it appears that parents' educational expectations for their children also play a significant role in whether students from all backgrounds persist toward completion of high school and whether they attend a postsecondary institution. In terms of high school completion (by 2006) among the entire cohort of 2002 sophomores, in this study I also found parent participation in extracurricular activities and school functions to be significant positive predictors, while communication between parent and school about children's school problems and having family rules for doing household chores exhibited negative effects. With regards to

postsecondary attendance, parent participation in school functions was a positive predictor of overall cohort attendance at a PSI as well as separately among non-high school diploma recipients.

The only negative predictor shared between the overall cohort model and the non-diploma recipients model was parent-school communication about children's school problems. This finding is similar to the results reported by Fan (2001) when exploring a similar type of involvement among parents of high school-aged students. This specific parental involvement dimension, termed "Contact with School", was comprised of three survey items regarding parents' contact with their children's school about (1) academic performance, (2) academic programs, and (3) behavior. Fan observed that the students of parents who reported more frequent contact with the school also had lower initial academic performance, which may explain the negative relationship between parent-school contact and academic growth, as measured in Fan's study. Thus, it is not surprising that parent-school communication about children's school problems is significantly related to dropping out of high school and not enrolling in postsecondary education.

While I am not recommending that parents and schools avoid communicating about students' academic or behavior problems, consideration should be given to increasing the frequency of other kinds of parent-school communication and contact. Unfortunately, parents often face time pressures and competing demands for their attention, leading to families and schools only communicating when there is a problem. Over time, a pattern of negative interactions (and disagreements) between parents and schools develops (Epstein, 1996), which is counterproductive to the goal of increasing positive family-school engagement. For this, and possibly other reasons, teachers of adolescents should plan for earlier engagement with parents (i.e., before problems surface) using efficient and effective communication tools, such as email, Web sites, electronic discussion boards, and blogs, to reduce or eliminate this barrier (Mandara, 2009).

An explanation for the lack of significant associations in the non-diploma recipients model for high school completion (via GED) is not easily found. One consideration is that possibly other factors, not studied here, are influential in predicting GED completion among students who did not earn a high school diploma by 2006. For instance, in another analysis of GED recipients from this ELS cohort, Malkus and Sen (2012) found that when asked about their reasons for leaving high school, a higher percentage of GED recipients reported leaving for a school-related reason (91%) than either a work-related or family-related reason (29% and 26%, respectively). Among GED recipients, the highest reported school-related reasons for leaving high school were: leavers thought it would be easier to get a GED (48%), leavers did not like school (44%), leavers were getting poor grades or failing school (39%), or leavers had missed too many school days (39%). As to reasons for earning a GED, 66% of recipients cited a need to meet requirements for additional study (e.g., a two- or four-year degree or sub-baccalaureate credential).

These findings could inform future studies of influential predictors of high school dropout and GED completion. That is, students at risk of dropping out of school and not completing any secondary or postsecondary credential may benefit from parental involvement in their high school education and extracurricular activities but perhaps they would benefit even more from school interventions designed to address some of the most frequently reported reasons for dropping out. Take for example, research demonstrating the strong negative relationship between chronic absenteeism and students' academic achievement, high school graduation and post-secondary enrollment outcomes (Balfanz & Byrnes, 2012). To address this problem, state and local education agencies have begun to add measures of student attendance to "early warning" indicator systems used to identify students at risk of dropping out or falling behind in school. The extent to which these early warning systems and interventions could explicitly include ways to engage parents – and

then study the effects on high school completion – **is a promising area for future research and** policy development.

The finding that parental involvement in school functions positively predicts postsecondary attendance among GED recipients could be used to encourage continued parental engagement for high school dropouts who enroll in a GED program. Furthermore, although the percentage of GED recipients who attended a postsecondary institution by 2006 (37%) is lower than for high school graduates, the fact that more than a third went on to enroll in some type of postsecondary education should encourage policymakers and practitioners to target resources and support for more of these students to pursue higher education. In fact, evidence of successful programs that help students earn a GED credential and enroll in college are beginning to emerge. For example, a study of the Bridge to Health and Business program, which offers students a career-related GED curriculum, found that one year after enrolling in the program, Bridge students were much more likely than those pursuing traditional GED programs to have finished the course, passed the GED exam, and enrolled in college (Martin & Broadus, 2013). **Future research should also study the postsecondary experiences of GED recipients in the ELS cohort to describe the range of options high school dropouts take advantage of and to what extent parental involvement may play a role in their success (or lack thereof).**

### **Conclusion: Parental Involvement Matters in High School**

The results presented here underscore the continued need for parental involvement once children reach high school. How to encourage and sustain effective levels of parental engagement is hard to prescribe, but the literature offers recommendations for parents, the federal government, and state and local educational agencies. For parents, the strategies that worked with their children in elementary school may not be as effective once the children reach adolescence. Therefore, research suggests that parents engage in more developmentally appropriate ways, such as communicating high expectations for their children's future (Chao & Hill, 2009). While, the current study and previous research overwhelmingly support the idea that parental expectations play a major role in a whole host of educational outcomes for children, this study also shows where high expectations, alone, may not be enough to propel students to reach their potential. That is, although I show here that (with the exception of Asian/Pacific Islanders), the parents of black students reported having the highest educational aspirations for their children in tenth-grade, being black was also associated with lower likelihoods of high school completion and postsecondary attendance, even after controlling for SES (see tables 6 and 7). To improve students' chances of success, research suggests that parents supplement their high expectations with actively assisting their children in planning for college (Chao & Hill, 2009). To the extent that parents are not familiar with the college planning process, schools should be working to provide this information and other skills to enhance the "college knowledge" of both parents and students. Other recommendations include augmenting the instruction and extracurricular activities that youth receive at school by enrolling them in afterschool tutorials, study groups, community sports programs, etc. However, given that high SES parents will likely have better access to these kinds of services than low SES parents, federal and locally-funded programs may be needed to offset costs, as well as provide transportation and other resources for high-needs children. Finally, research suggests that parental involvement in such activities as managing the homework of high school-aged children should shift from a supervisory role to more of a supportive one, as these youth become increasingly more independent and able to make decisions for themselves (Chao & Hill, 2009). However, learning to do this effectively takes skill, specifically in terms of knowing how to provide opportunities for youth to link schoolwork with



current events, how to monitor (rather than check) homework, and how to provide the autonomy for high school students to make decisions, while still setting boundaries around time use. This is another area where schools have a duty to coach and train parents about effectively engaging in their children's education.

As mentioned earlier, NCLB (and now ESSA) provided funding (through Title I) for parent engagement activities and required that schools provide parents with a written parental involvement policy that is based on parent input and leadership. The law also required that these policies be accessible to parents with limited English proficiency and that other reasonable support be provided (for more information, see section 1118 of NCLB or section 1116 of ESSA). However, these requirements are of little use if they are not informed by the local context. That is, one-size-fits-all approaches to increasing parental involvement will not work in all communities. To be effective for black and Latino parents and students, for example, some research suggests that school leaders first cultivate a school climate that welcomes and includes cultural diversity so that trust is established between parents, students, teachers, principals, and community members (Epstein & Sanders, 2002; Henderson & Mapp, 2002). In other words, for schools to succeed in engaging families from diverse backgrounds, more consideration must be given to practices that recognize, respect, and address the needs of individual families (as well as class and cultural differences between families), and that embrace a philosophy of partnership with shared responsibility and power.

### Limitations

Most of the data used in this analysis were self-reported by students and their parents and, while typical of large-scale studies, this method of data collection can yield biased estimates due to participants providing socially-desirable or unreliable information. Furthermore, no causal conclusions can be made from the multivariate statistics presented here. Although I observed statistically significant associations between some aspects of parental involvement in 2002 and students' high school completion and postsecondary attendance by 2006, there are potentially other factors not studied which may have also influenced these outcomes. For instance, parents' aspirations for their children's educational attainment appears to have a strong influence on students' high school completion and postsecondary attendance (as well as on other educational outcomes, as shown in previous studies). However, this relationship is not in itself evidence that simply having high educational expectations for one's child, regardless of relevant student characteristics (e.g., prior achievement or behavior), will lead to favorable outcomes for him/her. It may be that student achievement or behavior in earlier grades may influence parents' educational expectations for their children in tenth grade. **Future research should study parental expectations for tenth grade students across various student characteristics prior to tenth grade** (e.g., ninth grade GPA, whether student had ever been held back a grade or suspended from school) and examine the possible mediating effects of these prior characteristics on the relationship between parents' educational aspirations for their children and students' high school completion and postsecondary enrollment. Finally, I found both positive and negative relationships between specific types of parental involvement and the educational outcomes studied here (high school completion and postsecondary attendance). The extent to which this narrow set of activities and behaviors accurately captures the most important aspects of parental involvement poses limitations for the study of this construct. Thus, the analysis presented here may underestimate the real contributions that parents make to their children's growth, development, and success during and after the high school years.

## References

- 107<sup>th</sup> Congress. (2002). Pub. L. No. 107-110, 114 Stat. 1425 No Child Left Behind Act of 2001. Retrieved from <https://www.gpo.gov/fdsys/pkg/PLAW-107publ110/html/PLAW-107publ110.htm>
- 114<sup>th</sup> Congress. (2015). Every Student Succeeds Act. Pub. L. No. 114-95. Retrieved from <https://www.gpo.gov/fdsys/pkg/BILLS-114s1177enr/pdf/BILLS-114s1177enr.pdf>
- Alexander, K. L., Entwisle, D. R., & Horsey, C. S. (1997). From first grade forward: Early foundations of high school dropout. *Sociology of Education*, (70)2, 87-107. <http://dx.doi.org/10.2307/2673158>
- American Council on Education. (2008). *2008 GED Testing Program Statistical Report*. Washington, DC: Author. Retrieved from <http://www.gedtestingservice.com/uploads/files/9d42c6660ec6184f73f466f2c53ef279.5MB>
- Aston, N. M., & McLanahan, S. S. (1991). Family structure, parental practices and high school completion. *American Sociological Review*, 56, 309-320. <http://dx.doi.org/10.2307/2096106>
- Balfanz, R. & Byrnes, V. (2012). *Chronic Absenteeism: Summarizing What We Know From Nationally Available Data*. Baltimore: Johns Hopkins University Center for Social Organization of Schools.
- Baraldi, A. N., & Enders, C. K. (2010). An introduction to modern missing data analyses. *Journal of School Psychology*, 48, 5-37. <http://dx.doi.org/10.1016/j.jsp.2009.10.001>
- Battin-Pearson, S., Newcomb, M. D., Abbott, R. D., Hill, K. G., Catalano, R. F., & Hawkins, J. D. (2000). Predictors of early high school dropout: A test of five theories. *Journal of Educational Psychology*, (92)3, 568-582. <http://dx.doi.org/10.1037/0022-0663.92.3.568>
- Baum, S., Ma, J., & Payea, K. (2013). *Education pays 2013: The benefits of higher education for individuals and society*. New York: The College Board.
- Brand, J. E., & Xie, Y. (2010). Who benefits most from college? Evidence for negative selection in heterogeneous economic returns to higher education. *American Sociological Review*, 75(2) 273-302. <http://dx.doi.org/10.1177/0003122410363567>
- Bureau of Labor Statistics (nd). Labor Force Statistics from the Current Population Survey. Retrieved from: <http://www.bls.gov/cps/earnings.htm#education>.
- Chao, R. K., & Hill, N. E. (2009). Recommendations for developmentally appropriate strategies for parental involvement during adolescence. In N. E. Hill & R. K. Chao, *Families, schools, and the adolescent: Connecting research, policy, and practice*. New York: Teachers College Press.
- deCastro, B. S., & Catsambis, S. (2009). Parents still matter: Parental links to the behaviors and future outlook of high school seniors. In N. E. Hill & R. K. Chao, *Families, schools, and the adolescent: Connecting research, policy, and practice*. New York: Teachers College Press.
- Desimone, L. (1999). Linking parent involvement with student achievement: Do race and income matter? *Journal of Educational Research*, 93(1), 11-30. <http://dx.doi.org/10.1080/00220679909597625>
- Domina, T. (2005). Leveling the home advantage: Assessing the effectiveness of parental involvement in elementary school. *Sociology of Education*, (78), 233-249. <http://dx.doi.org/10.1177/003804070507800303>
- Dynarski, M., & Gleason, P. (1999). [How can we help? Lessons from federal drop-out prevention programs](http://www.mathematica-mpr.com/publications/PDFs/howhelp.pdf). Policy brief. Princeton, NJ: Mathematica Policy Research, Inc. Retrieved from [www.mathematica-mpr.com/publications/PDFs/howhelp.pdf](http://www.mathematica-mpr.com/publications/PDFs/howhelp.pdf).
- Eccles, J. S., Midgley, C., Wigfield, A., Buchanan, C. M., Reuman, D., Flanagan, C., & MacIver, D. (1993). Development during adolescence: The impact of stage-environment fit on young

- adolescents' experiences in schools and families. *American Psychologist*, 48(2), 90-101.  
<http://dx.doi.org/10.1037/0003-066X.48.2.90>
- Epstein, J. L., & Dauber, S. L. (1991). School programs and teacher practices of parent involvement in inner-city elementary and middle schools. *Elementary School Journal*, 91:289-305.  
<http://dx.doi.org/10.1086/461656>
- Epstein, J. L. (1995). School/Family/Community partnerships: Caring for the children we share. *The Phi Delta Kappan*, (76)9, 701-712.
- Epstein, J. L., & Sanders, M. G. (2002). Family, school, and community partnerships. In M. H. Bornstein (Ed.), *Handbook of parenting: Vol. 5. Practical issues in parenting* (2<sup>nd</sup> ed., pp. 407-437). Mahwah, NJ: Erlbaum.
- Fan, X. (2001). Parental involvement and students' academic achievement: A Growth modeling analysis. *The Journal of Experimental Education*, (70)1, 27-61.  
<http://dx.doi.org/10.1080/00220970109599497>
- Fan, W., & Williams, C. M. (2010). The effects of parental involvement on students' academic self-efficacy, engagement and intrinsic motivation. *Educational Psychology*, (30)1, 53-74.  
<http://dx.doi.org/10.1080/01443410903353302>
- Fan, W., & Wolters, C. A. (2014). School motivation and high school dropout: The mediating role of educational expectation. *British Journal of Educational Psychology*, (84), 22-39.  
<http://dx.doi.org/10.1111/bjep.12002>
- Fichman, M., & Cummings, J. N. (2003). Multiple imputation for missing data: Making the most of what you know. *Organizational Research Methods*, (6)3, 282-308.  
<http://dx.doi.org/10.1177/1094428103255532>
- Fishel, M., & Ramirez, L. (2005). Evidence-based parent involvement interventions with school-aged children. *School Psychology Quarterly*, (20)4, 371-402.  
<http://dx.doi.org/10.1521/scpq.2005.20.4.371>
- Gonzalez-DeHass, A. R., Willems, P. P., & Doan Holbein, M. F. (2005). Examining the relationship between parental involvement and student motivation. *Educational Psychology Review*, (17)2, 99-123. <http://dx.doi.org/10.1007/s10648-005-3949-7>
- Graham, J.W., & Hofer, S.M. (2000). Multiple imputation in multivariate research. In T.D. Little, K.U. Schnable, & J. Baumert (Eds.), *Modeling longitudinal and multilevel data: Practical issues, applied approaches, and specific examples* (pp. 201-218). Mahwah, NJ:Erlbaum.
- Grolnick, W. S., & Slowiaczek, M. L. (1994). Parents' involvement in children's schooling: A Multidimensional conceptualization and motivational model. *Child Development*, (65), 237-252.  
<http://dx.doi.org/10.2307/1131378>
- Heckman, J. J., Humphries, J. E., & Mader, N. S. (2010). *The GED* (NBER Working Paper 16064). Cambridge, MA: National Bureau of Economic Research. Retrieved from:  
<http://www.nber.org/papers/w16064>.
- Henderson, A. T., & Mapp, K. L. (2002). *The Impact of School, Family, and Community Connections on Student Achievement*. Austin, TX: Southwest Educational Development Laboratory. Retrieved from: <https://www.sedl.org/connections/resources/evidence.pdf>.
- Henry, K. L., Knight, K. E., & Thornberry, T. P. (2012). School disengagement as a predictor of dropout, delinquency, and problem substance use during adolescence and early adulthood. *Journal of Youth and Adolescence*, (41), 156-166. <http://dx.doi.org/10.1007/s10964-011-9665-3>
- Hill, N. E., & Craft, S. A. (2003). Parent-school involvement and school performance: Mediated pathways among socioeconomically comparable African American and Euro-American families. *Journal of Educational Psychology*, (95)1, 74-83. <http://dx.doi.org/10.1037/0022-0663.95.1.74>

- Hill, N. E., Castellino, D. R., Lansford, J. E., Nowlin, P., Dodge, K. A., Bates, J., & Pettit, G. (2004). Parent-academic involvement as related to school behavior, achievement, and aspirations: Demographic variations across adolescence. *Child Development*, 75(4), 1491-1509. <http://dx.doi.org/10.1111/j.1467-8624.2004.00753.x>
- Hill, N. E., & Chao, R. K. (2009). *Families, schools, and the adolescent: Connecting research, policy, and practice*. New York: Teachers College Press.
- Hill, N. E., Tyson, D. F., & Bromell, L. (2009). Developmentally appropriate strategies across ethnicity and socioeconomic status: Parental involvement during middle school. In N. E. Hill & R. K. Chao, *Families, schools, and the adolescent: Connecting research, policy, and practice*. New York: Teachers College Press.
- Hoover-Dempsey, K. V., Ice, C. L., & Whitaker, M. C. (2009). "We're way past reading together" Why and how parental involvement in adolescence makes sense. In N. E. Hill & R. K. Chao, *Families, schools, and the adolescent: Connecting research, policy, and practice*. New York: Teachers College Press.
- Howell, D. C. (2007). The analysis of missing data. In Outhwaite, W. & Turner, S. *Handbook of Social Science Methodology*. London: Sage. <http://dx.doi.org/10.4135/9781848607958.n11>
- Ingels, S. J., Pratt, D. J., Rogers, J. E., Siegel, P. H., & Stutts, E. S. (2004). *Education Longitudinal Study of 2002: Base Year Data File User's Manual* (NCES 2004-405). U.S. Department of Education. Washington, DC: National Center for Education Statistics.
- Ingels, S.J., Burns, L.J., Chen, X., Cataldi, E.F., & Charleston, S. (2005). *A Profile of the American High School Sophomore in 2002: Initial Results from the Base Year of the Education Longitudinal Study of 2002* (NCES 2005-338). U.S. Department of Education, Washington, DC: National Center for Education Statistics.
- Ingels, S.J., Pratt, D.J., Alexander, C.P., Jewell, D.M., Lauff, E. Mattox, T.L., and Wilson, D. (2014). *Education Longitudinal Study of 2002 Third Follow-up Data File Documentation* (NCES 2014-364). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, DC. Retrieved [date] from <http://nces.ed.gov/pubsearch>.
- Izzo, C. V., Weissberg, R. P., Kasprow, W. J., & Fendrich, M. (1999). A Longitudinal assessment of teacher perceptions of parent involvement in children's education and school performance. *American Journal of Community Psychology*, (27)6, 817- 839. <http://dx.doi.org/10.1023/A:1022262625984>
- Jeynes, W. H. (2005). A meta-analysis of the relation of parental involvement to urban elementary school student academic achievement. *Urban Education*, 40, 237-269. <http://dx.doi.org/10.1177/0042085905274540>
- Kena, G., Musu-Gillette, L., Robinson, J., Wang, X., Rathbun, A., Zhang, J., Wilkinson-Flicker, S., Barmer, A., and Dunlop Velez, E. (2015). *The Condition of Education 2015* (NCES 2015-144). U.S. Department of Education, National Center for Education Statistics. Washington, DC. Retrieved [date] from <http://nces.ed.gov/pubsearch>.
- Kenkel, D. S. (1991). Health behavior, health knowledge, and schooling. *Journal of Political Economy*, (99)2, 287-305. <http://dx.doi.org/10.1086/261751>
- Lauff, E., & Ingels, S. J. (2013). *Education Longitudinal Study of 2002 (ELS: 2002): A First look at 2002 high school sophomores 10 years later* (NCES 2014-363). U.S. Department of Education. Washington, DC: National Center for Education Statistics.
- Little, R.J.A. & Rubin, D.B. (1987). *Statistical analysis with missing data*. New York, Wiley.
- Mandara, J. (2009). Reaching out to all families: Developing parental involvement workshops for African American parents of middle school students. In N. E. Hill & R. K. Chao, *Families,*



- schools, and the adolescent: Connecting research, policy, and practice*. New York: Teachers College Press.
- Malkus, N., & Sen, A. (2012). *Characteristics of GED recipients in high school: 2002-06*. (NCES 2012-025). U.S. Department of Education. Washington, DC: National Center for Education Statistics.
- Martin, V., & Broadus, J. (2013). Enhancing GED instruction to prepare students for college and careers: Early success in LaGuardia Community College's Bridge to Health and Business program. *Policy brief*. New York, NY: MDRC. <http://dx.doi.org/10.2139/ssrn.2265891>
- National Dropout Prevention Center/Network. (n.d.). Effective Strategies. Retrieved from <http://dropoutprevention.org/effective-strategies/>
- Neild, R. C., Stoner-Eby, S., & Furstenberg, F. (2008). Connecting entrance and departure: The transition to ninth grade and high school dropout. *Education and Urban Society*, (40)5, 543-569. <http://dx.doi.org/10.1177/0013124508316438>
- Nicolau, S., & Ramos, C. L. (1990). *Together is better: Building strong relationships between school and Hispanic parents*. Washington, D.C: Hispanic Policy Development Project.
- Olivos, E. M. (2006). *The power of parents: A critical perspective of bicultural parent involvement in public schools*. New York: Peter Lang.
- Ou, S. (2008). Do GED recipients differ from graduates and school dropouts? Findings from an inner-city cohort. *Urban Education*, 43(1), 83-117. <http://dx.doi.org/10.1177/0042085907305187>
- Patterson, M. B., Song, W., Zhang, J. (2009). *GED candidates and their postsecondary educational outcomes: A Pilot study*. Research Studies 2009-5, GED Testing Service, Washington, DC. Retrieved from: <http://www.gedtestingservice.com/uploads/files/e248d9c38a9dc05883770deccab2261a.pdf>
- Pew Research Center. (2014). *The rising cost of not going to college*. Retrieved from <http://www.pewsocialtrends.org/2014/02/11/the-rising-cost-of-not-going-to-college/>
- Powell-Smith, K. A., Stoner, G., Shinn, M. R., & Good III, R. H. (2000). Parent tutoring in reading using literature and curriculum materials: Impact on student reading achievement. *School Psychology Review*, (29)1, 5-27.
- Raghunathan, T.E., Lepkowski, J.M., Van Hoewyk, J., and Solenberger, P. (2001). A Multivariate technique for multiply imputing missing values using a sequence of regression models. *Survey Methodology*, 27 (1), 85-95.
- Ross, T., Kena, G., Rathbun, A., KewalRamani, A., Zhang, J., Kristapovich, P., and Manning, E. (2012). *Higher Education: Gaps in Access and Persistence Study* (NCES 2012-046). U.S. Department of Education, National Center for Education Statistics. Washington, DC: Government Printing Office.
- Rubin (1987). *Multiple imputation for nonresponse in surveys*. New York: Wiley. <http://dx.doi.org/10.1002/9780470316696>
- Rumberger, R. W. (1995). Dropping out of middle school: A Multilevel analysis of students and schools. *American Educational Research Journal*, (32), 583-625. <http://dx.doi.org/10.3102/00028312032003583>
- Rumberger, R. W., & Larson, K. A. (1998). Student mobility and the increased risk of high school dropout. *American Journal of Education*, (107), 1-35. <http://dx.doi.org/10.1086/444201>
- Sheldon, S. J., & Epstein, J. L. (2005). Involvement Counts: Family and community partnerships and mathematics achievement. *The Journal of Educational Research*, (98)4, 196-206. <http://dx.doi.org/10.3200/JOER.98.4.196-207>

- Simon, B. S. (2000). Predictors of high school and family partnerships and the influence of partnerships on student success. Unpublished doctoral dissertation. Johns Hopkins University. Baltimore MD. <http://dx.doi.org/10.1177/019263650108562702>
- Simon, B. S. (2001). Family involvement in high school: Predictors and effects. *NASSP Bulletin*, (85)627, 8-19.
- Singh, K., Bickley, P. G., Trivette, P., & Keith, T. Z. (1995). The Effects of four components of parental involvement on eighth-grade student achievement: Structural analysis of NELS-88 data. *School Psychology Review*, (24)2, 299-317.
- Sirvani, H. (2007). The effect of teacher communication with parents on students' mathematics achievement. *American Secondary Education*, (36)1, 31-46.
- Smith, S., Robbins, T., Stagman, S. & Mahur, D. (2013). *Parent engagement from preschool through grade 3: A guide for policymakers*. Report. New York: National Center for Children in Poverty.
- Spera, C. (2005). A review of the relationship among parenting practices, parenting styles, and adolescent school achievement. *Educational Psychology Review*, 17(2), 125-146. <http://dx.doi.org/10.1007/s10648-005-3950-1>
- StataCorp. (2013). *Stata Statistical Software: Release 13*. College Station, TX: Author.
- Sui-Chu, E. H., & Willms, J. D. (1996). Effects of parental involvement on eighth-grade achievement. *Sociology of Education*, (69) 126-141. <http://dx.doi.org/10.2307/2112802>
- U.S. Department of Education, National Center for Education Statistics (1998). *Factors associated with father's and mother's involvement in their children's schools*. Washington, D.C.: Author.
- Yan, W., & Lin, Q. (2005). Parent involvement and mathematics achievement: Contrast across racial and ethnic groups. *Journal of Educational Research*, (99)2, 116-127. <http://dx.doi.org/10.3200/JOER.99.2.116>
- Zellman, G., & Waterman, J. (1998). Understanding the impact of parent school involvement on children's educational outcomes. *Journal of Educational Research*, (91)6, 370-380. <http://dx.doi.org/10.1080/00220679809597566>



## Appendix A

Table A-1.

*95% confidence intervals for mean estimates of parental involvement variables, by high school completion status in 2006*

|                                                                   | Total        | High School<br>Diploma<br>Recipients | GED<br>recipients | Non-<br>completers <sup>1</sup> |
|-------------------------------------------------------------------|--------------|--------------------------------------|-------------------|---------------------------------|
| Parental Involvement Variable                                     | [95% CI]     | [95% CI]                             | [95% CI]          | [95% CI]                        |
| Parent participation in extracurricular activities with children  | [3.04, 3.07] | [3.07, 3.10]                         | [2.87, 3.01]      | [2.79, 2.90]                    |
| Parental advising                                                 | [2.26, 2.28] | [2.27, 2.30]                         | [2.18, 2.31]      | [2.10, 2.21]                    |
| Parent-school communication concerning children's school problems | [1.31, 1.34] | [1.25, 1.27]                         | [1.64, 1.88]      | [1.72, 1.88]                    |
| School-initiated contact with parents                             | [1.32, 1.34] | [1.31, 1.34]                         | [1.27, 1.40]      | [1.33, 1.43]                    |
| Parent-initiated contact with school                              | [1.36, 1.38] | [1.35, 1.37]                         | [1.43, 1.57]      | [1.37, 1.49]                    |
| Parent participation in school functions                          | [0.28, 0.30] | [0.29, 0.31]                         | [0.18, 0.24]      | [0.16, 0.21]                    |
| Parental aspirations for children's postsecondary education       | [5.29, 5.35] | [5.35, 5.41]                         | [4.82, 5.11]      | [4.71, 4.95]                    |
| Family rules for maintaining grade                                | [0.81, 0.83] | [0.81, 0.83]                         | [0.76, 0.87]      | [0.76, 0.86]                    |
| Family rules for doing homework                                   | [0.92, 0.93] | [0.92, 0.93]                         | [0.87, 0.95]      | [0.90, 0.95]                    |
| Family rules for doing household chores                           | [0.88, 0.89] | [0.87, 0.89]                         | [0.89, 0.96]      | [0.90, 0.95]                    |
| Family rules for watching television                              | [0.63, 0.66] | [0.63, 0.66]                         | [0.55, 0.72]      | [0.65, 0.74]                    |

Note: Table values represent averaged estimates from five imputed datasets.

<sup>1</sup>Includes students receiving a certificate of attendance, and those still enrolled in high school in 2006. Students receiving certificates of attendance and those still enrolled in high school in 2006 represent approximately one percent of the unweighted study sample.

Table A-2

*95% confidence intervals for mean estimates of parents' aspirations for their tenth grader's postsecondary education, by race/ethnicity and SES*

| Student Characteristic              | Parents' aspirations for their 10th grader's postsecondary education <sup>1</sup> |
|-------------------------------------|-----------------------------------------------------------------------------------|
|                                     | [95% CI]                                                                          |
| Race/ethnicity                      |                                                                                   |
| White                               | [5.19, 5.27]                                                                      |
| American Indian/Alaska Native       | [4.82, 5.49]                                                                      |
| Asian/Pacific Islander              | [5.69, 5.83]                                                                      |
| Black                               | [5.47, 5.63]                                                                      |
| Hispanic                            | [5.27, 5.42]                                                                      |
| Two or more races                   | [5.18, 5.46]                                                                      |
| Socioeconomic Status (SES) Quartile |                                                                                   |
| Lowest quartile                     | [4.96, 5.09]                                                                      |
| Second quartile                     | [5.12, 5.24]                                                                      |
| Third quartile                      | [5.35, 5.44]                                                                      |
| Highest quartile                    | [5.66, 5.74]                                                                      |

Note: Table values represent averaged estimates from five imputed datasets.

<sup>1</sup>Based on (BYPARASP) How far in school the parent wants their tenth grader to go, where

- 1 = Less than high school graduation
- 2 = High school graduation or GED only
- 3 = Attend or complete 2-year college/school
- 4 = Attend college, 4-year degree incomplete
- 5 = Graduate from college
- 6 = Obtain Master's degree or equivalent
- 7 = Obtain PhD, MD, or other advanced degree

Table A-3

*95% confidence intervals for percentage estimates of spring 2002 sophomores whose parents aspired for them to attain a bachelor's degree or higher, by race/ethnicity and SES*

| Student Characteristic              | Percentage of tenth graders whose parents aspired for them to attain a bachelor's degree or higher <sup>1</sup> |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------------|
|                                     | [95% CI]                                                                                                        |
| Total                               | [85.51, 87.29]                                                                                                  |
| Race/ethnicity                      |                                                                                                                 |
| White                               | [84.51, 86.88]                                                                                                  |
| American Indian/Alaska Native       | [71.12, 89.3]                                                                                                   |
| Asian/Pacific Islander              | [91.60, 95.21]                                                                                                  |
| Black                               | [86.60, 90.35]                                                                                                  |
| Hispanic                            | [83.97, 87.68]                                                                                                  |
| Two or more races                   | [80.25, 88.23]                                                                                                  |
| Socioeconomic Status (SES) Quartile |                                                                                                                 |
| Lowest quartile                     | [75.84, 79.58]                                                                                                  |
| Second quartile                     | [80.69, 84.09]                                                                                                  |
| Third quartile                      | [88.74, 91.03]                                                                                                  |
| Highest quartile                    | [95.07, 96.82]                                                                                                  |

Note: Table values represent averaged estimates from five imputed datasets.

<sup>1</sup>Based on (BYPARASP) How far in school the parent wants their tenth grader to go. Categories 5, 6, and 7 (see descriptions below) were combined to produce these estimates.

- 1 = Less than high school graduation
- 2 = High school graduation or GED only
- 3 = Attend or complete 2-year college/school
- 4 = Attend college, 4-year degree incomplete
- 5 = Graduate from college
- 6 = Obtain Master's degree or equivalent
- 7 = Obtain PhD, MD, or other advanced degree

## About the Author

Terris Ross, Ph.D.

Division Leader, P-12 Research & Evaluation, U.S. Department of Education

[terrisross@yahoo.com](mailto:terrisross@yahoo.com)

Terris Ross leads the elementary and secondary division of the Policy and Program Studies Service (PPSS) at the U.S. Department of Education. There, she provides technical guidance and direction for national educational research activities, primarily in the areas of school accountability and student assessment, data analysis and reporting, and the use of data for policy decisions. Prior to joining PPSS, Terris served as an education statistician on the Annual Reports team at the National Center for Education Statistics (NCES), where she was lead author and principal researcher on the congressionally-mandated *Higher Education: Gaps in Access and Persistence Study*, a report which examined the lack of access to and persistence in college of males from underrepresented racial/ethnic groups. Before joining the U.S. Department of Education, Terris led the Assessment, Evaluation, and Development office in Henry County Schools, GA, as well as serving the Georgia Department of Education as lead analyst for the School Improvement Division. Terris holds bachelor's and master's of science degrees in mathematics from Clark Atlanta University, a specialist degree in Educational Leadership from Florida Atlantic University, and a Ph.D. in educational policy studies with a concentration in research, measurement and statistics from Georgia State University.

---

education policy analysis archives

Volume 24 Number 30

March 7, 2016

ISSN 1068-2341

---



Readers are free to copy, display, and distribute this article, as long as the work is attributed to the author(s) and **Education Policy Analysis Archives**, it is distributed for non-commercial purposes only, and no alteration or transformation is made in the work. More details of this Creative Commons license are available at <http://creativecommons.org/licenses/by-nc-sa/3.0/>. All other uses must be approved by the author(s) or **EPAA**. **EPAA** is published by the Mary Lou Fulton Institute and Graduate School of Education at Arizona State University. Articles are indexed in CIRC (Clasificación Integrada de Revistas Científicas, Spain), DIALNET (Spain), [Directory of Open Access Journals](#), EBSCO Education Research Complete, ERIC, Education Full Text (H.W. Wilson), QUALIS A2 (Brazil), SCImago Journal Rank; SCOPUS, Socolar (China).

Please contribute commentaries at <http://epaa.info/wordpress/> and send errata notes to Gustavo E. Fischman [fischman@asu.edu](mailto:fischman@asu.edu)

Join EPAA's Facebook community at <https://www.facebook.com/EPAAAAPE> and Twitter feed @epaa\_aape.

---

education policy analysis archives  
editorial board

Lead Editor: **Audrey Amrein-Beardsley** (Arizona State University)

Executive Editor: **Gustavo E. Fischman** (Arizona State University)

Associate Editors: **Sherman Dorn, David R. Garcia, Oscar Jimenez-Castellanos,**

**Eugene Judson, Jeanne M. Powers** (Arizona State University)

|                                                                       |                                                                        |                                                                        |
|-----------------------------------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------------------------|
| <b>Cristina Alfaro</b> San Diego State University                     | <b>Ronald Glass</b> University of California, Santa Cruz               | <b>R. Anthony Rolle</b> University of Houston                          |
| <b>Gary Anderson</b> New York University                              | <b>Jacob P. K. Gross</b> University of Louisville                      | <b>A. G. Rud</b> Washington State University                           |
| <b>Michael W. Apple</b> University of Wisconsin, Madison              | <b>Eric M. Haas</b> WestEd                                             | <b>Patricia Sánchez</b> University of University of Texas, San Antonio |
| <b>Jeff Bale</b> OISE, University of Toronto, Canada                  | <b>Julian Vasquez Heilig</b> California State University, Sacramento   | <b>Janelle Scott</b> University of California, Berkeley                |
| <b>Aaron Bevanot</b> SUNY Albany                                      | <b>Kimberly Kappler Hewitt</b> University of North Carolina Greensboro | <b>Jack Schneider</b> College of the Holy Cross                        |
| <b>David C. Berliner</b> Arizona State University                     | <b>Aimee Howley</b> Ohio University                                    | <b>Noah Sobe</b> Loyola University                                     |
| <b>Henry Braun</b> Boston College                                     | <b>Steve Klees</b> University of Maryland                              | <b>Nelly P. Stromquist</b> University of Maryland                      |
| <b>Casey Cobb</b> University of Connecticut                           | <b>Jackyung Lee</b> SUNY Buffalo                                       | <b>Benjamin Superfine</b> University of Illinois, Chicago              |
| <b>Arnold Danzig</b> San Jose State University                        | <b>Jessica Nina Lester</b> Indiana University                          | <b>Maria Teresa Tatto</b> Michigan State University                    |
| <b>Linda Darling-Hammond</b> Stanford University                      | <b>Amanda E. Lewis</b> University of Illinois, Chicago                 | <b>Adai Tefera</b> Virginia Commonwealth University                    |
| <b>Elizabeth H. DeBray</b> University of Georgia                      | <b>Chad R. Lochmiller</b> Indiana University                           | <b>Tina Trujillo</b> University of California, Berkeley                |
| <b>Chad d'Entremont</b> Rennie Center for Education Research & Policy | <b>Christopher Lubienski</b> University of Illinois, Urbana-Champaign  | <b>Federico R. Waitoller</b> University of Illinois, Chicago           |
| <b>John Diamond</b> University of Wisconsin, Madison                  | <b>Sarah Lubienski</b> University of Illinois, Urbana-Champaign        | <b>Larisa Warhol</b> University of Connecticut                         |
| <b>Matthew Di Carlo</b> Albert Shanker Institute                      | <b>William J. Mathis</b> University of Colorado, Boulder               | <b>John Weathers</b> University of Colorado, Colorado Springs          |
| <b>Michael J. Dumas</b> University of California, Berkeley            | <b>Michele S. Moses</b> University of Colorado, Boulder                | <b>Kevin Welner</b> University of Colorado, Boulder                    |
| <b>Kathy Escamilla</b> University of Colorado, Boulder                | <b>Julianne Moss</b> Deakin University, Australia                      | <b>Terrence G. Wiley</b> Center for Applied Linguistics                |
| <b>Melissa Lynn Freeman</b> Adams State College                       | <b>Sharon Nichols</b> University of Texas, San Antonio                 | <b>John Willinsky</b> Stanford University                              |
| <b>Rachael Gabriel</b> University of Connecticut                      | <b>Eric Parsons</b> University of Missouri-Columbia                    | <b>Jennifer R. Wolgemuth</b> University of South Florida               |
| <b>Amy Garrett Dikkers</b> University of North Carolina, Wilmington   | <b>Susan L. Robertson</b> Bristol University, UK                       | <b>Kyo Yamashiro</b> Claremont Graduate University                     |
| <b>Gene V Glass</b> Arizona State University                          | <b>Gloria M. Rodriguez</b> University of California, Davis             |                                                                        |

archivos analíticos de políticas educativas  
consejo editorial

Editor Ejecutivo: **Gustavo E. Fischman** (Arizona State University)

Editores Asociados: **Armando Alcántara Santuario** (Universidad Nacional Autónoma de México), **Jason Beech**, (Universidad de San Andrés), **Antonio Luzon**, Universidad de Granada

**Claudio Almonacid**  
Universidad Metropolitana de  
Ciencias de la Educación, Chile

**Miguel Ángel Arias Ortega**  
Universidad Autónoma de la Ciudad  
de México

**Xavier Besalú Costa**  
Universitat de Girona, España

**Xavier Bonal Sarro** Universidad  
Autónoma de Barcelona, España

**Antonio Bolívar Boitia** Universidad  
de Granada, España

**José Joaquín Brunner** Universidad  
Diego Portales, Chile

**Damián Canales Sánchez** Instituto  
Nacional para la Evaluación de la  
Educación, México

**Gabriela de la Cruz Flores**  
Universidad Nacional Autónoma de  
México

**Marco Antonio Delgado Fuentes**  
Universidad Iberoamericana, México

**Inés Dussel**, DIE-CINVESTAV,  
México

**Pedro Flores Crespo** Universidad  
Iberoamericana, México

**Ana María García de Fanelli**  
Centro de Estudios de Estado y  
Sociedad (CEDES) CONICET,  
Argentina

**Juan Carlos González  
Faraco** Universidad de  
Huelva, España

**María Clemente Linuesa**  
Universidad de Salamanca,  
España

**Jaume Martínez Bonafé**  
Universitat de València,  
España

**Alejandro Márquez  
Jiménez** Instituto de  
Investigaciones sobre la  
Universidad y la Educación,  
UNAM, México

**María Guadalupe Olivier  
Tellez**, Universidad  
Pedagógica Nacional, México

**Miguel Pereyra** Universidad  
de Granada, España

**Mónica Pini** Universidad  
Nacional de San Martín,  
Argentina

**Omar Orlando Pulido  
Chaves** Instituto para la  
Investigación Educativa y el  
Desarrollo Pedagógico  
(IDEP)

**José Luis Ramírez Romero**  
Universidad Autónoma de  
Sonora, México

**Paula Razquin** Universidad  
de San Andrés, Argentina

**José Ignacio Rivas Flores**  
Universidad de Málaga,  
España

**Miriam Rodríguez Vargas**  
Universidad Autónoma de  
Tamaulipas, México

**José Gregorio Rodríguez**  
Universidad Nacional de Colombia,  
Colombia

**Mario Rueda Beltrán** Instituto de  
Investigaciones sobre la  
Universidad y la Educación,  
UNAM, México

**José Luis San Fabián Maroto**  
Universidad de Oviedo,  
España

**Jurjo Torres Santomé**,  
Universidad de la Coruña, España

**Yengny Marisol Silva Laya**  
Universidad Iberoamericana,  
México

**Juan Carlos Tedesco** Universidad  
Nacional de San Martín, Argentina

**Ernesto Treviño Ronzón**  
Universidad Veracruzana, México

**Ernesto Treviño Villarreal**  
Universidad Diego Portales  
Santiago, Chile

**Antoni Verger Planells**  
Universidad Autónoma de  
Barcelona, España

**Catalina Wainerman**  
Universidad de San Andrés,  
Argentina

**Juan Carlos Yáñez Velazco**  
Universidad de Colima, México



## conselho editorial

Editor Executivo: **Gustavo E. Fischman** (Arizona State University)Editoras Associadas: **Geovana Mendonça Lunardi Mendes** (Universidade do Estado de Santa Catarina),**Marcia Pletsch, Sandra Regina Sales** (Universidade Federal Rural do Rio de Janeiro)**Almerindo Afonso**Universidade do Minho  
Portugal**Alexandre Fernandez Vaz**Universidade Federal de Santa  
Catarina, Brasil**José Augusto Pacheco**

Universidade do Minho, Portugal

**Rosanna Maria Barros Sá**Universidade do Algarve  
Portugal**Regina Célia Linhares Hostins**Universidade do Vale do Itajaí,  
Brasil**Jane Paiva**Universidade do Estado do Rio de  
Janeiro, Brasil**Maria Helena Bonilla**Universidade Federal da Bahia  
Brasil**Alfredo Macedo Gomes**Universidade Federal de Pernambuco  
Brasil**Paulo Alberto Santos Vieira**Universidade do Estado de Mato  
Grosso, Brasil**Rosa Maria Bueno Fischer**Universidade Federal do Rio Grande  
do Sul, Brasil**Jefferson Mainardes**Universidade Estadual de Ponta  
Grossa, Brasil**Fabiany de Cássia Tavares Silva**Universidade Federal do Mato  
Grosso do Sul, Brasil**Alice Casimiro Lopes**Universidade do Estado do Rio de  
Janeiro, Brasil**Jader Janer Moreira Lopes**Universidade Federal Fluminense e  
Universidade Federal de Juiz de Fora,  
Brasil**António Teodoro**Universidade Lusófona  
Portugal**Suzana Feldens Schwertner**Centro Universitário Univates  
Brasil**Debora Nunes**Universidade Federal do Rio Grande  
do Norte, Brasil**Lílian do Valle**Universidade do Estado do Rio de  
Janeiro, Brasil**Flávia Miller Naethe Motta**Universidade Federal Rural do Rio de  
Janeiro, Brasil**Alda Junqueira Marin**Pontifícia Universidade Católica de  
São Paulo, Brasil**Alfredo Veiga-Neto**Universidade Federal do Rio  
Grande do Sul, Brasil**Dalila Andrade Oliveira**Universidade Federal de Minas  
Gerais, Brasil

Copyright of Education Policy Analysis Archives is the property of Educational Policy Analysis Archives & Education Review and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.

# Gender Differences in the Effects of a Utility-Value Intervention to Help Parents Motivate Adolescents in Mathematics and Science

Christopher S. Rozek, Janet S. Hyde,  
and Ryan C. Svoboda  
University of Wisconsin—Madison

Chris S. Hulleman  
University of Virginia

Judith M. Harackiewicz  
University of Wisconsin—Madison

A foundation in science, technology, engineering, and mathematics (STEM) education is critical for students' college and career advancement, but many U.S. students fail to take advanced mathematics and science classes in high school. Research has neglected the potential role of parents in enhancing students' motivation for pursuing STEM courses. Previous research has shown that parents' values and expectations may be associated with student motivation, but little research has assessed the influence of parents on adolescents through randomized experiments. Harackiewicz, Rozek, Hulleman, and Hyde (2012) documented an increase in adolescents' STEM course-taking for students whose parents were assigned to a utility-value intervention in comparison to a control group. In this study, we examined whether that intervention was equally effective for boys and girls and examined factors that moderate and mediate the effect of the intervention on adolescent outcomes. The intervention was most effective in increasing STEM course-taking for high-achieving daughters and low-achieving sons, whereas the intervention did not help low-achieving daughters (prior achievement measured in terms of grade point average in 9th-grade STEM courses). Mediation analyses showed that changes in STEM utility value for mothers and adolescents mediated the effect of the intervention on 12th-grade STEM course-taking. These results are consistent with a model in which parents' utility value plays a causal role in affecting adolescents' achievement behavior in the STEM domain. The findings also indicate that utility-value interventions with parents can be effective for low-achieving boys and for high-achieving girls but suggest modifications in their use with low-achieving girls.

**Keywords:** academic motivation, educational intervention, STEM motivation, gender differences

In the United States, national education policies have focused on improving the performance of U.S. students relative to their international peers, particularly in areas related to science, technology, engineering, and mathematics (STEM; National Science Foundation [NSF], 2012). Of particular concern are students' decisions not to take advanced science and mathematics courses in high school. For example, only 35% of high school graduates have taken precalculus and only 39% have taken physics (NSF, 2012). Moreover, although gender gaps have closed for course-taking in some STEM areas, they persist in others. For example, although

girls and boys take calculus at the same rate, boys are more likely to take physics than girls are (42% vs. 36%) and are more likely to take engineering in high school (6% vs. 1%; NSF, 2012). Recently, a number of interventions have been implemented to increase STEM motivation and to close gender gaps (e.g., Harackiewicz et al., 2014; Hulleman & Harackiewicz, 2009; Miyake et al., 2010; Walton & Cohen, 2011). Here, we report on the moderators and mediators of an intervention shown to help parents motivate their adolescents to take mathematics and science courses in high school (Harackiewicz, Rozek, Hulleman, & Hyde, 2012). We probed

This article was published Online First June 2, 2014.

Christopher S. Rozek, Janet S. Hyde, and Ryan C. Svoboda, Department of Psychology, University of Wisconsin—Madison; Chris S. Hulleman, Center for Advanced Study of Teaching and Learning, University of Virginia; Judith M. Harackiewicz, Department of Psychology, University of Wisconsin—Madison.

This research was supported by the National Science Foundation (Grant DRL 0814750) and by the Institute for Education Sciences, U.S. Department of Education, through Award No. R305B090009 and Grant 144-NL14 to the University of Wisconsin—Madison. The opinions expressed are those of the authors and do not represent views of the National Science Foundation or the U.S. Department of Education. We thank Carlie Allison,

Corinne Boldt, Andrew Carpenter, Claire Johnson, Kerstin Krautbauer, Dan Lamanna, Anita Lee, Maria Mens, Michael Noh, Jenni Petersen, Margaret Wolfram, and Justin Wu for their help conducting this research, and we thank the members of our advisory board (Jacque Eccles, Adam Gamoran, Jo Handelsman, Jenefer Husman, Dominic Johann-Berke, Ann Renninger, and Judith Smetana) for their guidance. We are most grateful to the families of the Wisconsin Study of Families and Work project for their participation over the years.

Correspondence concerning this article should be addressed to Janet S. Hyde, Department of Psychology, University of Wisconsin—Madison, 1202 West Johnson Street, Madison, WI 53706-1611. E-mail: [jshyde@wisc.edu](mailto:jshyde@wisc.edu)

whether the intervention was equally effective for boys and girls depending on their prior performance in mathematics and science courses and what factors mediated the effect of the intervention on students' STEM course-taking.

### Theoretical Framework

Numerous theoretical models have been proposed to help explain student motivation and persistence in academics. One comprehensive model is Eccles's expectancy-value theory (Eccles-Parsons et al., 1983), which frames the research reported here. The expectancy-value model holds that expectations for success (expectancy) and perceived task value are direct predictors of achievement and achievement choices (e.g., Eccles-Parsons et al., 1983; Simpkins, Davis-Kean, & Eccles, 2006; Updegraff, Eccles, Barber, & O'Brien, 1996). In Eccles's model, expectancy for success is defined as how well an individual thinks he or she will do on an ensuing task (Eccles-Parsons et al., 1983). Task value consists of attainment value (how a task is related to one's identity), intrinsic value (enjoyment of the task), utility value (perceived usefulness of a task), and cost (costs to the individual of task engagement, such as what one concedes by choosing one task over others).

The expectancy-value model proposes that adolescents' perceived task values and expectations for success are the most proximal predictors of STEM-related achievement choices. Previous research supports this hypothesis, with students being more likely to choose to take mathematics and science courses when they have either high expectations for success or value for those courses or both (e.g., Eccles, Barber, Updegraff, & O'Brien, 1998; Simpkins et al., 2006; Updegraff et al., 1996; Watt, 2005; Watt, Eccles, & Durik, 2006). In addition, both expectancies and values predict classroom performance (e.g., Hulleman, Durik, Schweigert, & Harackiewicz, 2008; Watt, 2005).

### Parents' Influence on Values and Expectancies

The expectancy-value model proposes that, more distally, key socializers, such as parents, play an important role in shaping adolescents' values. Previous research has found that parents' values and expectancies for success for their child are linked to adolescents' values in a variety of domains, including mathematics and science (Jodl, Michael, Malanchuk, Eccles, & Sameroff, 2001; Simpkins, Fredericks, & Eccles, 2012). Much of this research has concentrated on adolescents and their achievement motivation in STEM courses throughout middle school and high school (Riegle-Crumb & King, 2010; Watt et al., 2012). Parents' values for mathematics and science are associated with adolescents' values in mathematics and science, which, subsequently, are associated with adolescents' educational choices and outcomes (Jodl et al., 2001; Simpkins et al., 2012).

Parents' expectancies for their adolescents have also been associated with their adolescents' expectancies for success in mathematics and science and educational outcomes, and these associations are even stronger than the associations between parents' values and adolescents' outcomes (Bleeker & Jacobs, 2004; Frome & Eccles, 1998; Jacobs & Eccles, 1992; Yee & Eccles, 1988). For instance, if parents have high expectancies for their adolescents in STEM, they are more likely to have adolescents with high expectancies

and better educational outcomes in STEM courses. If parents have low expectancies, they are more likely to have adolescents with low expectancies and worse educational outcomes in STEM (Jacobs & Eccles, 1992). However, studies involving the associations between parents' and adolescents' expectations and values are typically correlational in nature and thus are unable to test for a causal effect of parents' values and expectations on adolescents' values and expectations.

Whereas multiple studies have focused on the role of parental support—such as involvement and support for autonomy—in relation to children's school outcomes (Grolnick & Ryan, 1989; Grolnick, Ryan, & Deci, 1991; Ratelle, Larose, Guay, & Senécal, 2005; Spera, 2005), here we focus on parents' values for their child's education. Such values may be a key resource that educators can leverage to enhance student outcomes, such as STEM course-taking (Harackiewicz et al., 2012). From a process perspective, it is important to understand how parents' values are transmitted to children. Some researchers have examined the specific parental behaviors that contribute to value transmission from parents to adolescents, such as encouragement, provision of educational and other materials, and coactivity (e.g., Simpkins et al., 2012). However, parental behaviors are not the only means of value transmission. Because students' perceptions are featured heavily in the expectancy-value model, it is important to examine whether adolescents are even aware of their parents' values. If adolescents are unaware of their parents' utility-value beliefs, parents' values may have smaller effects on their adolescents' attitudes and behaviors. Such perceptions could serve as an important indicator that parental values are being communicated (Paulson & Sputa, 1996; Spera, 2006; Wood, Kurtz-Costes, & Copping, 2011).

### Gender Differences in Expectancies and Values

Two aspects of Eccles's model have been hypothesized to show gender differences that, in turn, may explain differences in STEM achievement: gender differences in expectancies and gender differences in values (e.g., Eccles, Wigfield, Harold, & Blumenfeld, 1993; Updegraff et al., 1996). Compared with boys, girls have lower expectancies for success in STEM domains (Yee & Eccles, 1988). This difference predicts increased enrollment in these courses for boys (Watt et al., 2012). Gender differences in expectancies for success can be influenced by socializers, especially parents. Research indicates that parents can have exaggerated expectancies for success in mathematics and science for their sons and diminished expectancies for success for their daughters (Eccles et al., 1993; Yee & Eccles, 1988).

The amount of value that boys and girls place on mathematics and science as well as the number of valued domains may influence gender differences in STEM achievement choices as well. The results are mixed on whether boys and girls differ in how much they value STEM domains, with many studies showing no gender differences in levels of STEM value (Eccles, 2009). However, there are gender differences in the number of valued domains, suggesting that women place high value on more domains (including non-STEM domains) than men do, which can lead to even high levels of STEM value being relatively less important for women (Eccles, 2007; Eccles, Barber, & Jozefowicz, 1999; Thoman, Arizaga, Smith, Story, & Soncuya, 2013). Additionally,

women, compared with men, tend to believe it is more important to make occupational sacrifices for the family and to have a job that helps people, which is one of the strongest predictors for women not pursuing STEM careers (Eccles, 2007). Men, however, are more likely to value making money and having a successful career. This difference may be especially crucial for talented girls, because they are caught between their beliefs in gender stereotypes on the one hand and their accomplishments in mathematics and science courses on the other (Eccles, 2007). Thus, high-achieving girls may shy away from enrolling in challenging STEM courses because of their belief in cultural stereotypes. Parents and other socializers, whose values are influenced by cultural stereotypes, may transmit these stereotyped beliefs to their adolescents.

### Utility-Value Interventions

Recent studies have focused on understanding the particular role of utility value (UV) in achievement behaviors (Durik & Harackiewicz, 2007; Hulleman et al., 2008; Hulleman, Godes, Hendricks, & Harackiewicz, 2010; Hulleman & Harackiewicz, 2009; Kauffman & Husman, 2004; Shechter, Durik, Miyamoto, & Harackiewicz, 2011). For example, Hulleman et al. (2008) found that students' perceptions of utility value predicted achievement in both a college classroom and a high school sports camp. In another study, students who had higher utility value for their studies persisted longer and performed better than those who had lower levels (Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004).

On the basis of this correlational research, researchers have recently begun to manipulate utility value with interventions in the lab, classroom, and home (Acee & Weinstein, 2010; Durik & Harackiewicz, 2007; Harackiewicz et al., 2012; Hulleman et al., 2010; Hulleman & Harackiewicz, 2009). They have targeted utility value in particular because it is likely that perceptions of utility value can be changed with interventions. Attainment and intrinsic values are more intrinsic and therefore would be difficult for an outside entity to manipulate. Utility value, in contrast, should be amenable to change by an intervention. Studies have found that these utility value interventions cause an increase in interest and performance in the subject, including STEM topics (Durik & Harackiewicz, 2007; Hulleman et al., 2010; Hulleman & Harackiewicz, 2009; Shechter et al., 2011). Although these UV interventions have had positive effects on motivation, these effects have typically been moderated by past performance or expectations for success, which is consistent with expectancy-value theory (Nagengast et al., 2011; Trautwein et al., 2012). Individuals with high expectations for success responded most positively when told why a topic was relevant to their lives (e.g., Durik & Harackiewicz, 2007), whereas individuals with low expectations for success showed no positive response or responded negatively when given relevance (UV) information (for a review, see Durik, Hulleman, & Harackiewicz, 2013). These results suggest that it is critically important to consider the role of expectations and past performance in studies involving utility-value interventions.

### Indirect Utility-Value Interventions

Based on the documented potential of UV information to promote motivation for many individuals and the associations between parents' values and their adolescent's values in correlational

research, we implemented a utility-value intervention aimed at parents (Harackiewicz et al., 2012). The ultimate goal of this intervention was to increase adolescents' STEM UV and STEM course-taking in high school. Previous research had not used randomized experiments to test the influence of parents on adolescents' utility value and achievement choices, but this study was able to evaluate the role of parents by randomly assigning them to an experimental UV intervention versus control condition. In the experimental condition, parents in an ongoing longitudinal study were given information about the relevance or usefulness (utility value) of mathematics and science for their adolescent. Parents in the control group received no information.

The results indicated that adolescents whose parents were in the intervention group took almost a semester more of mathematics and science classes during the last 2 years of high school than those whose parents were in the control group. These results indicated that parents can play a crucial role in increasing important adolescent achievement choices, such as advanced STEM course-taking. Although this intervention was effective for adolescents on average, it is important to consider the possibility that this intervention effect may vary as a function of gender and past performance, as has been observed in previous studies. It is also important to examine how this intervention worked to influence adolescents' course-taking.

### The Current Study

This study goes beyond our previous evaluation of the utility-value intervention described above, to investigate for whom the intervention worked best and how it worked. The first research question asked whether gender and past performance (i.e., 9th-grade math and science grade point average) moderated the effects of the intervention. Previously, we found a main effect of the intervention on course-taking in the last 2 years of high school; later we coded past performance from high-school transcripts to use as a proxy for expectancies to test for an expectancy (prior performance) by value (intervention) interaction. Given the underrepresentation of women in many STEM fields (Halpern et al., 2007) and previously documented gender differences in expectancies and values in the STEM domain, we tested both gender and past performance as moderators of the intervention effect. Although in an earlier paper we reported that the intervention effect did not differ as a function of gender (Harackiewicz et al., 2012), we hypothesized that gender differences might emerge once we considered students' past performance. We therefore tested for an interaction among the intervention, gender, and past performance in STEM classes.

Using a mediation model, the second research question asked what mechanisms accounted for the effect of the intervention on students' course-taking (see Figure 1 for the theoretical model). We hypothesized that the intervention would lead to increased STEM UV for parents, which we assessed with questionnaires given to mothers of the adolescents. This increase in mothers' STEM UV was then predicted to be associated with an increase in adolescents' perceptions of parents' STEM values and adolescents' STEM UV. To provide the strongest test of mediation, we capitalized on the longitudinal design of the original study. The outcome variable was 12th-grade STEM course-taking. Mothers' perceived STEM UV, adolescents' perceptions of parents' STEM

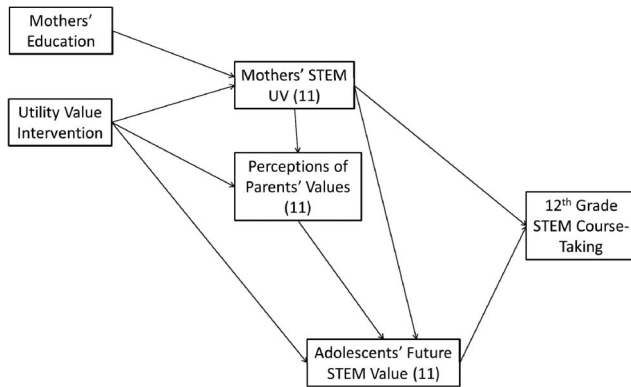


Figure 1. Theoretical model. STEM = science, technology, engineering, and mathematics; UV = utility value.

values, and adolescents' perceived STEM utility value were measured in the summer after 11th grade and therefore could be tested as mediators in the analyses of the effects of the intervention (which occurred during 10th and 11th grades) on 12th-grade STEM course-taking. These variables were predicted to mediate the effect of the intervention on 12th-grade STEM course-taking.

## Method

### Participants

The sample comprised families participating in the longitudinal Wisconsin Study of Families and Work (WSFW; for details on recruitment, see Hyde, Klein, Essex, & Clark, 1995). The current sample consisted of 188 adolescents (88 girls, 100 boys) and their parents who participated in a randomized experiment during high school (Harackiewicz et al., 2012). With regard to ethnicity, 90% of the adolescents were White (not of Hispanic origin), 2% were African American, 1% were Native American, and 7% were biracial or multiracial; this distribution is characteristic of the state of recruitment, in which 90% of the population is White (U.S. Census Bureau, 2006). At the time of data collection, participants attended 108 different high schools, increasing the generalizability of the findings. In 2010, the majority of adolescents (98%) had graduated from high school, and 94% reported plans to attend college or technical school. Average parents' years of education was 15.42 years ( $SD = 1.92$ ) on a scale where 12 years is equivalent to high school graduation or GED completion.

### Experimental Procedure

The intervention was implemented in October 2007 (10th grade) and again in January 2009 (11th grade). Families were followed through the teens' graduation from high school in June 2010. Families were randomly assigned to one of two experimental conditions and were blocked on gender of teen and mothers' educational level. Of these 188 families, 83 were in the experimental group and 105 were in the control group.

The intervention materials (two brochures and a website) were delivered exclusively to parents and focused on the usefulness of mathematics and science for adolescents. In particular, these ma-

terials explored potential connections between mathematics and science and current and future goals of adolescents (Harackiewicz et al., 2012). A first brochure, titled "Making Connections: Helping Your Teen Find Value in School," was sent to each household, addressed to the parents, in October of 10th grade. A second brochure, titled "Making Connections: Helping Your Teen with the Choices Ahead," was sent to each parent separately in January of 11th grade. This mailing included a letter giving them access to a dedicated, password-protected website called "Choices Ahead." Additionally, in the spring of 11th grade, parents in the experimental group were asked to complete an online questionnaire to evaluate the Choices Ahead website, which resulted in more parents visiting the website. A high percentage of parents (86%) reported using these resources, and a high percentage of adolescents (75%) reported exposure to this information. Parents in the control group did not receive any of these materials.

The 10th-grade brochure provided information about the importance or usefulness of mathematics and science in daily life and for various careers; it also provided parents with information about how to talk with adolescents about these issues. The 11th-grade brochure focused on these same themes but with different examples, and it gave greater emphasis to everyday activities (e.g., video games, cell phones) and preparation for college and careers. The 11th-grade brochure provided additional information for parents about communicating with their children about these issues and personalizing the relevance of mathematics and science for their 11th grader. The website featured clickable links to resources about STEM fields and careers. It also presented interviews with current college students who explained the usefulness of the mathematics and science courses that they had taken in high school. Parents were able to e-mail specific links from the site to their teens.

### Measures

#### STEM courses taken in 12th grade and prior performance.

Transcripts were obtained for 181 of the 188 students in the sample and came from 108 different high schools. Receipt of transcripts did not vary due to experimental condition or gender. The remaining sample of 181 families included 47 girls and 53 boys in the control group and 39 girls and 42 boys in the intervention group. For the outcome measure, we coded transcripts for the number of semesters of mathematics and science taken during 12th grade (12th-grade STEM course-taking). (Note that Harackiewicz et al. (2012) used number of mathematics and science courses taken in 11th and 12th grades as the outcome variable. Here we used just the number taken in 12th grade, so that a mediation model could be tested with mediators measured in 11th grade.)

For the measure of prior STEM performance, we created a standardized measure of ninth-grade STEM grade point average (GPA) by individually calculating each adolescent's GPA for mathematics and science courses taken in ninth grade on a GPA scale that ranged from 0 (F) to 4.0 (A/A+). The scale distinguished between grades by one third of a grade point (e.g., A = 4.0, A- = 3.67, B+ = 3.33). The final measure was a weighted, cumulative STEM GPA from ninth grade that took into account



the number of credits each course counted to weight the course grade.

**Mother's STEM utility value, adolescent's perceptions of parents' values, and adolescents' future STEM value.** Questionnaires given to mothers and adolescents in the summer after 11th grade included one measure from mothers (mothers' STEM UV for their adolescent) and two adolescent measures (perceptions of parents' STEM values and adolescents' STEM value). Response rates on the questionnaires were 83% for mothers and 77% for adolescents. All measures were based on items developed by Eccles and colleagues (e.g., Eccles & Wigfield, 2002; Eccles-Parsons et al., 1983). Mothers' STEM UV was measured with four items that asked about the mother's perceptions of the utility value of mathematics and science for her adolescent (e.g., *In general, how useful will [biology] be for your teen in the future?*  $\alpha = .79$ ). This question was asked about four STEM topics: biology, mathematics, chemistry, and physics. Responses were on a scale from 1 (*not at all useful*) to 5 (*very useful*). Fathers also reported on STEM UV for their adolescent. However, the response rate for fathers at 11th grade was only 62%, creating substantial missing data. Therefore, we used only the variable from mothers.

For adolescents' perceptions of parents' values, adolescents rated how important their parents thought mathematics and science would be in their lives with two items (e.g., *My parents think math and science are important for my life*;  $\alpha = .78$ ). Adolescents' perception of the value of mathematics and science for their future (future STEM value) was measured with four items that focused on the current and future value of mathematics and science for themselves (e.g., *Math and science are important for my future*;  $\alpha = .79$ ). Adolescent measures were rated on a scale from 1 (*strongly disagree*) to 7 scale (*strongly agree*).

**Parents' education.** In the current sample ( $N = 181$ ), mothers averaged 15.42 years of education ( $SD = 2.10$ ), and fathers also averaged 15.42 years of education ( $SD = 2.41$ ). A variable of parents' average years of education ( $M = 15.42$ ,  $SD = 1.92$ ) was created by averaging these two variables ( $r = .44$ ). In this paper, we use mothers' education for analyses involving mother variables and parents' education for analyses not involving mothers' reports.

## Overview of Analyses

We used multiple regression followed by structural equation modeling to analyze these data in two stages. First, multiple regression was used to investigate the direct effects of the predictors on 12th-grade STEM courses taken, which was the primary outcome variable. Second, a structural equation model was estimated based on the theoretical model (see Figure 1) to examine the relationships among the predictors, mediators (mothers' UV, perceptions of parents' values, and adolescents' future STEM value), and the outcome in a single model. In this model, we tested whether the total indirect effect of the predictors on the outcome through the mediators was significant (Preacher & Hayes, 2008). Cases with missing data were included by using full information maximum likelihood methods (Arbuckle, 1996).

There were seven predictors involving the intervention and the moderators of the intervention (*base predictors*): the intervention (coded as 1 for intervention group and  $-1$  for control group), adolescent's gender (coded 1 for boys and  $-1$  for girls), ninth-

grade STEM GPA (measured continuously and standardized), and two- and three-way interactions (the interaction of the intervention by adolescent's gender, the interaction between the intervention and ninth-grade STEM GPA, the interaction between adolescent's gender and ninth-grade STEM GPA, and the three-way interaction among the intervention, adolescent's gender, and ninth-grade STEM GPA). Finally, we included a term to test parental education.

## Results

Zero-order correlations and descriptive statistics for all variables are shown in Table 1, separately by adolescent's gender.

### Multiple Regression Model of Direct Effects on Course-Taking

To address the first research question, we regressed 12th-grade STEM courses taken on the base predictors and parents' education.<sup>1</sup> For 12th-grade STEM courses taken, there was one significant effect: the three-way interaction among the intervention, adolescent's gender, and ninth-grade STEM GPA ( $z = -2.44$ ,  $p < .05$ ,  $\beta = -.18$ ).<sup>2</sup> In contrast to the main effect of the intervention reported by Harackiewicz et al. (2012), the pattern of the three-way interaction (see Figure 2) suggests that, when prior performance and gender are taken into consideration, the intervention increased course-taking for low-GPA boys ( $\beta = .27$ ,  $p < .05$ ) and high-GPA girls ( $\beta = .22$ ,  $p < .10$ ), whereas the intervention did not help low-GPA girls ( $\beta = -.20$ , trend toward a negative effect of the intervention) and had no effect on high-GPA boys ( $\beta = -.04$ ). The graph of the three-way interaction in Figure 2, as for all interaction graphs in this paper, follows the convention of graphing high values at 1  $SD$  above the mean of GPA and low values at 1  $SD$  below the mean (Aiken & West, 1991).

### Structural Equation Model

To address the second research question, we used structural equation modeling in Mplus to test whether the direct effect of the intervention (as moderated by gender and prior STEM performance) on 12th-grade STEM course-taking was mediated by indirect effects through the mediators. In the model (see Figure 1), we estimated paths from the base predictors (the intervention, gender, prior STEM performance, and their interactions) to mothers' STEM UV, perceptions of parents' values, and adolescents' future STEM value. To be consistent with previous analyses (Harackiewicz et al., 2012), we also included mothers' years of education as a predictor of mothers' STEM UV and of STEM course-taking. In accordance with the theoretical model, mothers' STEM

<sup>1</sup> The results remain the same if mothers' education is substituted for parents' education here. The three-way interaction is still the only significant predictor ( $z = -2.39$ ,  $p < .05$ ,  $\beta = -.18$ ).

<sup>2</sup> These regression analyses were repeated with STEM course-taking in 11th and 12th grades as the outcome measure, the one used in the Harackiewicz et al. (2012) paper. The results were the same, that is the three-way interaction among intervention, gender, and prior performance significantly predicted 11th- plus 12th-grade STEM course-taking. We report results in detail here only for the 12th-grade course-taking outcome, to preserve the temporal sequence for mediation analyses.

Table 1

## Zero-Order Correlations and Descriptive Statistics for Major Variables by Gender

| Variable                          | 1           | 2           | 3           | 4           | 5           | 6            | 7            |
|-----------------------------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|
| 1. Ninth-grade STEM GPA           | —           | 0.34**      | 0.36**      | 0.26*       | 0.26*       | 0.24*        | 0.18         |
| 2. Mothers' STEM UV               | 0.21        | —           | 0.54**      | 0.39**      | 0.27*       | 0.30*        | 0.27*        |
| 3. Adolescents' future STEM UV    | 0.40**      | 0.52**      | —           | 0.55**      | 0.34**      | 0.28*        | 0.15         |
| 4. Perceptions of parents' values | 0.37**      | 0.39**      | 0.61**      | —           | 0.15        | 0.25*        | 0.16         |
| 5. STEM courses (12th grade)      | 0.16        | 0.34**      | 0.36**      | 0.18        | —           | 0.11         | 0.04         |
| 6. Parents' education             | 0.42**      | 0.15        | 0.10        | 0.17        | 0.26*       | —            | 0.79**       |
| 7. Mothers' education             | 0.42**      | 0.27*       | 0.26*       | 0.34*       | 0.21        | 0.86**       | —            |
| Girls, <i>M</i> ( <i>SD</i> )     | 3.15 (0.84) | 4.08 (0.79) | 5.23 (1.43) | 5.75 (1.06) | 3.77 (1.71) | 15.35 (2.09) | 15.41 (2.33) |
| Boys, <i>M</i> ( <i>SD</i> )      | 2.92 (0.88) | 4.11 (0.81) | 5.03 (1.63) | 5.62 (1.26) | 3.45 (1.85) | 15.48 (1.76) | 15.43 (1.88) |

Note. Correlations above the diagonal are for boys. Correlations below the diagonal are for girls. There were no mean differences due to gender. STEM = science, technology, engineering, and mathematics; GPA = grade point average; UV = utility value.

\*  $p < .05$ . \*\*  $p < .01$ .

UV was an additional predictor of perceptions of parents' values and adolescents' future STEM value. Furthermore, perception of parents' values was a predictor of adolescents' future STEM value. Additionally, paths were estimated from the base predictors, mothers' STEM UV, and adolescents' future STEM value to 12th-grade STEM courses taken. Thus, by examining the indirect effects of the base predictors through the mediators to STEM course-taking, this model tested whether the intervention, as moderated by GPA and adolescent's gender, influenced STEM course-taking through mothers' STEM UV, adolescents' perceptions of parents' values, and adolescents' future STEM value. Because this is a saturated model, it does not allow for a meaningful test of model fit.

Overall, the model accounted for 16.8% of the variance in 12th-grade STEM course-taking, 13.9% of the variance in mothers' STEM UV, 26.7% of the variance in perceptions of parents' values, and 50.8% of the variance in adolescents' future STEM value. See Figure 3 for the path models showing these results.

**Effects on mothers' STEM UV.** The base predictors and years of mothers' education were used to predict mothers' STEM

UV. There was a nearly significant effect of ninth-grade STEM GPA ( $z = 1.94$ ,  $p = .06$ ,  $\beta = .17$ ) showing a trend for mothers to perceive more STEM utility value when their adolescent had a higher ninth-grade STEM GPA. In addition, the predicted three-way interaction among the intervention, adolescent's gender, and ninth-grade STEM GPA was significant ( $z = -1.96$ ,  $p = .05$ ,  $\beta = -.16$ ); it is graphed in Panel A of Figure 4. The pattern of this interaction effect is similar to the one for the course-taking outcome in the multiple regression analysis (see Figure 2). Finally, mothers' education was a significant predictor of mothers' STEM UV ( $z = 2.32$ ,  $p < .05$ ,  $\beta = .20$ ), such that mothers with more years of education showed higher levels of STEM UV.<sup>3</sup>

**Effects on perceptions of parents' values.** The base predictors and mothers' STEM UV were used to predict adolescents' perceptions of parents' values. There were significant effects of ninth-grade STEM GPA ( $z = 2.64$ ,  $p < .05$ ,  $\beta = .23$ ), such that parents were perceived as seeing the value of STEM course-taking more when the adolescent had a higher STEM GPA. The two-way interaction between adolescent's gender and the intervention was significant ( $z = 2.41$ ,  $p < .05$ ,  $\beta = .19$ ), suggesting that the intervention increased boys' perceptions of parents' values and decreased girls' perceptions of parents' values; however, this two-way interaction was qualified by the three-way interaction among the intervention, adolescent's gender, and ninth-grade STEM GPA, which was nearly significant ( $z = -1.89$ ,  $p = .06$ ,  $\beta = -.17$ ). The pattern of the interaction is similar to the one for course-taking; in particular, the intervention appeared to decrease low-GPA girls' perceptions of their parents' values for them (see Figure 3, Panel A, and Figure 4, Panel B). That is, low-GPA girls in the intervention group perceived a lack of support for STEM from their parents. Finally, mothers' STEM UV was a significant predictor of adolescents' perceptions of parents' values ( $z = 3.70$ ,  $p < .01$ ,  $\beta = .29$ ), such that mothers with higher levels of STEM UV tended to have adolescents with higher levels of perceptions of parents' values.

**Effects on adolescents' future STEM value.** The base predictors, mothers' STEM UV, and perceptions of parents' values

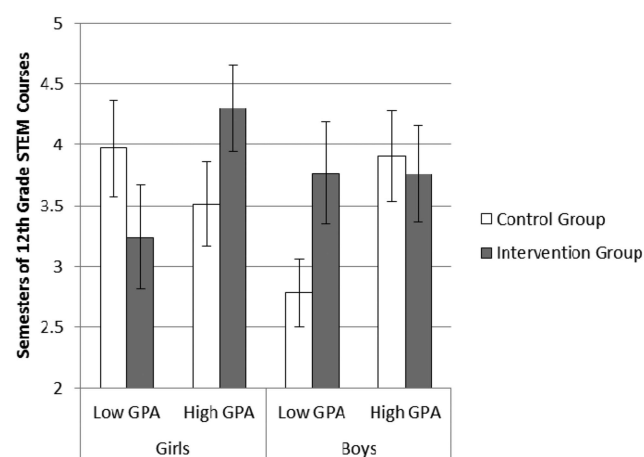
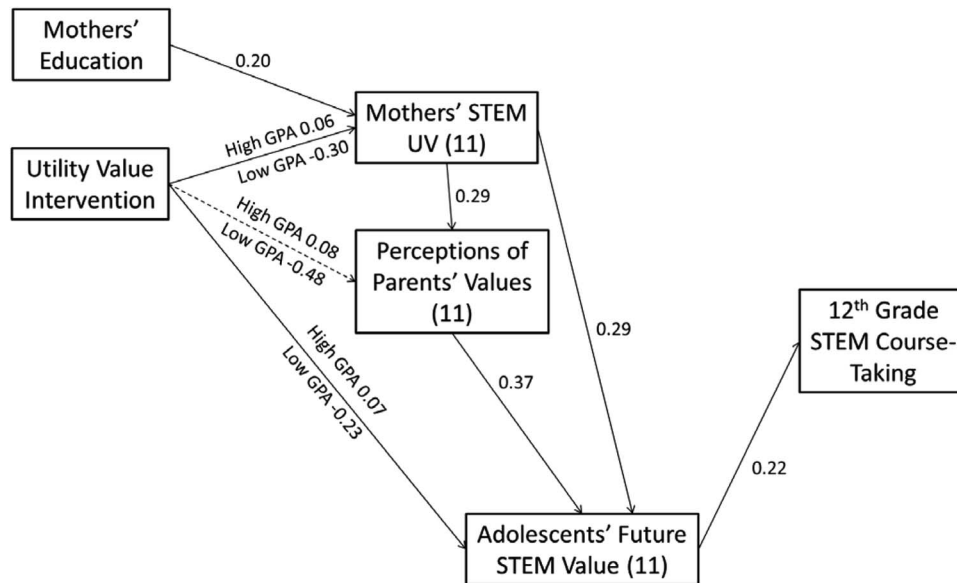


Figure 2. Direct effects of the intervention, adolescent's gender, and ninth-grade STEM GPA on STEM course-taking (12th grade). Predicted values were generated for high (1 *SD* above the mean) and low (−1 *SD*) ninth-grade STEM GPA from the multiple regression models. Error bars represent  $\pm 1$  *SEM*. STEM = science, technology, engineering, and mathematics; GPA = grade point average; *SEM* = standard error of the mean.

<sup>3</sup> The model was also tested using parents' education instead of mothers' education, and the results for the overall model did not change; however, parents' education was a nonsignificant predictor of mothers' STEM UV ( $z = 1.77$ ,  $p > .05$ ,  $\beta = .15$ ).

## A. Intervention Effects for Girls



## B. Intervention Effects for Boys

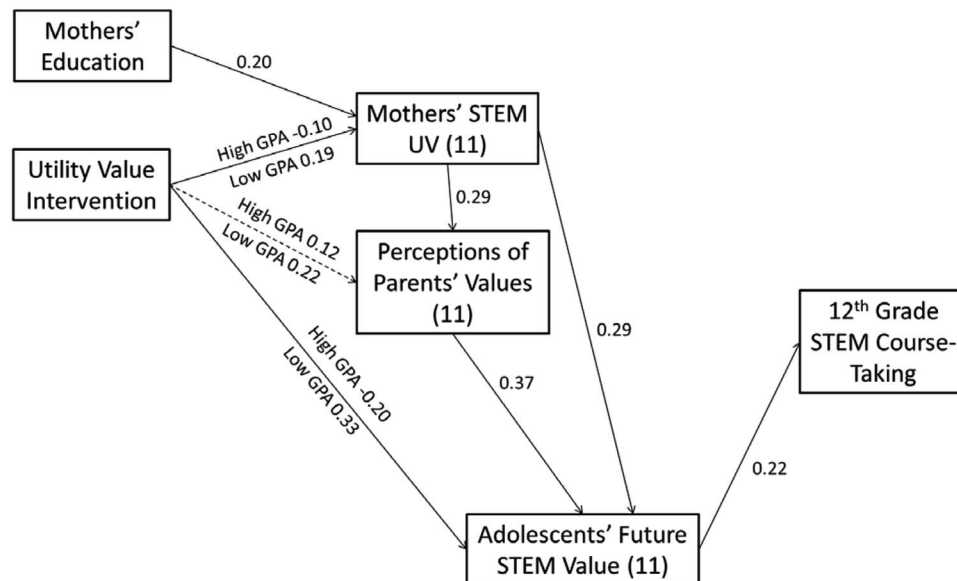


Figure 3. Empirical path model. Only significant paths are shown. The effect of the intervention on STEM course-taking in 12th grade differs by gender and ninth-grade STEM GPA and is mediated by mother's utility value (UV), perceptions of parents' values, and adolescents' future STEM value. The different intervention effects are shown (A) for girls and (B) for boys. Dashed line indicates  $p = .06$  (the three-way interaction involving the intervention to perceptions of parents' values). STEM = science, technology, engineering, and mathematics; GPA = grade point average.

were used to predict adolescents' future STEM value (see Figure 3). The three-way interaction among the intervention, adolescent's gender, and ninth-grade STEM GPA was significant, as predicted ( $z = -2.85$ ,  $p < .05$ ,  $\beta = -.21$ ). The three-way interaction is shown in Panel C of Figure 4; the pattern of the interaction is also

similar to the one for STEM course-taking and suggests that the intervention increased adolescents' future STEM value particularly for low-GPA boys. The effect of mothers' STEM UV was significant ( $z = 4.35$ ,  $p < .01$ ,  $\beta = .29$ ); higher levels of mothers' STEM UV predicted higher levels of adolescents' future STEM

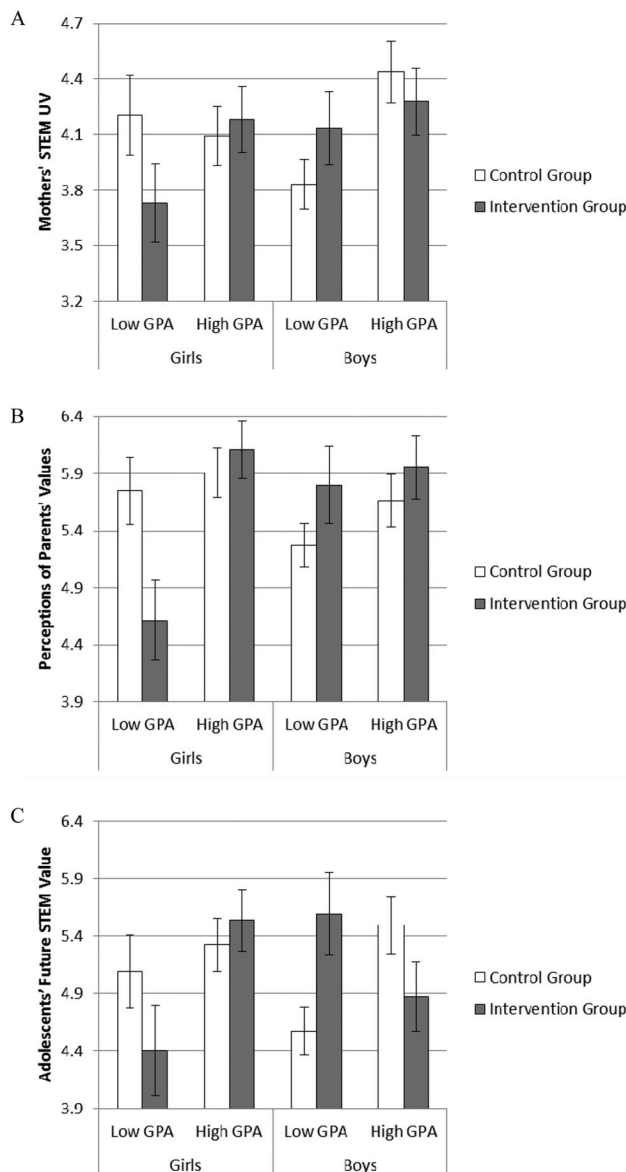


**Figure 4.** Direct effects of the intervention, child gender, and ninth-grade STEM GPA on the hypothesized mediators: (A) mothers' STEM UV, (B) perceptions of parents' values, and (C) adolescents' STEM utility value. Predicted values were generated for high (1 SD above the mean) and low (−1 SD) ninth-grade STEM GPA from the multiple regression models. For (A) the range of possible values is 1 to 5. For (B and C) the range of possible values is 1 to 7. Error bars represent  $\pm 1$  SEM. STEM = science, technology, engineering, and mathematics; GPA = grade point average; UV = utility value; SEM = standard error of the mean.

value. Perceptions of parents' values was a significant predictor as well ( $z = 5.36, p < .01, \beta = .37$ ); higher levels of perceptions of parents' values predicted higher levels of adolescents' future STEM value.

**Effects on 12th-grade STEM course-taking.** The base predictors, mothers' STEM UV, adolescents' future STEM value, and mothers' years of education were used to predict 12th-grade STEM course-taking.<sup>4</sup> There was a significant effect of adoles-

cents' future STEM UV ( $z = 2.18, p < .05, \beta = .22$ ). Higher levels of adolescents' future STEM value predicted more 12th-grade STEM courses taken, for both boys and girls.

**Indirect effects and mediation.** In the structural equation model, we hypothesized that the base predictors (specifically the three-way interaction) would influence 12th-grade STEM course-taking through the mediators, so the direct effects of the base predictors to 12th-grade STEM course-taking shown in the direct effects model should be reduced in a model containing the mediators; additionally, there should be significant indirect effects of the three-way interaction through the mediators to 12th-grade STEM course-taking. We hypothesized that the mediation would work in a specific way; that is, the three-way interaction should predict mothers' STEM UV, perceptions of parents' values, and adolescents' future STEM UV. Mothers' STEM UV should predict perceptions of parents' values and adolescents' future STEM UV, and perceptions of parents' values should predict adolescents' future STEM UV. Additionally, we specified that mothers' STEM UV and adolescents' future STEM value would predict STEM course-taking. Using procedures described by Preacher and Hayes (2008), we tested the total indirect effect of the intervention through the three mediators, as well as the specific indirect effect of mothers' STEM UV through adolescents' perceptions of parents' values and adolescents' future STEM UV.

Therefore, two indirect pathways were tested in order to test for the indirect effect of the three-way interaction on 12th-grade STEM course-taking as well as the indirect effect of mothers' STEM UV on 12th-grade STEM course-taking. For the first, we tested whether the three-way interaction had a significant total indirect effect on 12th-grade STEM course-taking through the three mediators and found support for this hypothesis ( $z = -2.40, p < .05$ ). Therefore, the intervention, as moderated by adolescent's gender and ninth-grade STEM GPA, had a significant total indirect effect on course-taking through the mediating variables: mothers' STEM UV, perceptions of parents' values, and adolescents' future STEM value. Additionally, the model with the mediators reduced the direct effects of the predicted three-way interaction on 12th-grade STEM course-taking (direct effect,  $\beta = -0.18, p < .05$ ; with mediators in the model,  $\beta = -0.09, ns$ ).

For the second, we tested for the specific indirect effect of mothers' STEM UV to 12th-grade STEM course-taking through perceptions of parents' values and adolescents' future STEM value. Results indicated a significant specific indirect effect ( $z = 2.06, p < .05$ ). This indicated that mothers' STEM UV had a significant specific indirect effect on 12th-grade STEM course-taking through perceptions of parents' values and adolescents' future STEM value.

## Discussion

To address concerns about low rates of adolescents taking advanced STEM courses in high school in the United States, we implemented an intervention, based in expectancy-value theory, with parents of adolescents (Harackiewicz et al., 2012). In the results reported here, we examined whether the intervention was differentially effective for girls compared with boys in the context

<sup>4</sup> The analyses were repeated using parents' education instead of mothers' education. Findings remained unchanged.



of past performance and what factors mediated the effects of the intervention on course-taking. In response to the first research question, the results from multiple regression analysis indicated that the intervention increased STEM course-taking in 12th grade for girls who had done well in ninth-grade STEM courses (high GPA) and for boys who had not done well (low GPA). However, the intervention did not increase course-taking for low-GPA girls (trending toward a negative effect), and it had no effect for high-GPA boys. The absence of an effect for high-GPA boys is most likely due to a ceiling effect on the measure of number of STEM courses taken in 12th grade.

In regard to the second research question, mediation analyses suggested that these intervention effects (specifically the three-way interaction among the intervention, gender, and prior STEM performance) occurred through changes in both mother and adolescent variables. The intervention was targeted exclusively at parents, so we predicted and found that the intervention increased mothers' STEM utility value for their adolescents. The intervention also led adolescents to perceive higher levels of parental STEM values and increased adolescents' future STEM value, and the changes in mothers' STEM utility value contributed to these changes in adolescent variables. Overall, the effect of the intervention on high-school STEM course-taking was mediated by the effects of the intervention on mothers' STEM utility value and adolescents' STEM utility value. This suggests that parents' utility value does indeed influence adolescents' utility value and achievement behavior.

Considerable support for Eccles's expectancy-value theory has been amassed through correlational and longitudinal research, but experimental support has been lacking. One strength of an experimental approach to this theory is that researchers can assess the causal effect of task values on achievement motivation and behavior. In particular, when studying families, an association has been shown between parents' beliefs and their children's beliefs and achievement-related behaviors (e.g., Chhin, Bleeker, & Jacobs, 2008), but the direction of the effect has been unclear. To explore whether parents' values could influence adolescents' values, we experimentally manipulated parents' utility value through a randomized intervention to assess the causal impact of parents' beliefs on their children's beliefs and behaviors (Harackiewicz et al., 2012). Although the original study showed that an increase in adolescents' STEM course-taking over the final 2 years of high school occurred as a result of this intervention, mediation analyses of this effect were not conducted.

### Processes Underlying Intervention Effects

In the current paper, we examined the hypothesis that the intervention worked by changing parents' and adolescents' STEM utility value. We found support for this hypothesis. In our previous paper (Harackiewicz et al., 2012), the results indicated that the intervention affected mothers' STEM utility value, which provides crucial support that this utility value intervention for parents had its intended effect. In the current analyses, this increase in mothers' STEM utility value was related to an increase in adolescents' perceptions of how much their parents valued STEM for them and also adolescents' future STEM value. Thus, both mothers and adolescents had increased perceptions of STEM value due to the intervention. Because the intervention was targeted exclusively at

parents, it is reasonable to conclude that adolescents were influenced by their parents.

Two paths in Figure 3 warrant additional discussion. First, the direct path (specifically the three-way interaction among the intervention, gender, and prior STEM performance) from the intervention to adolescents' perceptions of their parents' values was significant, above and beyond the indirect path through mothers' STEM utility value. That is, the intervention appeared to have some effect on adolescents' perceptions beyond the effect it had on mothers' STEM UV for them. This might involve a process such as a mother sharing the intervention website with her adolescent while not expressing her beliefs in the value of STEM. Second, the direct path from mothers' STEM UV to adolescents' future STEM value was significant, beyond the indirect effect through adolescents' perceptions of their parents' values. This effect might involve some changes in mothers' behavior that are not consciously perceived by the adolescent but that nonetheless have an effect.

### Moderation by Gender and Prior Performance

In this paper we also considered whether the intervention, which had an overall positive main effect on course-taking, might be differentially effective based on the adolescent's gender and prior STEM performance. The results indicated that, in fact, adolescents' prior STEM grades moderated the effect of the utility value intervention differently for girls and boys. The intervention had positive effects on STEM course-taking for low-GPA boys and high-GPA girls, but it had no effect (trending toward a negative effect) for low-GPA girls and had no effect for high-GPA boys.

Why were low-GPA girls not helped by the intervention when low-GPA boys were helped by it? The measure of prior performance, ninth-grade STEM GPA, should be linked tightly to both mothers' and adolescents' expectations for future success in STEM and has been used as a proxy for expectations in previous utility intervention research (Hulleman et al., 2010). Yet, research shows that parents are more likely to have inflated expectancies for success for boys in this domain in comparison to girls (Eccles, Jacobs, & Harold, 1990; Gunderson, Ramirez, Levine, & Beilock, 2012; Jacobs, Davis-Kean, Bleeker, Eccles, & Malanchuk, 2005; Yee & Eccles, 1988). Thus, parents may assess all boys as capable of success in STEM, even if they have had low grades in school. Therefore, even low-GPA boys may benefit from a utility-value intervention targeted at parents, because parents will still deem them capable of succeeding. Boys with higher prior STEM achievement did not benefit from the intervention, probably due to a ceiling effect in the number of semesters of mathematics and science taken during 12th grade. That is, their STEM course-taking was constrained by factors such as the number of class periods in the day and requirements that they take non-STEM courses. Positive effects of the intervention for high-GPA boys might be revealed in situations with fewer constraints (e.g., in college).

For girls, low STEM GPA may create low expectations for success—both for the girl and her mother—that negate the beneficial effects of the UV intervention; even if parents see the value of STEM, their low expectations for success for their low-GPA daughters mean that parents have low STEM aspirations for them, rendering the utility value of STEM irrelevant. These effects are consistent with the predicted effects in Eccles's expectancy-value theory. Moreover, they are consistent with past research showing

that UV interventions are less effective for those with low expectations for success (e.g., Durik & Harackiewicz, 2007).

In addition, girls and their mothers observe the unbalanced gender composition of many adult occupations (Ridgeway, 2011), which may contribute to the findings. Whereas girls with a high STEM GPA may aspire to traditionally masculine careers requiring substantial mathematics and science and be responsive to the intervention, girls with a low STEM GPA may see no reason to consider such aspirations and, simultaneously, may be drawn to traditionally feminine careers such as child-care worker (95% female, Bureau of Labor Statistics, 2011) or elementary- or middle-school teacher (82% female), which appear to require little mathematics and science (Beilock, Gunderson, Ramirez, & Levine, 2010). Moreover, if parents share these beliefs, they may not encourage their daughters to pursue STEM careers. This interpretation is supported by the relatively low level of parental valuing of STEM that low-GPA girls reported (see Figure 4, Panel B). On balance, then, girls with low prior STEM performance may have little interest in STEM courses and careers and receive little encouragement from parents, despite the intervention, while simultaneously experiencing a strong pull toward traditionally female careers that appear to require little mathematics and science and where they feel that they “belong” (Thoman et al., 2013).

It will be important for future interventions to take into account the role of expectancies in designing utility-value interventions that will be successful for all students. Recent research has shown that, although the interactive effects of expectancy and value are mixed, this interaction does occur in some studies (Nagengast et al., 2011; Trautwein et al., 2012). This intervention was in the STEM domain, so it is likely that both parents’ and adolescents’ expectancies would be affected not only by prior achievement but also by the adolescent’s gender. Future interventions may be strengthened by the inclusion of information that enhances not only perceptions of utility value but also expectations for success.

### Limitations and Directions for Future Research

Several limitations should be kept in mind when interpreting these results. First, the sample was representative of the state of Wisconsin but not racially diverse, so future research should extend these findings to more diverse groups. Previous studies have shown that the effects of utility-value interventions are consistent across racial groups (Hulleman & Harackiewicz, 2009), suggesting that our results would extend to more diverse contexts. Additionally, although the sample size was sufficiently large to have the power to detect the intervention effects, future studies would benefit from scaling up the intervention to larger samples.

Second, although the utility-value intervention affected mothers’ and adolescents’ perceptions of utility value and adolescents’ course-taking behavior, we do not have measures of the precise interpersonal processes by which these increases in mothers’ utility value changed adolescents’ attitudes. Correlational research has shown that these effects may be explained through a variety of parental behaviors, such as modeling, encouragement, and coactivity (e.g., Simpkins et al., 2012). Future studies could also assess these behaviors to understand how parents’ perceptions of utility value result in behavioral change that affects their children. It is likely that parents use a variety of methods and behaviors to influence their children, so understanding which behaviors are

most effective will make an important contribution to future research. We believe that future studies may also benefit from using measures of adolescents’ perceptions of their parents’ values as we did here, because that measure can capture the effect of a variety of parental behaviors.

Third, this utility-value intervention (and much of the correlational research based on expectancy-value theory) was conducted within a specific domain, STEM. Therefore, we cannot assume that these intervention results would generalize to non-STEM domains, and future research should extend these findings to other domains. Previous research has shown that the relationships between utility value and achievement behavior do extend to non-STEM domains (e.g., Jodl et al., 2001), so the intervention effects should also generalize, but this will need to be tested in future studies.

Finally, although the utility-value intervention had effects that differed due to gender and prior achievement, it is important to recognize that, on average, this intervention had substantial positive effects on STEM course-taking (Harackiewicz et al., 2012). Future studies may modify this intervention to make it more effective, but it had generally positive effects on a key educational outcome needed to enhance STEM preparation. Therefore, we can recommend this intervention as having positive effects and also recommend taking into account expectancies for success to make it more effective in future research.

### Implications

Several implications flow from these results. The findings indicate that parents are a resource—a largely untapped one—that may be used to enhance STEM motivation of adolescents. There is room to increase how much parents value STEM for their adolescents, and changes in parents’ utility value can affect adolescents’ beliefs and behavior. Therefore, parents—in addition to teachers and curriculum—may be used to increase students’ STEM preparation and motivation. Future utility-value interventions should also attend to issues of expectations for success, particularly in regard to gender gaps in STEM.

### References

- Acee, T. W., & Weinstein, C. (2010). Effects of a value-reappraisal intervention on statistics students’ motivation and performance. *Journal of Experimental Education*, 78, 487–512. doi:10.1080/00220970903352753
- Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Thousand Oaks, CA: Sage.
- Arbuckle, J. L. (1996). Full information estimation in the presence of incomplete data. In G. A. Marcoulides & R. E. Schumaker (Eds.), *Advanced structural equation modeling: Issues and techniques* (pp. 243–277). Mahwah, NJ: Erlbaum.
- Beilock, S. L., Gunderson, E. A., Ramirez, G., & Levine, S. C. (2010). Female teachers’ math anxiety affects girls’ math achievement. *Proceedings of the National Academy of Sciences, USA*, 107, 1860–1863. doi:10.1073/pnas.0910967107
- Bleeker, M. M., & Jacobs, J. E. (2004). Achievement in math and science: Do mothers’ beliefs matter 12 years later? *Journal of Educational Psychology*, 96, 97–109. doi:10.1037/0022-0663.96.1.97
- Bureau of Labor Statistics. (2011). *Women at work*. Retrieved from <http://www.bls.gov/spotlight/2011/women/>
- Chhin, C. S., Bleeker, M. M., & Jacobs, J. E. (2008). Gender-typed occupational choices: The long-term impact of parents’ beliefs and



- expectations. In H. M. G. Watt & J. S. Eccles (Eds.), *Gender and occupational outcomes: Longitudinal assessments of individual, social, and cultural influences* (pp. 215–234). doi:10.1037/11706-008
- Durik, A. M., & Harackiewicz, J. M. (2007). Different strokes for different folks: How individual interest moderates the effects of situational factors on task interest. *Journal of Educational Psychology*, 99, 597–610. doi:10.1037/0022-0663.99.3.597
- Durik, A. M., Hulleman, C. S., & Harackiewicz, J. M. (2013). One size fits some: Instructional enhancements to promote interest don't work the same for everyone. In K. A. Renninger & M. Nieswandt (Eds.), *Interest, the self, and K-16 mathematics and science learning*. Washington, DC: American Educational Research Association.
- Eccles, J. S. (2007). Where are all the women? Gender differences in participation in physical science and engineering. In S. J. Ceci & W. M. Williams (Eds.), *Why aren't more women in science: Top researchers debate the evidence* (pp. 199–210). doi:10.1037/11546-016
- Eccles, J. (2009). Who am I and what am I going to do with my life? Personal and collective identities as motivators of action. *Educational Psychologist*, 44, 78–89. doi:10.1080/00461520902832368
- Eccles, J. S., Barber, B., & Jozefowicz, D. (1999). Linking gender to educational, occupational, and recreational choices: Applying the Eccles et al. model of achievement-related choices. In W. B. Swann, J. H. Langlois, & L. A. Gilbert (Eds.), *Sexism and stereotypes in modern society: The gender science of Janet Taylor Spence* (pp. 153–192). doi:10.1037/10277-007
- Eccles, J. S., Barber, B. L., Updegraff, K., & O'Brien, K. M. (1998). An expectancy-value model of achievement choices: The role of ability self-concepts, perceived task utility and interest in predicting activity choice and course enrollment. In L. Hoffman, A. Krapp, K. A. Renninger, & J. Baumert (Eds.), *Interest and learning: Proceedings of the Second Conference on Interest and Gender* (pp. 267–280). Kiel, Germany: IPN.
- Eccles, J. S., Jacobs, J. E., & Harold, R. D. (1990). Gender role stereotypes, expectancy effects, and parents' socialization of gender differences. *Journal of Social Issues*, 46, 183–201. doi:10.1111/j.1540-4560.1990.tb01929.x
- Eccles, J. S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual Review of Psychology*, 53, 109–132. doi:10.1146/annurev.psych.53.100901.135153
- Eccles, J., Wigfield, A., Harold, R. D., & Blumenfeld, P. (1993). Age and gender differences in children's self- and task perceptions during elementary school. *Child Development*, 64, 830–847. doi:10.2307/1131221
- Eccles-Parsons, J., Adler, T. F., Futterman, R., Goff, S. B., Kaczala, C. M., Meece, J. L., & Midgley, C. (1983). Expectancies, values, and academic behaviors. In J. T. Spence (Ed.), *Achievement and achievement motivation* (pp. 75–146). San Francisco, CA: Freeman.
- Frome, P. M., & Eccles, J. S. (1998). Parents' influence on children's achievement-related perceptions. *Journal of Personality and Social Psychology*, 74, 435–452. doi:10.1037/0022-3514.74.2.435
- Grolnick, W. S., & Ryan, R. M. (1989). Parent styles associated with children's self-regulation and competence in school. *Journal of Educational Psychology*, 81, 143–154. doi:10.1037/0022-0663.81.2.143
- Grolnick, W. S., Ryan, R. M., & Deci, E. L. (1991). Inner resources for school achievement: Motivational mediators of children's perceptions of their parents. *Journal of Educational Psychology*, 83, 508–517. doi:10.1037/0022-0663.83.4.508
- Gunderson, E. A., Ramirez, G., Levine, S. C., & Beilock, S. L. (2012). The role of parents and teachers in the development of gender-related math attitudes. *Sex Roles*, 66, 153–166. doi:10.1007/s11199-011-9996-2
- Halpern, D. F., Benbow, C. P., Geary, D. C., Gur, R., Hyde, J. S., & Gernsbacher, M. A. (2007). The science of sex differences in science and mathematics. *Psychological Science in the Public Interest*, 8, 1–51. doi:10.1111/j.1529-1006.2007.00032.x
- Harackiewicz, J. M., Canning, E. A., Tibbetts, Y., Giffen, C. J., Blair, S. S., Rouse, D. I., & Hyde, J. S. (2014). Closing the social class achievement gap for first-generation students in undergraduate biology. *Journal of Educational Psychology*, 106, 375–389.
- Harackiewicz, J. M., Rozek, C. S., Hulleman, C. S., & Hyde, J. S. (2012). Helping parents to motivate adolescents in mathematics and science: An experimental test of a utility-value intervention. *Psychological Science*, 23, 899–906. doi:10.1177/0956797611435530
- Hulleman, C. S., Durik, A. M., Schweigert, S. B., & Harackiewicz, J. M. (2008). Task values, achievement goals, and interest: An integrative analysis. *Journal of Educational Psychology*, 100, 398–416. doi:10.1037/0022-0663.100.2.398
- Hulleman, C. S., Godes, O., Hendricks, B. L., & Harackiewicz, J. M. (2010). Enhancing interest and performance with a utility value intervention. *Journal of Educational Psychology*, 102, 880–895. doi:10.1037/a0019506
- Hulleman, C. S., & Harackiewicz, J. M. (2009, December 4). Promoting interest and performance in high school science classes. *Science*, 326, 1410–1412. doi:10.1126/science.1177067
- Hyde, J. S., Klein, M. H., Essex, M. J., & Clark, R. (1995). Maternity leave and women's mental health. *Psychology of Women Quarterly*, 19, 257–285. doi:10.1111/j.1471-6402.1995.tb00291.x
- Jacobs, J. E., Davis-Kean, P., Bleeker, M., Eccles, J. S., & Malanchuk, O. (2005). "I can, but I don't want to": The impact of parents, interests, and activities on gender differences in math. In A. M. Gallagher & J. C. Kaufman (Eds.), *Gender differences in mathematics: An integrative psychological approach* (pp. 246–263). New York, NY: Cambridge University Press.
- Jacobs, J. E., & Eccles, J. S. (1992). The impact of mothers' gender-role stereotypic beliefs on mothers' and children's ability perceptions. *Journal of Personality and Social Psychology*, 63, 932–944. doi:10.1037/0022-3514.63.6.932
- Jodl, K. M., Michael, A., Malanchuk, O., Eccles, J. S., & Sameroff, A. (2001). Parents' roles in shaping early adolescents' occupational aspirations. *Child Development*, 72, 1247–1266. doi:10.1111/1467-8624.00345
- Kauffman, D. F., & Husman, J. (2004). Effects of time perspective on student motivation: Introduction to a special issue. *Educational Psychology Review*, 16, 1–7. doi:10.1023/B:EDPR.0000012342.37854.58
- Miyake, A., Kost-Smith, L. E., Finkelstein, N. D., Pollock, S. J., Cohen, G. L., & Ito, T. A. (2010, November 26). Reducing the gender achievement gap in college science: A classroom study of values affirmation. *Science*, 330, 1234–1237. doi:10.1126/science.1195996
- Nagengast, B., Marsh, H. W., Scalas, L. F., Xu, M. K., Hau, K.-T., & Trautwein, U. (2011). Who took the "X" out of expectancy-value theory? A psychological mystery, a substantive-methodological synergy, and a cross-national generalization. *Psychological Science*, 22, 1058–1066. doi:10.1177/0956797611415540
- National Science Foundation. (2012). *Science and engineering indicators 2012*. Retrieved from [www.nsf.gov/statistics/seind12/](http://www.nsf.gov/statistics/seind12/)
- Paulson, S. E., & Sputa, C. L. (1996). Patterns of parenting during adolescence: Perceptions of adolescents and parents. *Adolescence*, 31, 369–381.
- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40, 879–891. doi:10.3758/BRM.40.3.879
- Ratelle, C. F., Larose, S., Guay, F., & Senécal, C. (2005). Perceptions of parental involvement and support as predictors of college students' persistence in a science curriculum. *Journal of Family Psychology*, 19, 286–293. doi:10.1037/0893-3200.19.2.286
- Ridgeway, C. L. (2011). *Framed by gender: How gender inequality persists in the modern world*. New York, NY: Oxford University Press.

- Riegle-Crumb, C., & King, B. (2010). Questioning a White male advantage in STEM: Examining disparities in college major by gender and race/ethnicity. *Educational Researcher*, 39, 656–664. doi:10.3102/0013189X10391657
- Shechter, O. G., Durik, A. M., Miyamoto, Y., & Harackiewicz, J. M. (2011). The role of utility value in achievement behavior: The importance of culture. *Personality and Social Psychology Bulletin*, 37, 303–317. doi:10.1177/0146167210396380
- Simpkins, S. D., Davis-Kean, P. E., & Eccles, J. S. (2006). Math and science motivation: A longitudinal examination of the links between choices and beliefs. *Developmental Psychology*, 42, 70–83. doi:10.1037/0012-1649.42.1.70
- Simpkins, S. D., Fredricks, J. A., & Eccles, J. S. (2012). Charting the Eccles' expectancy-value model from mothers' beliefs in childhood to youths' activities in adolescence. *Developmental Psychology*, 48, 1019–1032. doi:10.1037/a0027468
- Spera, C. (2005). A review of the relationship among parenting practices, parenting styles, and adolescent school achievement. *Educational Psychology Review*, 17, 125–146. doi:10.1007/s10648-005-3950-1
- Spera, C. (2006). Adolescents' perceptions of parental goals, practices, and styles in relation to their motivation and achievement. *Journal of Early Adolescence*, 26, 456–490. doi:10.1177/0272431606291940
- Thoman, D. B., Arizaga, J. A., Smith, J. L., Story, T. S., & Soncuya, G. (2013). The grass is greener in non-science, technology, engineering, and math classes: Examining the role of competing belonging to undergraduate women's vulnerability to being pulled away from science. *Psychology of Women Quarterly*. Advance online publication. doi:10.1177/0361684313499899
- Trautwein, U., Marsh, H. W., Nagengast, B., Lüdtke, O., Nagy, G., & Jonkmann, K. (2012). Probing for the multiplicative term in modern expectancy-value theory: A latent interaction modeling study. *Journal of Educational Psychology*, 104, 763–777. doi:10.1037/a0027470
- Updegraff, K. A., Eccles, J. S., Barber, B. L., & O'Brien, K. M. (1996). Course enrollment as self-regulatory behavior: Who takes optional high school math courses? *Learning and Individual Differences*, 8, 239–259. doi:10.1016/S1041-6080(96)90016-3
- U.S. Census Bureau. (2006). *State and country quickfacts*. Retrieved from <http://quickfacts.census.gov/qfd/states/55000.html>
- Vansteenkiste, M., Simons, J., Lens, W., Sheldon, K. M., & Deci, E. L. (2004). Motivating learning, performance, and persistence: The synergistic effects of intrinsic goal contents and autonomy-supportive contexts. *Journal of Personality and Social Psychology*, 87, 246–260. doi:10.1037/0022-3514.87.2.246
- Walton, G. M., & Cohen, G. L. (2011, March 18). A brief social-belonging intervention improves academic and health outcomes of minority students. *Science*, 331, 1447–1451. doi:10.1126/science.1198364
- Watt, H. M. (2005). Explaining gendered math enrollments for NSW Australian secondary school students. *New Directions for Child and Adolescent Development*, 2005, 15–29. doi:10.1002/cd.147
- Watt, H. M., Eccles, J. S., & Durik, A. M. (2006). The leaky mathematics pipeline for girls: A motivational analysis of high school enrolments in Australia and the USA. *Equal Opportunities International*, 25, 642–659. doi:10.1108/02610150610719119
- Watt, H. M. G., Shapka, J. D., Morris, Z. A., Durik, A. M., Keating, D. P., & Eccles, J. S. (2012). Gendered motivational processes affecting high school mathematics participation, educational aspirations, and career plans: A comparison of samples from Australia, Canada, and the United States. *Developmental Psychology*, 48, 1594–1611. doi:10.1037/a0027838
- Wood, D., Kurtz-Costes, B., & Copping, K. E. (2011). Gender differences in motivational pathways to college for middle class African American youths. *Developmental Psychology*, 47, 961–968. doi:10.1037/a0023745
- Yee, D. K., & Eccles, J. S. (1988). Parent perceptions and attributions for children's math achievement. *Sex Roles*, 19, 317–333. doi:10.1007/BF00289840

Received May 11, 2013

Revision received March 25, 2014

Accepted March 31, 2014 ■

## PARENT-TEACHER RELATIONSHIPS IN ELEMENTARY SCHOOL: AN EXAMINATION OF PARENT-TEACHER TRUST

RACHEL T. SANTIAGO, S. ANDREW GARBACZ, TIFFANY BEATTIE, AND CHRISTABELLE L. MOORE

*University of Oregon*

Trust is an important dimension of parent educational involvement and parent-teacher relationships. Preliminary research suggests that parent trust in teachers and schools is associated with student learning and behavior. However, examinations of parent trust in children's education are limited. The present study investigated the influence of demographic variables on parent trust and relations among parent trust, student behavior, and parent involvement. Findings suggested that student eligibility for a free or reduced-price lunch predicted parent trust of teachers and schools, parent trust was correlated with dimensions of student behavior, and parent trust of teachers predicted parent involvement. Implications for parent involvement and parent-teacher relationships are discussed.  
© 2016 Wiley Periodicals, Inc.

Students with behavioral concerns in elementary school are at elevated risk for a variety of poor outcomes, including academic difficulties, high school dropout, unemployment, depression, anxiety, development of conduct disorder, arrest, and substance use (Bradshaw, Schaeffer, Petras, & Ialongo, 2010; Fergusson, Horwood, & Riddler, 2005; Schaeffer, Petras, Ialongo, Poduska, & Kellam, 2003; Sourander et al., 2005). These findings indicate that behavioral concerns in elementary-age students are associated with a trajectory of problems later in life. Given the predictive value of childhood behavior problems, it is important to identify how to most effectively intervene in elementary school, particularly in the early grades.

Theoretical models suggest the important influence families and schools have in children's development. According to an ecological model (Bronfenbrenner, 1977), reciprocal relations exist between individuals and their environments. Within an ecological model (Bronfenbrenner, 1977), the microsystem comprises specific settings in which children reside (e.g., home, school). The mesosystem includes interactions among microsystems, such as the reciprocal relationships that exist across home and school. By focusing interventions at the mesosystemic level, the interactions among systems are targeted to build a comprehensive community of support and promote positive behavior across settings.

Interventions that target the mesosystem, such as the home-school interface, are associated with better student academic performance and behavior. Research examining parent educational involvement has found associations with positive outcomes. In particular, increased parent educational involvement is associated with regular school attendance, higher academic performance, higher standardized test scores, improved behavior, and higher homework completion (Alameda-Lawson, 2014; Dearing, Kreider, Simpkins, & Weiss, 2006; Fishel & Ramirez, 2005; Guli, 2005; Henderson & Mapp, 2002). Beyond parent educational involvement, research has begun to uncover how positive relationships between parents and teachers may be associated with improved outcomes for students. Minke, Sheridan, Kim, Ryoo, and Koziol (2014) investigated the effect of congruence for parent and teacher perceptions of relationship quality on student outcomes. They found that shared perceptions of parent-teacher relationships positively affect student adjustment at school. However, it remains unclear what features of the parent-teacher relationship contribute to positive student outcomes.

---

S. Andrew Garbacz is now at the Department of Educational Psychology, University of Wisconsin-Madison.

Correspondence to: Rachel T. Santiago, Department of Special Education and Clinical Sciences, 5208 University of Oregon, Eugene, OR 97403-5208. E-mail: [rsantia2@uoregon.edu](mailto:rsantia2@uoregon.edu)

## PARENT TRUST OF TEACHERS AND SCHOOLS

One aspect of the parent-teacher relationship that is important to consider is parent trust of teachers and schools (Adams & Christenson, 2000; Forsyth, Adams, & Hoy, 2011; Dunlap & Fox, 2007). Parent trust is particularly important to understand in elementary school, when new family-school relationships are established (Rimm-Kaufman & Pianta, 2005). For the purposes of this study, trust is defined as the belief that the other party will meet expectations of his or her role (e.g., teacher) and be open, honest, benevolent, and reliable (Adams & Christenson, 2000; Forsyth et al., 2011). In family-school trust literature, trust has generally been measured through self-report surveys, such as the Family-School Relationship Survey (FSRS; Adams & Christenson, 2000) and trust-related items on the Home-School Partnership Survey (Adams & Christenson, 1998). Preliminary research suggests that parents' trust of their child's teacher and school is positively related to important outcomes; however, research on parent trust of teachers and schools is limited (Adams & Christenson, 2000), particularly in elementary school. Three important directions for research examining parent trust in elementary school include (1) the influence of demographic variables on parent trust, (2) relations between parent trust and student behavior, and (3) the relation between parent trust and parent involvement.

*Demographic Variables*

Literature regarding the influence demographic variables have on parent trust is mixed. Several studies have found no statistically significant associations between family demographic variables and parent trust of teachers (e.g., eligibility for a free or reduced-price school lunch, ethnicity, child gender; Adams & Christenson, 1998, 2000; Janssen, Bakker, Bosman, Rosenberg, & Leseman, 2012; Lerkkanen, Kikas, Pakarinen, Poikonen, & Nurmi, 2013). However, other studies have found statistically significant relations between family demographic variables and parent trust (e.g., child gender, parent education; Kikas et al., 2011; Westergård & Galloway, 2004). In general, findings suggest that ethnicity and eligibility for a free or reduced-price lunch may not be statistically associated with parent trust while parent education and child gender may be statistically associated with parent trust. Findings from the broader parent educational involvement literature suggest that family demographic variables, particularly parent education and family income, are statistically associated with parent involvement (Fantuzzo, Tighe, & Childs, 2000; Manz, Fantuzzo, & Power, 2004).

Although some findings investigating the influence of demographic variables on parent trust are beginning to emerge, there are three primary limitations with extant research. First, many findings are equivocal (e.g., child gender), have limited research support, or contradict findings from the broader parent involvement literature. Second, most findings investigating parent trust have been conducted in countries outside the United States (e.g., Lerkkanen et al., 2013), which limits implications for families and schools in the United States. Given differences in parent involvement across cultures (Huntsinger & Jose, 2009) and countries (Garbacz & Sheridan, 2011), and calls for family-school research across cultures (Walker, Wilkins, Dallaire, Sandler, & Hoover-Dempsey, 2005), this is important. Third, research examining demographic variables, such as eligibility for a free or reduced-price school lunch, the number of children in the school district, and the presence of an alternate caregiver in the home are not available for an elementary school sample.

*Student Behavior*

Prior literature has also demonstrated links between parent-teacher trust and student academics and behavior. Janssen and colleagues (2012) found support for the relation between teacher trust in parents and reading performance among students in first grade. Froiland and Davison (2014)

examined trust as one dimension of the parent-teacher relationship. The results indicated that parent-teacher relationships were positively associated with parent perceptions of their child's grades, positive behavior, and grade promotion. With a high school sample, Adams and Christenson (2000) found that parent trust of teachers was associated with credits earned and grade point average. These studies have elucidated important relations. However, existing examinations of relations between parent trust (as measured by a unique construct) and student behavior are not available. Research is needed that singles out parent trust and examines it as a predictor of important dimensions of student behavior (e.g., conduct problems, peer problems).

### *Parent Involvement*

Parent educational involvement is an important ingredient for student success (Anderson & Minke, 2007; Hoover-Dempsey et al., 2005). Conceptual models (Walker et al., 2005) and research studies have explored some factors that may increase parent involvement. Based on a sample of racially and educationally diverse parents of kindergarteners, Nzinga-Johnson, Baker, and Aupperlee (2009) found that among parents and teachers, higher parent involvement was associated with better quality parent-teacher relationships as measured by several attributes, such as trust, warmth, and communication. A study conducted in Turkey found that parent trust of schools was positively related to parent involvement in secondary schools (Beycioglu, Ozer, & Sahin, 2013). With a middle school sample, Adams and Christenson (1998) found that parents who reported high levels of trust also had more positive attitudes and participated in more parent involvement activities than did parents with low or moderate trust levels. In a study 2 years later, Adams and Christenson (2000) found diminishing levels of parent trust across elementary school, middle school, and high school. With an early childhood sample of Turkish teachers, Karakus and Savas (2012) found that teacher trust of parents was positively associated with parent involvement. Although these findings are promising, more work is needed to identify the relation between parent trust and parent involvement in elementary school for schools in the United States.

### STUDY PURPOSE

Establishing positive family-school relationships in elementary school is critical to support student outcomes (Rimm-Kaufman & Pianta, 2005). One important aspect of family-school relationships is parent trust (Froiland & Davison, 2014). Unfortunately, available research on parent trust in early elementary school is limited in three areas. First, family demographic characteristics have been examined as predictors of parent trust, but findings across studies are equivocal and/or contradict findings from the broader parent involvement literature. In addition, many studies on parent trust have been conducted outside the United States, and very few studies have specifically targeted elementary school. Second, research examining relations between a unique variable of parent trust and student social behavior is not available. Third, findings examining a unique variable of parent trust and parent involvement are not available with an elementary school sample. The purpose of the present study was to address gaps in the parent trust literature by examining the following research questions:

1. To what extent do family demographic variables predict (a) parent trust of their child's teacher and (b) parent trust of their child's school?

We hypothesized that parent education level would significantly correlate with parent trust of their child's teacher or parent trust of their child's school based on the existing literature supporting this relation outside the United States (e.g., Lerkkanen et al., 2013). Based on limited research examining parent trust and the other demographic variables examined in the present study (i.e.,



number of children the respondent currently has in the target child's district, number of years the respondent has had children in the target child's district, the presence of an alternate caregiver, eligibility for free or reduced-price lunch, and primary language spoken in the home), no further hypotheses were made for this research question.

- 2 What is the relation between (a) parent trust of their child's teacher and (b) parent trust of their child's school, and student social behavior?

We hypothesized that parent trust would significantly correlate with student behavior. Specifically, high levels of parent trust of their child's teacher and of their child's school would correlate with high levels of student prosocial behavior and lower levels of student problem behavior based on available findings in related areas (Froiland & Davison, 2014; Henderson & Mapp, 2002).

- 3 What is the relation between (a) parent trust of their child's teacher and (b) parent trust of their child's school, and parent educational involvement?

We hypothesized that parent trust would significantly correlate with parent involvement based on research examining this relation in early childhood and middle school as well as in related areas. Specifically, high levels of parent trust of their child's teacher and of their child's school would correlate with high levels of parent educational involvement (Adams & Christenson, 1998; Anderson & Minke, 2007; Beycioglu et al., 2013; Hoover-Dempsey et al., 2005; Karakus & Savas, 2012; Nzinga-Johnson et al., 2009).

## METHOD

### *Participants*

Participants were parents of 212 kindergarten through fourth-grade children enrolled in four local elementary schools in the Pacific Northwest region of the United States. Ninety-two percent of respondents were female. When asked about their highest level of education received, 4% indicated less than high school or GED, 20% indicated high school diploma or GED, 22% indicated partial college, 19% indicated junior college or associate's degree, 18% indicated standard college, and 15% indicated graduate- or professional-level training.

Fifty-two percent of students were female and 47% were eligible for a free or reduced-price school lunch. Twenty percent of students were in kindergarten, 21% were in first grade, 23% were in second grade, 19% were in third grade, and 17% were in fourth grade. A higher number of participants were drawn from School 4, which chose to implement an additional incentive procedure. Other descriptive differences across schools were observed for eligibility for a free or reduced-price lunch and parent education (Table 1).

### *Materials and Procedures*

Questionnaire packets included consent materials, the survey, and an opportunity to participate in an incentive drawing. Packets were sent home with students in a weekly folder. For three schools, surveys were returned via prepaid and stamped envelope, and for one school, completed forms were returned to a confidential location at the school. Participants completed a questionnaire for their oldest or only child in kindergarten to fourth grade. The final response rate across schools was 13.85% (final  $N = 212$ ).

Schools requested questionnaire packets in Spanish and English. The survey was translated to Spanish by a professional translator with a clinical graduate degree and 23 years of



Table 1  
*Demographic Information and Sample Sizes for Study Participants Across Schools*

| Demographic Variable                 | Total    |     | School 1 |    | School 2 |    | School 3 |    | School 4 |    |
|--------------------------------------|----------|-----|----------|----|----------|----|----------|----|----------|----|
|                                      | <i>N</i> | %   | <i>n</i> | %  | <i>n</i> | %  | <i>n</i> | %  | <i>n</i> | %  |
| Sample size                          | 212      | 100 | 47       | 22 | 32       | 15 | 44       | 21 | 89       | 42 |
| Parent education level               |          |     |          |    |          |    |          |    |          |    |
| Less than high school/GED            | 8        | 4   | 1        | 2  | 0        | 0  | 3        | 7  | 4        | 4  |
| High school/GED                      | 43       | 20  | 10       | 21 | 4        | 13 | 7        | 16 | 22       | 25 |
| Partial college                      | 47       | 22  | 8        | 17 | 7        | 22 | 8        | 18 | 24       | 27 |
| Junior college/associate's degree    | 40       | 19  | 8        | 17 | 6        | 19 | 7        | 16 | 19       | 21 |
| Standard college                     | 38       | 18  | 10       | 21 | 10       | 31 | 8        | 18 | 10       | 11 |
| Graduate/professional                | 31       | 15  | 8        | 17 | 4        | 13 | 11       | 25 | 8        | 9  |
| Free or reduced-price lunch eligible | 100      | 47  | 19       | 40 | 23       | 72 | 12       | 27 | 46       | 52 |

experience in technical translation. Eight Spanish-language surveys were completed, which represented approximately 4% of the sample.

### *Measures and Variables*

The following section includes details about measures and variables. Study variables, including parent trust in school and teacher, family demographic variables, student behavior, and parent's involvement in education, are described. Descriptive statistics for all study variables are included in Table 2.

### *Demographic Variables*

Demographic variables included the number of children in the school district (treated as continuous), the number of years in the school district (treated as continuous), presence of a partner or other adult sharing caregiving duties in the home (0 = no alternate caregiver present, 1 = alternate caregiver present), child eligibility for free or reduced-price lunch (0 = not eligible, 1 = eligible), primary language spoken at home (0 = English, 1 = Spanish), and parent level of education (i.e., the highest level of education of the respondent; range = 1–6, treated as continuous).

### *Parent Trust*

Two scales were used to measure parent trust: the FSRS (Adams & Christenson, 2000) and the Parent Trust in School Scale (PTSS; Forsyth et al., 2011).

*Parent Trust in Teacher.* The trust scale from the FSRS (Adams & Christenson, 2000) was used to measure parent trust in teachers. The trust scale includes 19 items (e.g., "I am confident that teachers are doing a good job keeping me well informed of my child's progress"), rated on a 4-point Likert-type scale (1 = *Strongly Disagree* to 4 = *Strongly Agree*). This measure was selected because it is well aligned with the parent trust in teacher variable and has good psychometric properties. Prior psychometric work has demonstrated internal consistency of the FSRS as measured by the alpha coefficient (.96; Adams & Christenson, 2000). Internal consistency was .92 with the current sample. The parent trust in teacher variable was computed by averaging items.

Table 2  
*Descriptive Statistics of Study Variables*

| Variable                            | Total (N = 212) |
|-------------------------------------|-----------------|
| Mean (SD) parent trust in teacher   | 2.41 (0.51)     |
| Mean (SD) parent trust in school    | 6.66 (1.30)     |
| Mean (SD) children in district      | 1.51 (1.17)     |
| Mean (SD) years in district         | 4.59 (4.25)     |
| Mean (SD) educational involvement   | 3.60 (0.68)     |
| Child behavior                      |                 |
| Mean (SD) total difficulties        | 8.77 (4.70)     |
| Mean (SD) hyperactivity-inattention | 3.23 (2.42)     |
| Mean (SD) emotional symptoms        | 1.63 (1.94)     |
| Mean (SD) prosocial behavior        | 8.68 (1.67)     |
| Mean (SD) conduct problems          | 2.50 (1.21)     |
| Mean (SD) peer problems             | 1.41 (1.45)     |
| Presence of alternate caregiver     |                 |
| Caregiver                           | 77.80%          |
| Free or reduced-price lunch         |                 |
| Eligible                            | 47.20%          |
| Primary language spoken in home     |                 |
| English                             | 93.40%          |
| Spanish                             | 3.30%           |

*Parent Trust in School.* The PTSS (Forsyth et al., 2011), a 10 item scale, was used to examine the trust a participant felt for his or her child’s school (e.g., “At this school, I know I will be listened to”). Participants responded to questions on an 8-point Likert-type scale (1 = *Strongly Disagree* to 8 = *Strongly Agree*). This measure was selected because it is well aligned with our parent trust in school variable and has good psychometric properties. Prior psychometric work has indicated that the PTSS has strong internal consistency, with an alpha coefficient of .95 (Adams, Forsyth, & Mitchell, 2009). Internal consistency was .96 with the current sample. The parent trust in school variable was computed by averaging items from the PTSS.

*Parent Perception of Student Behavior.* The Strengths and Difficulties Questionnaire (SDQ; Goodman, 2001) was used to measure parent perceptions of student behavior. The SDQ is a 25-item scale that examines children’s behavior. Participants responded to questions on a 3-point scale (1 = *Not True* to 3 = *Certainly True*). The five factors in the scale are emotional symptoms (e.g., “Often complains of headaches, stomach-aches, or illness”), conduct problems (e.g., “Often lies or cheats”), hyperactivity-inattention (e.g., “Easily distracted, concentration wanders”), peer problems (e.g., “Has at least one good friend”), and prosocial behavior (e.g., “Helpful if someone is hurt, upset, or feeling ill”). Prior psychometric work has indicated that the SDQ has satisfactory internal consistency; the mean Cronbach alphas for each scale are .67, .63, .77, .57, and .65, respectively, and .73 for all scales combined (Goodman, 2001). In the current sample, Cronbach alphas were .71, .73, .80, .45, and .73 for each subscale, respectively, and .65 overall. This measure was selected because it is well aligned with our parent perception of student behavior variable, measures several proximal attributes of student behavior, and has acceptable psychometric properties.

*Parent Educational Involvement.* Items to measure parent involvement were drawn from two scales, the Parent Choice of Involvement Activities (Walker et al., 2005) and the Family Involvement Questionnaire-Elementary Version (FIQ-E; Manz et al., 2004). Items were drawn from the two scales to efficiently capture parent involvement across three common dimensions (i.e., home-based involvement, school-based involvement, and home-school communication), in alignment with conceptual models of parent educational involvement (Epstein, 1995) and factor loadings (Manz et al., 2004).

Ten items from the Parent Choice of Involvement Activities (Walker et al., 2005) were used to assess parents' home-based and school-based involvement. Items were drawn from the Parents' Involvement in Home-Based and School-Based Activities domain. Five items relate to home-based involvement and five items relate to school-based involvement. Participants respond to questions (e.g., "Someone in this family reads with this child") on a 6-point Likert-type scale of activity frequency (1 = *Never* to 6 = *Daily*). Prior psychometric work on this scale indicates adequate internal consistency. Five items from the FIQ-E (Manz et al., 2004) were used to assess home-school communication. Participants responded to items (e.g., "I talk with my child's teacher on the telephone.") on a 4-point Likert-type scale (1 = *Rarely* to 4 = *Always*). Prior psychometric work on the FIQ-E reported internal consistency for home-school communication as .91 (Manz et al., 2004). The mean of the 15 parent involvement items was computed and included in analyses. Internal consistency across the 15 items in the current sample was .84.

### *Analysis Plan*

We employed two types of analyses for each dependent variable: zero-order correlation analyses and unique variance analyses. Zero-order correlations provide insight into the relation between two variables; however, given zero-order correlation limitations relating to shared variance with other variables and potential suppressor effects (Nunnally & Bernstein, 1994), we have included unique variance results. For all regression results, we have interpreted both standardized and unstandardized coefficients to provide a comprehensive overview of the strength of the relations. Unstandardized coefficients provide unit change effects for each variable relation, and standardized coefficients provide an estimate of the magnitude of effect.

For the first and third research questions (trust and demographic variables; trust and parent educational involvement), we employed multiple regression analyses to examine the unique variance of each predictor variable for each dependent variable and individual multiple regression analyses to establish zero-order correlations.

For the second research question (trust and student behavior), we created six SDQ variables, one for each of the five factors and an overall score described by Goodman (2001). Factor variables were created by summing relevant items and computing a new variable. We then employed a Pearson correlation analysis to assess the relation between the two trust dimensions (teacher and school), and the five SDQ factors and overall SDQ difficulties. Findings that reached statistical significance at  $p < .05$  are reviewed.

## RESULTS

### *Trust and Demographic Variables*

For the first research question, we first provide zero-order correlations and unique variance results for analyses involving parent trust of teacher as the dependent variable. Second, we provide zero-order correlations and unique variance results for analyses involving parent trust of school as the dependent variable.

*Parent Trust of Teacher.* Results of the regression analyses are displayed in Table 3.

Table 3  
Summary of Regression Analyses for Variables Predicting Parent Trust of Teacher

| Variable                    | Parent Trust of Teacher |                       |                   |                 |                       |                   |
|-----------------------------|-------------------------|-----------------------|-------------------|-----------------|-----------------------|-------------------|
|                             | Zero-order correlation  |                       |                   | Unique variance |                       |                   |
|                             | <i>b</i>                | <i>SE<sub>b</sub></i> | $\beta$           | <i>b</i>        | <i>SE<sub>b</sub></i> | $\beta$           |
| Children in district        | 0.04                    | 0.03                  | .08               | 0.05            | 0.03                  | .13               |
| Years in district           | −0.01                   | 0.01                  | −.08              | −0.00           | 0.01                  | −.02              |
| Alternate caregiver         | 0.28                    | 0.08                  | .22 <sup>a</sup>  | 0.21            | 0.10                  | .17 <sup>a</sup>  |
| Free or reduced-price lunch | −0.18                   | 0.07                  | −.18 <sup>a</sup> | −0.19           | 0.08                  | −.20 <sup>a</sup> |
| Primary language            | −0.21                   | 0.20                  | −.08              | −0.06           | 0.20                  | −.03              |
| Parent education            | 0.03                    | 0.03                  | .07               | −0.02           | 0.03                  | −.05              |

Note. Full model  $R^2 = .09$ .  
<sup>a</sup> $p < .05$ .

**Zero-Order Correlations.** The results of the multiple regression analysis indicated that a one-unit increase in the presence of an alternate caregiver was significantly related to a 0.28-unit increase in parent trust of teacher ( $b = 0.28$ ,  $SE_b = 0.08$ ,  $t = 3.29$ ,  $p < .01$ ). The standardized coefficient for presence of an alternate caregiver was .22. Therefore, every 1-standardized-unit increase in alternate caregiver presence resulted in a .22-standardized-unit increase in parent trust in teacher. The analysis also indicated that a 1-unit increase in free or reduced-price lunch eligibility was significantly related to a 0.18-unit decrease in parent trust of teacher ( $b = -0.18$ ,  $SE_b = 0.07$ ,  $t = -0.18$ ,  $p < .05$ ). The standardized coefficient for the presence of lunch eligibility was −.18. Therefore, every 1-standardized-unit increase in lunch eligibility resulted in a .18-standardized-unit decrease in parent trust in teacher.

**Unique Variance.** The results of the multiple regression analysis indicated that, when controlling for all other variables, a 1-unit increase in the presence of an alternate caregiver resulted in a 0.21-unit increase in parent trust in teacher ( $b = 0.21$ ,  $SE_b = 0.10$ ,  $t = 2.12$ ,  $p < .05$ ). The standardized coefficient for the presence of an alternate caregiver was .17. Therefore, every 1-standardized-unit increase in alternate caregiver presence resulted in a .17-standardized-unit increase in parent trust in teacher. In addition, when controlling for all other variables, a 1-unit increase in free or reduced-price lunch eligibility resulted in a 0.19-unit decrease in parent trust in teacher ( $b = -0.19$ ,  $SE_b = 0.08$ ,  $t = -2.35$ ,  $p < .05$ ). The standardized coefficient for presence of lunch eligibility was −.20. Therefore, every 1-standardized-unit increase in lunch eligibility resulted in a .20-standardized-unit decrease in parent trust in teacher. Parent education level was not significantly associated with parent trust in the teacher. The  $R^2$  statistic was .09. This indicates that the independent variables accounted for 9% of the total variation in a given respondent’s trust of their child’s teacher,  $F(6, 156) = 2.53$ ,  $p < .05$ .

**Parent Trust of School.** Results from the regression analyses are displayed in Table 4.

**Zero-Order Correlations.** The results of the multiple regression analysis indicated that a 1-unit increase in lunch eligibility was significantly related to a 0.63-unit decrease in parent trust in school ( $b = -0.63$ ,  $SE_b = 0.18$ ,  $t = -3.48$ ,  $p < .01$ ). The standardized coefficient for lunch eligibility was −.25. Therefore, every 1-standardized-unit increase in lunch eligibility resulted in a .25-standardized-unit decrease in parent trust in school. The multiple regression analysis also indicated that a 1-unit increase in primary home language resulted in a 1.18-unit decrease in parent trust in school ( $b = -1.18$ ,  $SE_b = 0.49$ ,  $t = -2.40$ ,  $p < .05$ ). The standardized coefficient for primary

Table 4  
Summary of Regression Analyses for Variables Predicting Parent Trust of School

| Variable                    | Parent Trust of School |                       |                   |                 |                       |                   |
|-----------------------------|------------------------|-----------------------|-------------------|-----------------|-----------------------|-------------------|
|                             | Zero-order correlation |                       |                   | Unique variance |                       |                   |
|                             | <i>b</i>               | <i>SE<sub>b</sub></i> | $\beta$           | <i>b</i>        | <i>SE<sub>b</sub></i> | $\beta$           |
| Children in district        | 0.13                   | 0.08                  | .12               | 0.16            | 0.09                  | .15               |
| Years in district           | 0.00                   | 0.02                  | .01               | 0.01            | 0.02                  | .02               |
| Alternate caregiver         | 0.20                   | 0.22                  | .07               | 0.14            | 0.25                  | .04               |
| Free or reduced-price lunch | -0.63                  | 0.18                  | -.25 <sup>a</sup> | -0.78           | 0.21                  | -.31 <sup>a</sup> |
| Primary language            | -1.18                  | 0.49                  | -.17 <sup>a</sup> | -0.79           | 0.52                  | -.12              |
| Parent education            | -0.01                  | 0.06                  | -.01              | -0.12           | 0.07                  | -.13              |

Note. Full model  $R^2 = .12$ .

<sup>a</sup> $p < .05$ .

Table 5  
Pearson Correlation Coefficient Values Between Parent Trust Dimensions and Student Behavior

| Student Behavior          | Parent Trust Dimension |                   |
|---------------------------|------------------------|-------------------|
|                           | Teacher                | School            |
| Hyperactivity-inattention | -.12                   | -.09              |
| Emotional symptoms        | -.13                   | -.24 <sup>a</sup> |
| Prosocial behavior        | .18 <sup>a</sup>       | .02               |
| Conduct problems          | -.10                   | -.08              |
| Peer problems             | -.16 <sup>a</sup>      | -.20 <sup>a</sup> |
| Total difficulties        | -.19 <sup>a</sup>      | -.23 <sup>a</sup> |

<sup>a</sup> $p < .05$ .

home language was  $-.17$ . Therefore, every 1-standardized-unit increase in primary home language resulted in a  $.17$ -standardized-unit decrease in parent trust in school.

**Unique Variance.** The results of the multiple regression analysis indicated that a 1-unit increase in free or reduced-price lunch eligibility resulted in a  $0.78$ -unit decrease in parent trust in school ( $b = -0.78$ ,  $SE_b = 0.21$ ,  $t = -3.72$ ,  $p < .001$ ). The standardized coefficient for lunch eligibility was  $-.31$ . Therefore, every 1-standardized-unit increase in lunch eligibility resulted in a  $.31$ -standardized-unit decrease in parent trust in school. Parent primary home language and parent education level did not uniquely predict parent trust in school.

The  $R^2$  statistic was  $.12$ . This indicates that the demographic variables account for 12% of the total variation in a parent's trust of their child's school,  $F(6, 155) = 3.36$ ,  $p < .05$ .

#### Trust and Student Behavior

The analysis produced six significant correlations. Parent trust in teacher was significantly related to child prosocial behavior ( $r = .18$ ,  $p < .01$ ), child peer problems ( $r = -.16$ ,  $p < .05$ ), and total child difficulties ( $r = -.19$ ,  $p < .01$ ). Parent trust in school was significantly related to child emotional symptoms ( $r = .24$ ,  $p < .01$ ), child peer problems ( $r = -.20$ ,  $p < .01$ ), and total child difficulties ( $r = -.23$ ,  $p < .01$ ). Results of the Pearson correlation analyses are displayed in Table 5.

Table 6  
Summary of Regression Analyses for Variables Predicting Parent Educational Involvement

| Variable                | Parent Educational involvement |             |                  |                 |             |                  |
|-------------------------|--------------------------------|-------------|------------------|-----------------|-------------|------------------|
|                         | Zero-order correlations        |             |                  | Unique variance |             |                  |
|                         | <i>b</i>                       | <i>SE B</i> | $\beta$          | <i>b</i>        | <i>SE B</i> | $\beta$          |
| Parent trust of teacher | 0.20                           | 0.09        | .15 <sup>a</sup> | 0.29            | 0.11        | .22 <sup>a</sup> |
| Parent trust of school  | −0.01                          | 0.04        | −.01             | −0.07           | 0.04        | −.13             |

Note. Full model  $R^2 = .04$ .  
<sup>a</sup> $p < .05$ .

Trust and Educational Involvement

Results from the regression analyses are displayed in Table 6.

*Zero-Order Correlations.* Regression analyses indicated that a 1-unit increase in parent trust in teacher was significantly related to a 0.20-unit increase in parent educational involvement ( $b = 0.20$ ,  $SE_b = .09$ ,  $t = 2.17$ ,  $p < .05$ ). The standardized coefficient for parent trust in teacher was .15. Therefore, every 1-standardized-unit increase in parent trust in teacher resulted in a .15-standardized-unit increase in parent educational involvement. Conversely, the regression analyses did not identify a significant relation between parent trust in school and parent educational involvement.

*Unique Variance.* When controlling for parent trust in school, a 1-unit increase in parent trust in teacher was significantly related to a 0.29-unit increase in parent educational involvement ( $b = 0.29$ ,  $SE_b = .11$ ,  $t = 2.77$ ,  $p < .05$ ). The standardized coefficient for parent trust in teacher was .22. Therefore, every 1-standardized-unit increase in parent trust in teacher resulted in a .22-standardized unit increase in parent educational involvement. Conversely, when controlling for parent trust in teacher, the regression analysis did not identify a significant relation between parent trust in school and parent educational involvement.

The  $R^2$  statistic was .04. This indicates that the independent variables (parent trust in teacher and parent trust in school) accounted for 4% of the total variation in parent involvement,  $F(2, 205) = 3.84$ ,  $p < .05$ . Overall, these findings suggest that parent trust of teacher significantly predicted involvement in their child’s schooling.

DISCUSSION

Parent trust is a critical component of family-school relationships (Adams & Christenson, 1998) in elementary school (Rimm-Kaufman & Pianta, 2005). Several important limitations with the parent trust literature were addressed in this study, including targeting equivocal findings for demographic variable predictors, examining relations between parent trust as a unique variable, and student behavior and parent involvement, as well as including parents of students in elementary school in the United States. The purpose of this study was to address these limitations by exploring the influence of key demographic variables on parent trust and determine relations among parent trust, student behavior, and parent involvement relevant for parents of children in elementary school.

Main Findings

A student’s eligibility for free or reduced-price lunch significantly predicted a decrease in parent trust in their child’s teacher and their child’s school across zero-order correlations and unique variance analyses. The presence of an alternate caregiver in the home significantly predicted an



increase in parent trust in their child's teacher across zero-order and unique variance analyses. Zero-order correlation of the family's primary home language significantly predicted parent trust in school, but the unique variance explained by that variable (i.e., family's primary home language) did not. Because those relations have not been discussed in extant literature, these findings add new information to the literature on parent trust and family demographic variables. Other studies that have examined parent trust and family demographic variables (e.g., Janssen et al., 2012) have not commonly included eligibility for free or reduced-price lunch, the presence of an alternate caregiver in the home, or the primary language used in the home as predictor variables of trust as a unique variable.

One exception is the study by Adams and Christenson (1998), which found that with a middle school sample, that there was not a significant difference in trust as a function of eligibility for a free or reduced-price lunch. These results provide important insights into how eligibility for a free or reduced-price lunch, the presence of an alternate caregiver, and primary language used in the home predict dimensions of parent-teacher relationships in early elementary school. In particular, the results suggest that (a) eligibility for free or reduced-price school lunch may be a risk factor for reduced trust and (b) the presence of an alternate caregiver and, in certain situations, the primary language used in the home may serve as protective factors for trust. With regard to the presence of an alternate caregiver, it is possible that school structures are designed to support two-caregiver families (e.g., schools may expect that a caregiver is available to volunteer for school events). Single-parent families may feel less supported or welcomed by the school, which may adversely affect the development of parent trust of teachers and schools.

Parent education level was not significantly associated with parent trust; this portion of our hypothesis was not supported. Given previous findings regarding relations between parent education level and educational involvement (e.g., Fantuzzo et al., 2000; Manz et al., 2004), these results add to the extant literature by suggesting that parent education level may have a differential association with various dimensions of parent-teacher relationships and educational involvement, such as parent trust.

Higher levels of parent trust in teacher were associated with increased child prosocial behavior, decreased peer problems, and decreased total difficulties. Higher levels of parent trust in school were associated with decreased levels of emotional symptoms, peer problems, and total difficulties. These findings partially supported our hypothesis because not all student behavior variables were associated with parent trust in teacher or in school. The present study findings expand on existing parent trust literature that has examined the association between parent trust and student behavior (e.g., Froiland & Davison, 2014) by (a) examining trust as a unique variable and (b) using specific dimensions of student behavior (e.g., peer relationships) in relation to parent trust. For example, Froiland and Davison (2014) examined the relation between parent-teacher relationships and child behavior. In addition, Adams and Christenson (2000) examined the relation between trust and student credits earned, grade point average, and attendance. Findings from this study suggest for whom parent trust may be most important (e.g., students with peer problems) and under what conditions (e.g., parent trust in teachers). It is important to note that these relations may be bidirectional. For example, child problem behavior may adversely affect aspects of the parent-teacher relationship and adverse parent-teacher relationships may exacerbate child problem behavior.

Higher levels of parent trust in teacher significantly predicted increased parent educational involvement. This partially supported our hypothesis; although educational involvement was significantly related to parent trust in teacher, it was not significantly related to parent trust in school. The parent trust in teacher findings are consistent with results of prior examinations of parent trust in teachers (e.g., Adams & Christenson, 1998). For example, Adams and Christenson (1998) found that parents of middle school students reporting low and moderate trust reported less frequent parent

involvement than did parents reporting high trust. Similarly, Beycioglu et al. (2013) found that among a sample of parents of secondary students in Turkey, parent trust of school was positively related to parent involvement. The present study findings add an important dimension to this literature by suggesting that findings reported by Adams and Christenson (1998) with a middle school sample may hold with an early elementary school sample. In addition, findings from the present study provide new information on relationships between parents and schools by examining parent trust in schools as a potential predictor of parent educational involvement in elementary school. Much of the existing parent trust literature focuses on parent-teacher relationships (e.g., Adams & Christenson, 1998; Karakus & Savas, 2012; Nzinga-Johnson et al., 2009); less is known about trust in the relationship between parents and schools. It is possible that forming a relationship with an individual teacher, who may serve as a point of contact and offer invitations, suggestions, and support for involvement (Epstein & Dauber, 1991; Walker et al., 2005), may be different than forming a relationship with a larger entity, such as a school. Although research has examined parent trust as an indicator of parent-teacher relationships (Nzinga-Johnson et al., 2009), research is needed using trust as a unique variable in analyses.

Parent trust in school was statistically significantly related to student behavior. Specifically, higher parent trust in school was associated with lower parent-report of student emotional symptoms, peer problems, and total difficulties. These findings may support efforts to enhance school-based supports for students and families. Given the importance of school-wide family engagement efforts for supporting student outcomes (Garbacz et al., 2016), examining relationships between parents and schools can provide important information regarding strengths and areas for focus at the school-wide level and contribute to identifying durable, contextually relevant supports (McIntosh, Lucyshyn, Strickland-Cohen, & Horner, 2015) for all members of school communities.

### *Implications*

Findings from the present study have three primary important implications. First, findings indicated parents of students eligible for a free or reduced-price school lunch were less trusting of teachers and the school. To address this finding, schools could proactively reach out to families throughout the school year. This may be most efficiently accomplished school-wide by embedding within existing school frameworks. For example, in schools implementing School-Wide Positive Behavioral Interventions and Supports, the family advisory group could play a key role in inviting and incorporating feedback using culturally responsive practices (Garbacz et al., 2016).

Second, in the present study, parent trust was significantly associated with several dimensions of student behavior. This finding is unique to the parent trust literature and suggests that parent trust in their child's teacher and school may be an important point of intervention to improve student behavior concerns. For example, for students experiencing peer relationship difficulties, it could be useful for the child's teacher to reach out to the parent to build a trusting and supportive relationship that can facilitate cross-setting interventions for the specific peer relationship difficulties the child is experiencing. Because parent trust in teachers and parent educational involvement were also significantly associated in this study, these relationship-building strategies may also increase the parent's involvement, which is another avenue to improve student behavior (Fantuzzo, McWayne, Perry, & Childs, 2004). Furthermore, proactive outreach to parents through behavior screening and follow-up is another approach to build relationships before severe problems develop and to identify targets for intervention (Moore et al., 2016). School staff may consider reaching out to parents as partners in the event that an educator is facing behavioral difficulties with a student.

Third, the present study found evidence to suggest that Adams and Christenson's (1998) finding suggesting that parents who report higher trust of teachers also report more frequent parent

involvement with a middle school sample holds with an early elementary school sample. Furthermore, this study had a unique contribution to the parent trust literature by identifying that parent trust in school may not be associated with parent educational involvement. This underscores the importance of meaningful connections between parents and teachers (Garbacz, Sheridan, Koziol, Kwon, & Holmes, 2015) in elementary school. Because the importance of parent educational involvement is well documented (e.g., Anderson & Minke, 2007), school staff may wish to target the parent-teacher trust relationship as one way to increase parent involvement in educational activities.

### *Limitations and Future Directions*

Although the present study provides important findings and implications for parent trust of teachers and schools, several limitations are worth noting. First, there may be threats to internal validity. The present study relied on parent self-report for all measures. Although this is a logical method for many of the variables, student behavior variables may be better measured through direct means. However, given this study's focus on parent perceptions in the role of teacher and school relationships, the reliance on self-report is not unwarranted. In addition, with the present sample, the internal consistency for the peer problems factor of the SDQ was low. However, in the Goodman (2001) study, the internal consistency of that factor was acceptable.

Second, there are several threats to external validity. The sample size of the present study was modest. In addition, the response rate was relatively low, suggesting that the sample may not be representative of the area from which it was drawn. It is possible that the present sample may consist of parents with particularly strong feelings regarding their relationships with their child's teacher or school. In fact, mean scores for parent trust of teacher and trust of school were relatively high, suggesting that the present sample consists of parents with a relatively high level of trust in their child's teacher and school. Third, the sample is not ethnically diverse. For example, given the number of Spanish-language questionnaires distributed, very few were returned. Finally, some findings are associated with modest to weak magnitudes, particularly for Research Question 2, indicating caution is needed when interpreting findings. Nevertheless, many findings are within the magnitude range of other studies examining parent involvement (Garbacz, McDowall, Schaughency, Sheridan, & Welch, 2015; Jeynes, 2012).

These findings and limitations provide a foundation for future research directions. First, future studies could examine differences in teacher and parent trust of one another and its impact on student behavior. This work could inform a study examining congruence in parent and teacher ratings of trust (c.f. Garbacz, Sheridan et al., 2015). Second, future studies could delve into the relationships between trust and student behavior. These studies could identify predictive relations among the variables (e.g., identify aspects of child behavior that predict parent-teacher trust) and inform parent-teacher relationship-building activities. Furthermore, these studies could include direct assessments of child behavior to enrich findings. Third, studies could include a sample more diverse than the sample studied here, which may enhance external validity. Fourth, studies could incorporate different efforts to increase survey response rate. This may involve standardizing procedures for dissemination and incentives, as well as procedures for collecting completed surveys. Fifth, future studies could examine home-school communication valence as a dimension of trust. Understanding the valence of communication between families and schools could provide important contextual information regarding trust in home-school relationships and facilitate the development of effective communication initiatives (e.g., invitations and support for involvement delivered to parents by the school). Sixth, future studies could examine aspects of school structures which may affect trust for parents in one-caregiver and two-caregiver households.

## CONCLUSION

The present study examined parent trust of teachers and schools to identify predictors of parent trust, whether parent trust predicts parent involvement, and relations between parent trust and dimensions of student behavior. Findings indicated that demographic variables predict parent trust, parent trust predicts parent involvement, and parent trust is associated with several dimensions of parent perceptions of student behavior. Future studies should seek to use larger and more diverse samples than were included in this study. In addition, collecting direct assessments of student behavior and information about parent and teacher trust of one another would strengthen this literature.

## REFERENCES

- Adams, C. M., Forsyth, P. B., & Mitchell, R. M. (2009). The formation of parent-school trust: A multilevel analysis. *Educational Administration Quarterly*, 45, 4–33.
- Adams, K. S., & Christenson, S. L. (1998). Differences in parent and teacher trust levels: Implications for creating collaborative family-school relationships. *Special Services in the Schools*, 14, 1–22.
- Adams, K. S., & Christenson, S. L. (2000). Trust and the family-school relationship examination of parent-teacher differences in elementary and secondary grades. *Journal of School Psychology*, 38, 477–497.
- Alameda-Lawson, T. (2014). A pilot study of collective parent engagement and children's academic achievement. *Children and Schools*, 36, 199–209.
- Anderson, K. J., & Minke, K. M. (2007). Parent involvement in education: Toward an understanding of parents' decision making. *The Journal of Educational Research*, 100, 311–323.
- Beycioglu, K., Ozer, N., & Sahin, S. (2013). Parental trust and parent-school relationships in Turkey. *Journal of School Public Relations*, 34, 306–329.
- Bradshaw, C. P., Schaeffer, C. M., Petras, H., & Jalongo, N. (2010). Predicting negative life outcomes from early aggressive-disruptive behavior trajectories: Gender differences in maladaptation across life domains. *Journal of Youth Adolescence*, 39, 953–966.
- Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist*, 32, 513–531.
- Dearing, E., Kreider, H., Simpkins, S., & Weiss, H. B. (2006). Family involvement in school and low-income children's literacy: Longitudinal associations between and within families. *Journal of Educational Psychology*, 98, 653–664.
- Dunlap, G., & Fox, L. (2007). Parent-professional partnerships: A valuable context for addressing challenging behaviours. *International Journal of Disability, Development and Education*, 54, 273–285.
- Epstein, J. L. (1995). School/family/community partnerships: Caring for the children we share. *Phi Delta Kappan*, 76, 701–712.
- Epstein, J. L., & Dauber, S. L. (1991). School programs and teacher practices of parent involvement in inner-city elementary and middle schools. *The Elementary School Journal*, 91, 289–305.
- Fantuzzo, J., McWayne, C., Perry, M. A., & Childs, S. (2004). Multiple dimensions of family involvement and their relations to behavioral and learning competencies for urban, low-income children. *School Psychology Review*, 33, 467–480.
- Fantuzzo, J., Tighe, E., & Childs, S. (2000). Family Involvement Questionnaire: A multivariate assessment of family participation in early childhood education. *Journal of Educational Psychology*, 92, 367–376.
- Fergusson, D. M., Horwood, L. J., & Ridder, E. M. (2005). Show me the child at seven: The consequences of conduct problems in childhood for psychosocial functioning in adulthood. *Journal of Child Psychology and Psychiatry*, 46, 837–849.
- Fishel, M., & Ramirez, L. (2005). Evidence-based parent involvement interventions with school-aged children. *School Psychology Quarterly*, 20, 371–402.
- Forsyth, P. B., Adams, C. M., & Hoy, W. K. (2011). *Collective trust: Why schools can't improve without it*. New York, NY: Teachers College Press.
- Froiland, J. M., & Davison, M. L. (2014). Parental expectations and school relationships as contributors to adolescents' positive outcomes. *Social Psychology of Education*, 17, 1–17.
- Garbacz, S. A., McDowall, P. S., Schaughency, E., Sheridan, S. M., & Welch, G. W. (2015). A multidimensional examination of parent involvement across child and parent characteristics. *The Elementary School Journal*, 115, 384–406.
- Garbacz, S. A., McIntosh, K., Eagle, J. W., Dowd-Eagle, S. E., Ruppert, T., & Hirano, K. (2016). Family engagement within School-Wide Positive Behavioral Interventions and Supports. *Preventing School Failure: Alternative Education for Children and Youth*, 60, 60–69.
- Garbacz, S. A., & Sheridan, S. M. (2011). A multidimensional examination of New Zealand family involvement in education. *School Psychology International*, 32, 600–615.

- Garbacz, S. A., Sheridan, S. M., Koziol, N. A., Kwon, K., & Holmes, S. R. (2015). Congruence in parent-teacher communication: Implications for the efficacy of CBC for students with behavioral concerns. *School Psychology Review*, 44, 150–168.
- Goodman, R. (2001). Psychometric properties of the Strengths and Difficulties Questionnaire. *Journal of the American Academy of Child and Adolescent Psychiatry*, 40, 1337–1345.
- Guli, L. A. (2005). Evidence-based parent consultation with school-related outcomes. *School Psychology Quarterly*, 20, 455–472.
- Henderson, A. T., & Mapp, K. L. (2002). *A new wave of evidence: The impact of school, family, and community connections on student achievement*. Austin, TX: Southwest Educational Development Laboratory.
- Hoover-Dempsey, K. V., Walker, J. M., Sandler, H. M., Whetsel, D., Green, C. L., Wilkins, A. S., & Closson, K. (2005). Why do parents become involved? Research findings and implications. *The Elementary School Journal*, 106, 105–130.
- Huntsinger, C. S., & Jose, P. E. (2009). Parental involvement in children's schooling: Different meanings in different cultures. *Early Childhood Research Quarterly*, 24, 398–410.
- Janssen, M., Baker, J. T. A., Bosman, A. M. T., Rosenberg, K., & Leseman, P. P. M. (2012). Differential trust between parents and teachers of children from low-income and immigrant backgrounds. *Educational Studies*, 38, 383–396.
- Jeynes, W. (2012). A meta-analysis of the efficacy of different types of parental involvement programs for urban students. *Urban Education*, 47, 706–742.
- Karakus, M., & Savas, A. C. (2012). The effects of parental involvement, trust in parents, trust in students and pupil control ideology on conflict management strategies of early childhood teachers. *Educational Sciences: Theory and Practice*, 12, 2977–2985.
- Kikas, E., Poikonen, P. L., Kontoniemi, M., Lyyra, A. L., Lerkkanen, M. K., & Niilo, A. (2011). Mutual trust between kindergarten teachers and mothers and its associations with family characteristics in Estonia and Finland. *Scandinavian Journal of Educational Research*, 55, 23–37.
- Lerkkanen, M. K., Kikas, E., Pakarinen, E., Poikonen, P. L., & Nurmi, J. E. (2013). Mothers' trust toward teachers in relation to teaching practices. *Early Childhood Research Quarterly*, 28, 153–165.
- Manz, P. H., Fantuzzo, J. W., & Power, T. J. (2004). Multidimensional assessment of family involvement among urban elementary students. *Journal of School Psychology Students*, 42, 461–475.
- McIntosh, K., Lucyshyn, J. M., Strickland-Cohen, M. K., & Horner, R. H. (2015). Building supportive environments: Toward a technology for enhancing fidelity of implementation. In F. Brown, J. Anderson & R. L. DePry (Eds.), *Individual positive behavior supports: A standards-based guide to practices in school and community-based settings* (pp. 401–415). Baltimore, MD: Brookes.
- Minke, K., Sheridan, S. M., Kim, E. M., Ryoo, J. H., & Koziol, N. (2014). Congruence in parent-teacher relationships: The role of shared perceptions. *The Elementary School Journal*, 114, 527–546.
- Moore, K. J., Garbacz, S. A., Dishion, T. J., Gau, J. M., Brown, K. L., Stormshak, E. A., & Seeley, J. R. (2016). Proactive parent engagement in public schools: Using a brief strengths and needs assessment in a multiple-gating risk management strategy. *Journal of Positive Behavior Interventions*, 18, 230–240.
- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). New York, NY: McGraw-Hill.
- Nzinga-Johnson, S., Baker, J. A., & Aupperlee, J. (2009). Teacher-parent relationships and school involvement among racially and educationally diverse parents of kindergartners. *The Elementary School Journal*, 110, 81–91.
- Rimm-Kaufman, S. E., & Pianta, R. C. (2005). Family-school communication in preschool and kindergarten in the context of a relationship-enhancing intervention. *Early Education and Development*, 16, 287–316.
- Schaeffer, C. M., Petras, H., Ialongo, N., Poduska, J., & Kellam, S. (2003). Modeling growth in boys aggressive behavior across elementary school: Links to later criminal involvement, conduct disorder, and antisocial personality disorder. *Developmental Psychology*, 39, 1020–1035.
- Sheridan, S. M., Bovaird, J. A., Glover, T. A., Garbacz, S. A., Witte, A., & Kwon, K. (2012). A randomized trial examining the effects of conjoint behavioral consultation and the mediating role of the parent-teacher relationship. *School Psychology Review*, 41, 23–46.
- Sourander, A., Multimäki, P., Nikolakaros, G., Haavisto, A., Ristkari, T., Helenius, H., & . . . Almqvist, F. (2005). Childhood predictors of psychiatric disorders among boys: A prospective community-based follow-up study from age 8 years to early adulthood. *Journal of the American Academy of Child and Adolescent Psychiatry*, 44, 756–767.
- Walker, J. M., Wilkins, A. S., Dallaire, J. R., Sandler, H. M., & Hoover-Dempsey, K. V. (2005). Parental involvement: Model revision through scale development. *The Elementary School Journal*, 106, 85–104.
- Westergård, E., & Galloway, D. (2004). Parental disillusionment with school: Prevalence and relationship with demographic variables, and phase, size and location of school. *Scandinavian Journal of Educational Research*, 48, 189–204.

Copyright of Psychology in the Schools is the property of John Wiley & Sons, Inc. and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.



*Research Article*

**Parental Support and High School Students' Motivation in Biology, Chemistry, and Physics: Understanding Differences Among Latino and Caucasian Boys and Girls**

Sandra D. Simpkins, Chara D. Price, and Krystal Garcia

*T. Denny Sanford School of Social and Family Dynamics, Arizona State University, Tempe, Arizona*

*Received 18 March 2014; Accepted 28 March 2015*

**Abstract:** Individuals are at an increased risk to drop out of the STEM pipeline if they are female or Latino, and during certain periods including high school. Families are a potential untapped resource of support for high school students. Based on the expectancy-value model, we examined if a variety of parental behaviors predicted students' ability self-concepts in and value they placed on biology, chemistry, and physics. Self-report surveys were collected from 988 9th grade Latino boys, Latina girls, Caucasian boys, and Caucasian girls. The findings suggest that, as early as the beginning of high school, students hold different motivational beliefs for biology, chemistry, and physics. Caucasian boys reported higher parental behaviors and motivational beliefs compared to Latino boys, Latina girls, and Caucasian girls. Latina girls reported the lowest parental behaviors and motivational beliefs. Parent education and Spanish language use partially explained some of these differences suggesting ethnic differences are in part due to differences among Caucasians and Latinos on parent education and language use. Parents' positivity, co-activity and school-focused behaviors predicted higher adolescent ability self-concepts and importance values in all three sciences for all adolescents in this study. Parents can support adolescents in science through a variety of behaviors at home. Many of these behaviors do not require parents to be science experts and thus may be attainable for a range of families. © 2015 Wiley Periodicals, Inc. *J Res Sci Teach*

**Keywords:** motivation; high school; families; adolescence; Latino; gender

Many talented and capable young people are turning away from careers in STEM (i.e., science, technology, engineering, and mathematics; National Science Board, 2014). The loss of science talent is particularly pronounced among females and Latinos in the physical sciences. For instance, the percentage of the Hispanic US population rose from 12% to 16% from 2000 to 2010 (Pew Research Center, 2012), but comparable gains were not realized in the percentage of college degrees. The percentage of science and engineering bachelor's degrees only increased from 7% to 8% during the same period (National Science Board, 2014). If left unchecked, this ethnic disparity for Latinos could worsen over time.

High school is the first time when students can drop out of science coursework. Adolescents who have minimal science coursework in high school can inadvertently close the door to STEM

---

Contract grant sponsor: The National Science Foundation; Contract grant number: DRL-1054798.

Correspondence to: Sandra D. Simpkins; e-mail: Sandra.simpkins@asu.edu

DOI 10.1002/tea.21246

Published online in Wiley Online Library (wileyonlinelibrary.com).

college majors and careers (Andersen & Ward, 2014; Chang, Sharkness, Hurtado, & Newman, 2014; Maltese & Tai, 2011). In fact, 45% of the 10th grade students interested in pursuing a STEM career lost that interest by the end of high school, making high school a pivotal point in the STEM pipeline (Aschbacher, Li, & Roth, 2010).

One of the strongest predictors of individuals' choices to pursue STEM through coursework and careers is their motivational beliefs (e.g., Britner, 2008; Else-Quest, Mineo, & Higgins, 2013; Maltese & Tai, 2011; Simpkins, Fredricks, & Eccles, in press; Watt, Shapka, Morris, Durik, Keating, & Eccles, 2012). Motivational beliefs, like ability self-concepts and values, predict choices even after controlling for individuals' actual ability and achievement. A recent theoretical piece on STEM career choices stated that motivational beliefs are one of the central determinants of success throughout the STEM pipeline (Ceci et al., 2009; Ceci, Williams, & Barnett, 2009). Despite the importance of motivational beliefs, science education scholars have noted that there is a dearth of research on science motivation (e.g., Vedder-Weiss & Fortus, 2011).

If motivational beliefs are critical, what ignites and sustains youths' science motivational beliefs? Several pieces of evidence suggest that encouragement and experiences outside of school are critical in order to persist in science. Specifically, students who do not fit the stereotype of a Caucasian male scientist often do not find school to be a supportive environment in terms of science and rely more heavily on support outside of school (Andersen & Ward, 2014; Brown, 2006; Johnson, Brown, Carlone & Cuevas, 2011; Mutegi, 2013; Stake & Mares, 2001). Family is consistently mentioned as an instrumental source of support (Dabney, Chakraverty & Tai, 2013). Family support was one key difference between high school students who maintained their interest in pursuing a STEM career throughout high school compared to peers who lost that interest (Aschbacher et al., 2010). In fact, many established Latino STEM professionals proclaimed that having a supportive family was one of the central reasons they succeeded through the pipeline (Taningco, 2008). Aligned with NARST's charge to look beyond the classroom (Rennie, Feher, Dierking, & Falk, 2003), the broad goals of this study were (a) to examine high school students' motivational beliefs and parental support, and (b) to test differences across Latino boys, Latina girls, Caucasian boys, and Caucasian girls.

### *Theoretical Foundation on Adolescents' Motivational Beliefs*

The study of youths' motivational beliefs has a long history within education and psychology resulting in multiple theories over the years (Wigfield, Eccles, Fredricks, Simpkins, Roeser, & Schiefele, 2015). Most theories focus on a specific aspect of youths' motivational beliefs, such as their beliefs about their abilities and expectancies, interest, basic needs, and achievement goals (e.g., Aschbacher et al., 2010; Beghetto, 2007; Harackiewicz et al., 2012; Harackiewicz, Rozerk, Hulleman, & Hyde, 2012; Meece, Anderman, & Anderman, 2006). The theories differ in the extent to which they address two fundamental questions youth face in science: Am I good at science and do I value science? In line with previous scholars, we argue that to persist in STEM, youth must believe they are good at science (i.e., self-concept of ability) *and* believe science is important (i.e., value) (Aschbacher et al., 2010; Ing, 2014). The Eccles' expectancy-value model is the leading theory that includes youths' ability self-concepts *and* their value beliefs within the same framework. According to this model, ability self-concepts and value beliefs are two of the most immediate precursors of adolescents' achievement-related choices (see Figure 1 in Wigfield et al., 2015).

The model also specifies what aspects of youths' environments influence their motivation and how that influence unfolds (see Figure 1 in Wigfield et al., 2015). Parents are children's first and primary socializing agents and continue to be central throughout development though the nature of their support changes (e.g., homework help to providing advice on college; Simpkins,

Fredricks, & Eccles, 2015). Parents can convey their beliefs about science through interactions with their children and by shaping children's exposure to science (Simpkins et al., 2015). Moreover, the larger cultural milieu, inclusive of gender roles, cultural practices, and ethnic stereotypes, is theorized to shape youths' motivational beliefs through its influence on youths' immediate environments (Wigfield et al., 2015). For example, societal gender role beliefs about whether science in general or specific areas of science are more appropriate for males than females influence parental beliefs, which in turn shape whether parents encourage science more for their sons than daughters (Simpkins et al., 2015). In other words, gender and ethnic differences in STEM are theorized to be partly the result of environmental and socialization differences at home and more broadly (e.g., school, media).

Although a number of researchers have used the expectancy-value model to guide their empirical work, a few significant gaps remain. First, in comparison to the wealth of research on gender, much less has been done on ethnic differences or differences at the intersection of gender and ethnicity. Second, most of the existing work on STEM motivation concentrates on math or science globally despite the fact that the pattern of disparities varies greatly across science subdisciplines (National Science Board, 2014). Third, the literature on parental supports is focused largely on students before high school (e.g., Crowley, Callanan, Tenenbaum & Allen, 2001; Vedder-Weiss & Fortus, 2011, 2012, 2013; Zimmerman, 2012). The work that does exist on parents of high school students has focused on science support broadly (e.g., Aschbacher et al., 2010; Ing, 2014). Though these studies point to the importance of parents for high school students, they provide little insight into what specific types of parental support matter.

### *Parents' Science-Related Support*

Parents' support is integral to students' academic success across subjects, developmental periods, and demographic groups (for a review, see Simpkins et al., 2015). Scholars vary in how they conceptualize and measure parents' behaviors. Much of the work in science addresses parental support globally or focuses on detailed qualities of parent-child interactions. Family support or encouragement, defined at a global level, is an important factor in youths' science motivation (e.g., Archer, DeWitt, & Willis, 2014; Aschbacher et al., 2010; Dabney et al., 2013; Navarro, Flores, & Worthington, 2007; Stake, 2006; Turner, Steward, & Lapan, 2004). Children's science motivation and achievement are also related to the quality of parent-child science interactions, such as types of explanations parents use in museums or the extent to which interactions are intrinsically focused or emphasize mastery goals (e.g., Crowley et al., 2001; Ing, 2014; Vedder-Weiss & Fortus, 2013). Importantly, these studies suggest that how parents interact and talk with youth about science matters. They provide less insight, however, into the frequency in which parents engage in these behaviors and the multitude of ways that parents can support adolescents in science.

Several scholars have examined how often parents are involved in their child's school through a variety of behaviors, such as involvement in the PTA, attendance at parent-teacher conferences, and help with homework (Hill & Tyson, 2009). Although these traditional forms of family involvement predict youths' academic achievement from elementary through high school, they often occur on the school campus and focus on school-related tasks. Additional work is needed to provide a more comprehensive understanding of how parents support science specifically at home (Lee & Bowen, 2006) that incorporates the many meaningful ways ethnic minority families support their children academically (Zarate, 2007; Zimmerman, 2012). For example, parents' provision of enriching experiences at home, such as playing math games, hobbies, and activities around taking care of a family pets, were central to children's STEM interest, knowledge, and skills (Dabney et al., 2013; LeFevre, Skwarchuk, Smith-Chant, Fast, Kamawar, & Bisanz, 2009; Zimmerman, 2012). The emerging work on such relations in STEM suggests that parents' support

of math or math/science (combined) predicts Caucasian children's motivational beliefs in elementary and middle school (Simpkins, Davis-Kean, & Eccles, 2005; Simpkins, Fredricks, & Eccles, 2012, in press). Unfortunately, few studies on science have taken such a comprehensive and complex view of parents' science-related behaviors, particularly in high school.

### *Group Differences in Measurement, Means, and Process*

Group differences are a pervasive theme in STEM. Disparities based on gender and ethnicity/race exist in STEM motivation, achievement, coursework, and careers (e.g., Johnson et al., 2011; Mutege, 2013; Wigfield et al., 2015). For example, Latinos and females tend to be at a disadvantage compared to Caucasians and males in terms of science motivational beliefs (e.g., Andersen & Ward, 2014; Beghetto, 2007; Bouchee & Harter, 2005; Fortus & Vedder-Weiss, 2014; Stake, 2006; Stake & Mares, 2001; see Britner, 2008; Else-Quest et al., 2013 for exceptions). Parent support often varies across demographic groups as well. In a hallmark study, parents were three times more likely to provide an explanation to boys than to girls at a science museum (Crowley et al., 2001). Although several inequalities based on gender and ethnicity have been identified, we argue that the previous work has failed to address the full scope of potential group differences.

One of the central weaknesses of previous research is that gender and ethnic inequalities largely have been examined independently. Recent work poignantly points out that gender and ethnicity do not function independently in young people's lives and that researchers need to consider the intersection of gender and ethnicity to truly understand individuals' pursuit of STEM (Aschbacher et al., 2010; Johnson et al., 2011). Students who do not fit the stereotype of a Caucasian male scientist and identify with demographic groups who have historically been treated as inferior in society are more likely to face challenges at school and question the extent to which science is an appropriate pursuit for them (Johnson et al., 2011; Mutege, 2013). In addition, certain groups defined by both gender and ethnicity may be at-risk to face substantial challenges due to traditional cultural values. For example, Latina girls have reported feeling pressure to conform to traditional gender roles and did not receive family support to aspire to college or science specifically (Aschbacher et al., 2010).

A second weakness of previous research is that the majority of research on inequalities focuses on mean-level differences, which address whether one group scores higher than another group on an indicator. Little is known concerning the two other ways groups can differ. First, it is important to test whether the constructs (e.g., self-concept of ability) have similar meaning and function similarly across groups. This is known as measurement invariance, and provides the foundation of all scientific research on group differences (Millsap, 2011). Without this, it is unclear if group differences reflect actual group differences on the same phenomenon or group biases in the instruments. Second, it is possible to have group differences in the processes, or that the predictors of adolescents' science motivation vary across groups. Scholars have speculated that science-related support may be more influential for youth who do not fit the stereotype of the Caucasian male scientist, such as females and ethnic minority youth (Andersen & Ward, 2014; Aschbacher et al., 2010; Johnson et al., 2011; Stake & Mares, 2001). According to this literature, Latina girls may benefit most as they do not fit the science stereotype in terms of both gender and ethnicity and in turn often face multiple challenges (Johnson et al., 2011). There also may be differences in the predictive power of parental support among the four specific groups, such as support being more influential for Latino boys compared to Caucasian boys. If there are differences in the predictors of adolescents' pursuit of STEM, interventions or programs need to be tailored specifically to each group to maximize effectiveness.

These types of group differences are independent. For example, Simpkins, Fredricks, and Eccles (in press) tested these three types of gender differences in math. Youths' math ability self-

concepts and value, as well as parents' math-related behaviors had a similar meaning across girls and boys (i.e., measurement invariance). Girls and boys reported similar math values and parental supports, but girls often had lower math ability self-concepts than boys (i.e., mean-level differences). Despite that girls had lower math self-concepts than boys, having parental support predicted similar increases in girls' and boys' math ability self-concepts (i.e., lack of moderation based on gender). In other words, girls *and* boys were more likely to experience increases in their math ability self-concepts over time if parents provided high math-related support. However, testing group differences at multiple levels has only been studied systemically in math (Lazarides & Ittel, 2012; Watt et al., 2012). Examination of group differences at all three levels provides a more comprehensive description of the potential differences, which is necessary to provide appropriate advice to teachers and parents.

### *The Current Study*

The goals of this study were to test if parental behaviors predict adolescents' motivation and whether there were group differences in terms of the measurement, means, and processes in parents' behaviors and adolescents' science motivation. Latino and Caucasian students were selected as the two ethnic/racial groups for this study because Caucasians account for the largest percentage of STEM majors and careers, whereas Latinos comprise one of the lowest percentages and may experience increasing STEM disparities in the future (National Science Board, 2014). Moreover, Latinos and Caucasians have received the least and most attention in previous research (respectively). By including Caucasians, we can understand if the measures and results follow expected trends. Our specific hypotheses were:

- a Adolescents will differentiate between biology, chemistry, and physics in their ability self-concepts and their importance values, as well as between types of supportive parenting behaviors.
- b We expect these indicators will have similar measurement properties across the four groups: Latino boys, Latina girls, Caucasian boys, and Caucasian girls.
- c We expect Caucasian boys will have higher motivational beliefs in chemistry and physics and parental behaviors compared to Latino boys and Caucasian girls, who in turn will be higher than Latina girls. In addition, we expect Caucasian girls will have higher biology motivational beliefs compared to Caucasian boys and Latina girls, who in turn will be higher than Latino boys.
- d We expect parents' behaviors will positively predict adolescents' motivational beliefs, and that these relations will be stronger for ethnic minority and female adolescents compared to Caucasian boys.

## Methods

### *Participants*

Participants were drawn from three public high schools in a large metropolitan area in the southwest. As shown in Table 1, each school had a large proportion of Caucasian and Hispanic students. School C was the smallest school, had a higher percentage of lower income students, and had lower science and math achievement rates on statewide tests compared to the other two schools. In all schools, the ninth grade honors science course was honors biology. The basic science course varied by school.

Table 1  
*School information<sup>a</sup>*

|                                                               | School A | School B | School C |
|---------------------------------------------------------------|----------|----------|----------|
| Total student population                                      | 3,175    | 2,637    | 1,285    |
| 9 <sup>th</sup> grade student population                      | 841      | 746      | 331      |
| Ethnic composition                                            |          |          |          |
| % Caucasian                                                   | 43%      | 53%      | 36%      |
| % Hispanic                                                    | 39%      | 23%      | 48%      |
| Eligible for free/reduced lunch                               | 30%      | 17%      | 63%      |
| 4-year graduation rate                                        | 93%      | 91%      | 79%      |
| 10 <sup>th</sup> grade students who passed the statewide test |          |          |          |
| Science                                                       | 68%      | 62%      | 29%      |
| Math                                                          | 72%      | 63%      | 38%      |
| Reading                                                       | 83%      | 83%      | 69%      |
| Response rate                                                 | 84%      | 71%      | 55%      |

<sup>a</sup>2012 AIMS Assessment Report, Arizona Department of Education; 2011 National Center for Education Statistics Common Core Data.

All ninth grade adolescents were invited to participate. Active consent was collected by sending letters home to parents in English and Spanish. In total, 1,324 ninth grade students completed the survey. Because the questions in this study focus on processes for Latino and Caucasian students, data from Latino and Caucasian students were retained for this paper. The sample included 988 students (51% Latino, 49% female). Participant demographic information is presented for each of the four focal groups in Table 2.

### *Procedures*

Participants completed a self-report survey during class in fall 2012. Each participant received \$5 in cash as compensation. Although Spanish surveys were available, all students completed the survey in English.

*Parents' Behavior.* Family support was collected using a 23-item measure developed from two existing measures and adapted to ask about supportive behaviors specific to science (Bouchey & Harter, 2005; Price & Simpkins, 2011; "Help you feel better when science is hard" and "Look at science websites with you;" 1=*never*, 5=*always*). Because such a large number of items can create identification problems in structural equation models, we created 11 parcels to use as indicators in the analyses (Little, Cunningham, Shaher, & Widaman, 2002). Each parcel was the average of the two items that comprised the parcel. The parcels were based on two criteria. We first identified potential parcels that included homogenous items tapping theoretically similar parental behaviors. Second, we confirmed and adjusted the parcels based on factor analysis. The factor analysis suggested there were three types of parent behaviors: (a) positivity with four parcels (b) co-activity with three parcels, and (c) school-focused behavior with four parcels. The full list of scales, parcels, and individual items can be found in Table S1 in the supplementary material. Table 2 includes information on reliability and descriptive statistics.

*Self-Concept of Ability.* Adolescents reported their beliefs about their abilities in biology, chemistry, and physics with four items in each subdiscipline on a 7-point scale (see Table S2 in the supplementary material for the items and Table 2 for reliability and descriptive statistics; an example item is "How good at (biology/chemistry/physics) are you?" 1=*not at all good*, 7=*very*



Table 2  
Participant information

|                                             | Latino boys       | Latina girls      | Caucasian boys    | Caucasian girls   |
|---------------------------------------------|-------------------|-------------------|-------------------|-------------------|
| Participant information                     |                   |                   |                   |                   |
| N                                           | 268               | 251               | 231               | 238               |
| Adolescent information                      |                   |                   |                   |                   |
| % U.S. born                                 | 88%               | 88%               | 98%               | 99%               |
| % Honors science course                     | 23%               | 31%               | 45%               | 45%               |
| Science grade [ <i>M</i> (SD)] <sup>a</sup> | 2.81 (1.06)       | 2.89 (1.01)       | 3.09 (.93)        | 3.13 (.86)        |
| Parent information                          |                   |                   |                   |                   |
| Language [ <i>M</i> (SD)] <sup>b</sup>      | 2.88 (1.22)       | 2.97 (1.28)       | 4.89 (.41)        | 4.89 (.31)        |
| % College education <sup>c</sup>            | 51%               | 49%               | 87%               | 87%               |
| % U.S. born                                 | 53%               | 58%               | 95%               | 97%               |
| Family information                          |                   |                   |                   |                   |
| % 2-parent household                        | 68%               | 68%               | 77%               | 72%               |
| Scale statistics <i>M</i> (SD) [ $\alpha$ ] |                   |                   |                   |                   |
| Parent behaviors                            |                   |                   |                   |                   |
| Co-activity                                 | 2.16 (.90) [.86]  | 1.93 (.70) [.73]  | 2.25 (.89) [.85]  | 2.04 (.73) [.74]  |
| Positivity                                  | 2.58 (1.02) [.87] | 2.46 (1.01) [.88] | 2.85 (.99) [.85]  | 2.70 (1.02) [.87] |
| School-focused                              | 2.90 (.97) [.80]  | 2.81 (.99) [.80]  | 3.12 (1.00) [.79] | 3.05 (.97) [.75]  |
| Ability self-concepts                       |                   |                   |                   |                   |
| Biology                                     | 4.23 (1.08) [.85] | 3.99 (1.11) [.88] | 4.61 (1.21) [.89] | 4.52 (1.14) [.88] |
| Chemistry                                   | 4.18 (1.25) [.91] | 3.81 (1.28) [.92] | 4.62 (1.22) [.92] | 4.25 (1.26) [.92] |
| Physics                                     | 4.28 (1.33) [.93] | 3.73 (1.30) [.93] | 4.70 (1.35) [.95] | 4.22 (1.39) [.95] |
| Importance values                           |                   |                   |                   |                   |
| Biology                                     | 4.70 (1.34) [.81] | 4.74 (1.32) [.84] | 4.70 (1.42) [.88] | 4.80 (1.32) [.84] |
| Chemistry                                   | 4.58 (1.39) [.89] | 4.39 (1.47) [.90] | 4.70 (1.34) [.89] | 4.38 (1.47) [.91] |
| Physics                                     | 4.74 (1.43) [.91] | 4.38 (1.55) [.91] | 4.90 (1.40) [.93] | 4.26 (1.49) [.93] |

<sup>a</sup>The response scale was 0 = F/E, 1 = D, 2 = C, 3 = B, 4 = A.

<sup>b</sup>The response scale was 1 = *only Spanish*, 2 = *More Spanish than English*, 3 = *Both equally*, 4 = *More English than Spanish*, 5 = *only English*.

<sup>c</sup>This is the percent of youth who had one or two parents with at least some college education.

*good*). The scales have excellent face, convergent, and discriminant validity, as well as strong psychometric properties (e.g., Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002).

**Importance Value.** Adolescents reported how much importance they placed on biology, chemistry, and physics with the same three items in each subdiscipline on a 7-point scale (see Table S2 for the items and Table 2 for reliability and descriptive statistics; an example item is "How useful is what you learn in (biology/chemistry/physics) ?" 1 = *Not at all useful*, 7 = *Very useful*). The scales have good reliability and excellent convergent and discriminate validity (e.g., Jacobs et al., 2002).

**Demographic Controls.** Demographic characteristics about the adolescents and their parents were collected (see Table 2 for descriptive statistics). Adolescents' science class (0 = *basic*, 1 = *honors*) and self-reported science grade (0 = *F/E*, 4 = *A*) were collected. We also included indicators of parental socioeconomic status (i.e., SES) and language use as they are important predictors of children's science outcomes (e.g., Archer et al., 2014; Carlone, Scott, & Lowder, 2014; Crosnoe & Lopez Turley, 2011). Parent education was selected as the indicator of family SES because scholars have raised concerns about adolescents' ability to accurately report family income (Ensminger et al., 2000). Adolescents reported their mothers' and fathers' level of

education (0=*less than high school*, 5=*more than a college degree*) and Spanish language use (i.e., one item; “what language does your mom mostly read and speak”; 1 = *only Spanish*, 5 = *only English*; Marin, Sabogal, Marin, Otero-Sabogal, & Perez-Stable, 1987). In order to include information on both parents in the analyses, we created summary variables across mothers and fathers. For parent education, we created an indicator noting if one or both parents had at least some college ( $r = .65, p < .001$ ; 0=both parents had a high school degree or less, 1 = 1 or both parents had at least some college education). For parent Spanish language use, we took the mean of the one item across mothers and fathers ( $r = .82, p < .001$ ). Finally, adolescents reported the number of parents living in the home (0 = *1 parent*, 1 = *2 parents*). These demographic indicators were included in the analyses to control for differences due to socioeconomic status as well as other parent and adolescent characteristics known to predict parent behavior and adolescent motivational beliefs.

### *Plan of Analysis*

Before we discuss the specific analysis used to address each question, we need to describe some general information applicable to all analyses. We calculated design effects because we were concerned with non-independence of the data decreasing the size of the standard error and increasing the likelihood of a Type I error (Muthén & Sattora, 1995). Our design effects were less than .05 which is lower than the 2.0 cutoff suggesting that the non-independence of the data was ignorable (Muthén & Muthén, 1998-2010).

All analyses were estimated with structural equation models in MPlus v7.11. Structural equation models (SEM) allow researchers to test complex models and statistics like those posed in this study and to examine relations among indicators where measurement error has been removed (Little, 2013). We used several indicators of model fit, including the CFI (comparative fit index), RMSEA (root mean squared error of approximation), SRMR (standardized root mean square residual), and chi-square. Models that fit the data well are indicated by a  $CFI \geq .95$ ,  $RMSEA \leq .05$ , and  $SRMR \leq .05$  (Millsap, 2011). Adequate models are indicated by a  $CFI \geq .90$ ,  $RMSEA \leq .08$ , and  $SRMR \leq .08$ .

In addition to these overall model statistics, we examined the difference between nested models to test three of our four hypotheses. In order to test whether the difference between two nested models is meaningful, scholars traditionally have used the change in chi-square (i.e.,  $\Delta X^2$ ). However, when sample size is large as is true in this study, the change in  $X^2$  can be statistically significant when the change in the model is relatively small. Experts have recommended also using the criterion of a change in CFI that is less than .010 (i.e.,  $\Delta CFI < .010$ ) to indicate if the findings are similar across groups (Little, 2013). We determined that two models were *not* similar if (a) the overall model fit was poor or (b) the  $\Delta X^2$  was statistically significant *and* the  $\Delta CFI \geq .010$ .

Because our missing data were negligible (i.e., every student had data, only 0.2–1.8% of the items were skipped across students), we retained cases with missing data and used a maximum likelihood estimator. To identify each latent variable, we fixed the loading of one indicator to 1.0. Following recommendations on estimating models that have the same items across content areas, we estimated the covariances between the unique variances of the same measured indicator across the three science subdisciplines (Little, 2013). For example, the three covariances between the item “I am good at (biology/chemistry/physics) ?” across each of the three science subdisciplines were estimated. Finally, we estimated separate models for individuals’ ability self-concepts and importance values to avoid statistical problems associated with multicollinearity and because our goal was to test if adolescents differentiated between the three subdisciplines of science within each motivational belief.

## Results

*Do Adolescents Differentiate Across Parental Behaviors and Science Disciplines?*

In order to address this first question, we tested if a model with three latent variables did a better job describing the data than a model with one latent variable. For example, in the first model, all 12 items measuring adolescents' ability self-concept were fixed to load on a single science latent variable. In the second model, the same 12 items were divided among three latent variables that differentiated between biology, chemistry, and physics ability self-concepts. Two similar models were estimated for adolescents' importance values. The models with parents' behaviors examined (a) if parents' behaviors formed one general type of science support or (b) if there were three different types of science support. These models were estimated on the full sample. In each case, we examined overall model fit of each model and the difference in model fit across the two nested models.

The overall model statistics shown in Table 3 suggest that the models with one overarching indicator were not as good as the models differentiating multiple indicators. The models with a single latent variable did not describe the data well, as noted in the poor overall fit statistics (i.e., CFI = .67–.88, RMSEA = .12–.29, SRMR = .05–.11). In contrast, the models with three latent variables represented the data well (i.e., CFIs = .95–.99, RMSEA = .04–.08, SRMR = .01–.03). The significant differences in the overall model fit between the two models also confirms that the models with three latent variables were better than the models with one latent variable (i.e.,  $\Delta X^2$  ( $\Delta df = 3$ ) = 426.05–3297.32,  $p < .001$ ;  $\Delta CFI = .07$ –.25). In other words, the statistics suggest that adolescents differentiate between the three parental behaviors (see Table S1 for the items and scales), their ability self-concepts in the three science subdisciplines, and their importance values in the three science subdisciplines. This is evidence of discriminant validity that parents' behaviors included three broader types of behaviors and that adolescents' motivational beliefs are separate for the three science subdisciplines.

*Do the Scales Function Similarly for Latino Boys, Latina Girls, Caucasian Boys, and Caucasian Girls?*

To address this second question, we tested for measurement invariance in parents' behaviors, adolescents' ability self-concepts, and adolescents' importance values (Millsap, 2011). Testing for measurement invariance is important to understand if bias exists in the measurement tools. If the scales are not invariant and include bias that varies across the groups, we would be unable to make group comparisons. It would be akin to the common phrase "comparing apples to oranges."

Table 3  
*Model fit indicators for the 1- and 3-latent variable models*

| Model                             | (df) $X^2$      | CFI  | RMSEA | SRMR | ( $\Delta df$ ) $\Delta X^2$ | $\Delta CFI$ |
|-----------------------------------|-----------------|------|-------|------|------------------------------|--------------|
| Parents' behavior                 |                 |      |       |      |                              |              |
| 1-latent model                    | (44) 742.93***  | .884 | .127  | .055 |                              |              |
| 3-latent model                    | (41) 316.88***  | .954 | .083  | .037 | (3) 426.05***                | .070         |
| Adolescents' ability self-concept |                 |      |       |      |                              |              |
| 1-latent model                    | (42) 3526.20*** | .670 | .290  | .117 |                              |              |
| 3-latent model                    | (39) 228.88***  | .982 | .070  | .024 | (3) 3297.32***               | .258         |
| Adolescents' importance values    |                 |      |       |      |                              |              |
| 1-latent model                    | (18) 1453.00*** | .804 | .284  | .075 |                              |              |
| 3-latent model                    | (15) 45.00***   | .996 | .045  | .018 | (3) 1408.00***               | .192         |

\*\*\* $p < .001$ .

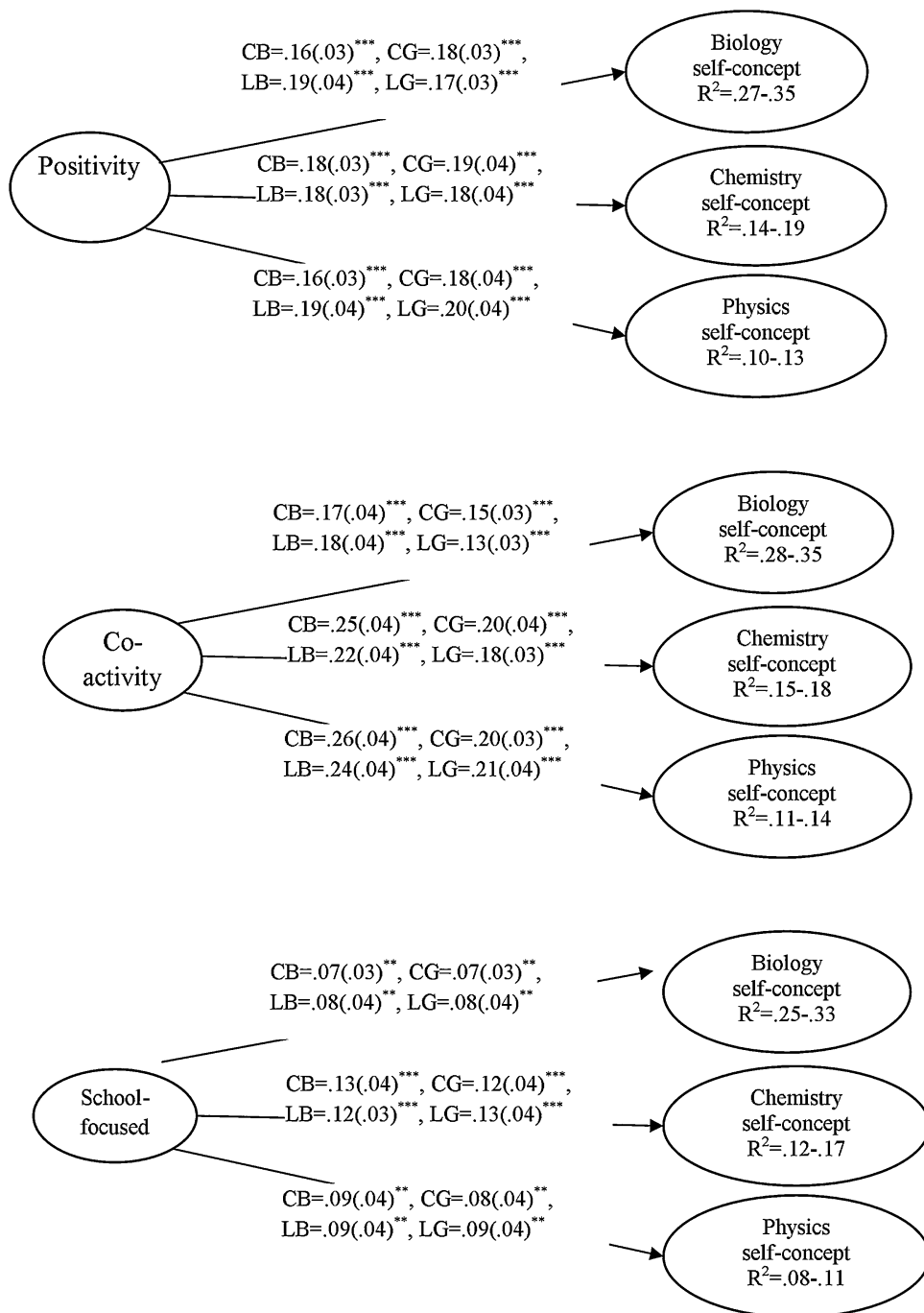


*Figure 1.* Results showing whether parents' behaviors predict adolescents' ability self-concepts. The standardized path estimates and (standard errors) are presented for each group: CB, Caucasian boys; CG, Caucasian girls; LB, Latino boys; LG, Latina girls.

A full description of the results including the table with model fit statistics (see Table S3), a conceptual figure (see Figure S1) are presented in the supplementary material. Here, we provide a brief overview. Overall, the data suggest that adolescents' reports of parents' behaviors, ability self-concepts, and importance values are similar across Latino boys, Latina girls, Caucasian boys, and Caucasian girls. The specific tests suggested that the same items represented these constructs for each group (i.e., configural and weak invariance) and that the item intercepts were similar across groups (i.e., strong invariance). These findings suggest that the constructs are similar across all groups and gives confidence that differences across groups are *not* the result of measurement bias.

### *Are There Mean-Level Differences in These Constructs Across Groups?*

We tested if there were mean-level differences across the four groups by examining the differences in the latent means. Testing differences through latent means is optimal compared to traditional analysis of variance techniques as measurement error should be removed from the latent variable. We estimated several models to calculate all possible comparisons across the four groups. To provide a more comprehensive examination, we tested mean-level differences two ways: (a) differences without any control variables, and (b) differences that existed after controlling for parent education and Spanish language use. In each model, the means for one group were set to zero. The means for the other three groups were estimated, which make the numbers presented in Table 4 the relative differences.

The most consistent differences in parents' behaviors emerged when comparing Caucasian boys to Latino boys and Latina girls. In the models where we did not account for parent characteristics, Caucasian boys reported higher parent co-activity, positivity, and school-focused behavior than Latino boys and Latina girls. These differences were small to moderate in size. However, all but one of the differences diminished when we accounted for parent education and Spanish language use. Specifically, the size of many of these differences (i.e., the *d* statistics in Table 4) was cut in half once we accounted for parents' characteristics. These changes suggest that the differences among these groups are largely the result of differences in parent education and Spanish language use rather than differences in ethnicity.

Adolescents' ability self-concept in biology, chemistry, and physics varied across groups. Caucasian boys had higher ability self-concepts in all three science subdisciplines compared to every other group when we did not account for parents' characteristics. These differences ranged from small to large depending on the comparison group. Latina girls had lower ability self-concepts than all other groups, many of which were moderate to large discrepancies. Caucasian girls only differed from Latino boys in their biology self-concept, where girls were higher. Some of these differences became non-significant and diminished in size in the models controlling for parent education and language. Specifically, the differences across ethnic groups within the same gender changed in their level of significance and many of the effect sizes were reduced by half. All of the differences among Caucasian and Latino boys became non-significant once parent characteristics were account for. All of the differences among Caucasian and Latina girls either diminished or became non-significant as well. The gender differences within each ethnic group, such as Latina girls reporting lower means than Latino boys, remained.

In comparison to ability self-concepts, there were not many differences among the groups for importance values. Most of the differences emerged in physics. In the models without parent characteristics, Caucasian and Latino boys had higher physics importance values than Caucasian and Latina girls. The inclusion of parent characteristics did not change the size of these differences in physics importance, except for the differences between Caucasian girls and Latino boys became smaller.

Table 4  
Relative mean differences without controls (top half) and with controls for parent education and language (bottom half)

| Indicator                                                            | Caucasian boys compared to Latino boys |                | Latina girls compared to Latino boys |                | Caucasian girls compared to Latino boys |                | Latina girls compared to Caucasian girls |                | Caucasian girls compared to Caucasian boys |                | Latina girls compared to Caucasian boys |                |
|----------------------------------------------------------------------|----------------------------------------|----------------|--------------------------------------|----------------|-----------------------------------------|----------------|------------------------------------------|----------------|--------------------------------------------|----------------|-----------------------------------------|----------------|
|                                                                      | B (SE)                                 | d <sup>a</sup> | B (SE)                               | d <sup>a</sup> | B (SE)                                  | d <sup>a</sup> | B (SE)                                   | d <sup>a</sup> | B (SE)                                     | d <sup>a</sup> | B (SE)                                  | d <sup>a</sup> |
| Mean differences with no controls                                    |                                        |                |                                      |                |                                         |                |                                          |                |                                            |                |                                         |                |
| Parents' behavior                                                    |                                        |                |                                      |                |                                         |                |                                          |                |                                            |                |                                         |                |
| Co-activity                                                          | .27 (.01)**                            | .29            | -.09 (.09)                           | .10            | .10 (.09)                               | .11            | .20 (.10)                                | .21            | -.15 (.10)                                 | .17            | -.35 (.10)***                           | .38            |
| Positivity                                                           | .21 (.09)*                             | .22            | -.19 (.08)*                          | .22            | -.06 (.09)                              | .07            | .13 (.08)                                | .15            | -.26 (.10)**                               | .29            | -.38 (.10)***                           | .44            |
| School-focused                                                       | .25 (.09)**                            | .29            | -.09 (.08)                           | .10            | .06 (.09)                               | .07            | .15 (.09)                                | .18            | -.17 (.09)                                 | .21            | -.33 (.09)                              | .37            |
| Adolescents' ability self-concept                                    |                                        |                |                                      |                |                                         |                |                                          |                |                                            |                |                                         |                |
| Biology                                                              | .45 (.11)***                           | .38            | -.23 (.10)*                          | .21            | .36 (.11)**                             | .32            | -.60 (.11)***                            | .51            | -.09 (.12)                                 | .07            | -.68 (.12)***                           | .57            |
| Chemistry                                                            | .48 (.11)***                           | .39            | -.38 (.11)***                        | .30            | .11 (.11)                               | .09            | -.48 (.12)***                            | .39            | -.38 (.12)***                              | .31            | -.86 (.12)***                           | .69            |
| Physics                                                              | .48 (.11)***                           | .37            | -.52 (.12)***                        | .41            | .01 (.12)                               | .01            | -.54 (.12)***                            | .43            | -.47 (.13)                                 | .35            | -1.01 (.12)***                          | .79            |
| Adolescents' importance values                                       |                                        |                |                                      |                |                                         |                |                                          |                |                                            |                |                                         |                |
| Biology                                                              | -.02 (.12)                             | .02            | .03 (.11)                            | .02            | .12 (.12)                               | .10            | -.09 (.12)                               | .08            | .14 (.12)                                  | .23            | .05 (.12)                               | .02            |
| Chemistry                                                            | .10 (.13)                              | .08            | -.22 (.13)                           | .16            | -.19 (.13)                              | .14            | -.03 (.13)                               | .02            | -.29 (.13)*                                | .46            | -.32 (.13)*                             | .17            |
| Physics                                                              | .16 (.13)                              | .11            | -.37 (.14)**                         | .24            | -.46 (.13)***                           | .32            | -.10 (.14)                               | .06            | -.62 (.14)                                 | .43            | -.53 (.14)                              | .46            |
| Mean differences after controlling for parent education and language |                                        |                |                                      |                |                                         |                |                                          |                |                                            |                |                                         |                |
| Parents' behavior                                                    |                                        |                |                                      |                |                                         |                |                                          |                |                                            |                |                                         |                |
| Positivity                                                           | .03 (.12)                              | .03            | -.05 (.09)                           | .06            | -.11 (.11)                              | .12            | .63 (.11)                                | .07            | -.12 (.10)                                 | .13            | -.06 (.12)                              | .06            |
| Co-activity                                                          | .11 (.11)                              | .11            | -.15 (.08)                           | .18            | -.16 (.11)                              | .18            | .02 (.10)                                | .03            | -.25 (.10)                                 | .28            | -.22 (.11)*                             | .26            |
| School-focused                                                       | .03 (.11)                              | .04            | -.05 (.08)                           | .06            | -.13 (.11)                              | .15            | .08 (.11)                                | .10            | -.14 (.09)                                 | .17            | -.05 (.11)                              | .07            |
| Adolescents' ability self-concept                                    |                                        |                |                                      |                |                                         |                |                                          |                |                                            |                |                                         |                |
| Biology                                                              | .18 (.14)                              | .16            | -.20 (.10)*                          | .18            | .12 (.13)                               | .11            | -.31 (.14)*                              | .28            | -.06 (.12)                                 | .05            | -.38 (.14)**                            | .32            |
| Chemistry                                                            | .12 (.14)                              | .10            | -.39 (.11)***                        | .29            | -.27 (.14)                              | .22            | -.09 (.14)                               | .08            | -.36 (.19)***                              | .32            | -.48 (.15)***                           | .39            |
| Physics                                                              | .30 (.15)*                             | .23            | -.49 (.12)***                        | .39            | -.19 (.15)                              | .14            | -.31 (.15)*                              | .24            | -.49 (.13)                                 | .37            | -.79 (.15)***                           | .63            |
| Adolescents' importance values                                       |                                        |                |                                      |                |                                         |                |                                          |                |                                            |                |                                         |                |
| Biology                                                              | .04 (.15)                              | .03            | .07 (.11)                            | .05            | .19 (.14)                               | .16            | -.12 (.14)                               | .10            | .15 (.12)                                  | .12            | .03 (.15)                               | .02            |
| Chemistry                                                            | .05 (.16)                              | .03            | -.19 (.13)                           | .14            | -.24 (.16)                              | .18            | .05 (.17)                                | .03            | -.28 (.13)*                                | .21            | -.24 (.16)                              | .17            |
| Physics                                                              | .35 (.17)*                             | .25            | -.33 (.14)*                          | .23            | -.28 (.17)                              | .19            | -.06 (.18)                               | .04            | -.62 (.14)                                 | .43            | -.68 (.17)                              | .46            |

A negative value suggests that the first group has a lower mean than the second group whereas, a positive value suggests that the first group has a higher mean than the second group.

\* $p < .05$ .

\*\* $p < .01$ .

\*\*\* $p < .001$ .



*Do Parents' Behaviors Predict Adolescents' Motivation for All Four Groups?*

One central goal of this study was to examine whether parents' behaviors predicted adolescents' motivational beliefs and whether these relations varied across the four groups. These multi-group models included the measurement models with the invariance constraints based on the earlier analyses. In addition, we included parents' behavior and the predictive paths from parents' behavior to adolescents' motivational beliefs. Models for each parent behavior had to be estimated separately as parents' behaviors were highly correlated ( $r = .68-.73$ ,  $p's < .001$ ). Models including all three parental behaviors had issues with multicollinearity.

We also included a series of control variables that predicted parents' behaviors and adolescents' motivational beliefs. The control variables included students' science grade, and whether they were in a basic versus honors science course; parents' education and Spanish language use; and number of parents in the home. Initially, we estimated the path from each control variable to predict each latent variable included in the model. Following recommendations to not over control (Little, 2013), we dropped paths when a control variable did not significantly predict a particular latent variable at the  $p < .10$  level. If a control variable did not significantly predict any of the latent variables in a particular model, it was dropped from that model. The specific findings concerning the control variables are available from the first author.

First, we examined if the predictive paths from parents' behaviors to adolescents' motivational beliefs varied across groups. To test this, we examined the difference between two nested models through a multi-group analysis: (a) a model in which the predictive paths were freely estimated across groups and (b) a model in which the predictive paths were constrained to be equal across all four groups. A path was considered significantly different across groups if the change in chi-square was significant at  $p < .001$  (Little, 2013). The model fit statistics are presented in Table 5. The change in chi-square for every model except one was less than our criteria of  $p < .001$  suggesting that parents' behaviors predicted adolescents' motivational beliefs in a similar way across all four groups. The one exception was that the predictive power of parents' positivity in predicting adolescents' importance values varied across groups (as noted with the significant change in chi-square in Table 5). Follow-up tests revealed that the path from positivity to the importance adolescents placed on biology was different for Caucasian boys compared to the other three groups who were similar to each other. Specifically, positivity predicted adolescents' biology importance values for all groups, but this relation was stronger for Caucasian boys compared to the other three groups.

Figures 1 and 2 display the results for the models with ability self-concepts and importance values respectively. As shown in Figure 1, parents' positivity, co-activity, and school-focused behaviors predicted adolescents' ability self-concepts in biology, chemistry, and physics. All of the paths were statistically significant and positive suggesting that parents who engaged in more of these behaviors had adolescents with higher ability self-concepts in all three science subdisciplines. The r-squared statistics (i.e.,  $R^2$ ) are presented in the figures as well. Those suggest that the parental behavior and control variables accounted for 8–35% of the variance in adolescents' ability self-concepts.

The results in Figure 2 suggest that parents' positivity, co-activity, and school-focused behavior predicted the value adolescents placed on biology, chemistry, and physics. Parallel to the ability self-concept models, all of the paths were statistically significant and positive suggesting that parental behaviors predicted higher value of biology, chemistry, and physics. These parental behaviors predicted even after controlling for adolescents' science class and grade, as well as parent education, Spanish language use, and whether they lived with their partner. These parental

Table 5

*Model fit indicators for the models in which the paths from parents' behaviors to adolescents' motivational beliefs are freely estimated and constrained across groups*

| Model                                  | (df) $\chi^2$    | CFI  | RMSEA | SRMR | ( $\Delta$ df) $\Delta\chi^2$ |
|----------------------------------------|------------------|------|-------|------|-------------------------------|
| Models predicting ability self-concept |                  |      |       |      |                               |
| Co-activity                            |                  |      |       |      |                               |
| Paths free                             | (702) 1004.74*** | .975 | .042  | .053 |                               |
| Paths constrained                      | (711) 1021.04*** | .975 | .042  | .059 | (9) 16.30                     |
| Positivity                             |                  |      |       |      |                               |
| Paths free                             | (703) 1084.92*** | .971 | .047  | .056 |                               |
| Paths constrained                      | (712) 1097.79*** | .971 | .047  | .061 | (9) 12.87                     |
| School-focused                         |                  |      |       |      |                               |
| Paths free                             | (627) 865.77***  | .979 | .039  | .053 |                               |
| Paths constrained                      | (636) 873.40***  | .980 | .039  | .056 | (9) 7.63                      |
| Models predicting importance values    |                  |      |       |      |                               |
| Co-activity                            |                  |      |       |      |                               |
| Paths free                             | (486) 678.72***  | .979 | .040  | .057 |                               |
| Paths constrained                      | (495) 690.35***  | .979 | .040  | .059 | (9) 11.63                     |
| Positivity                             |                  |      |       |      |                               |
| Paths free                             | (487) 697.71***  | .979 | .042  | .051 |                               |
| Paths constrained                      | (496) 726.03***  | .977 | .043  | .055 | (9) 28.31***                  |
| Final model <sup>a</sup>               | (495) 710.20***  | .978 | .042  | .054 | (1) 15.83***                  |
| School-focused                         |                  |      |       |      |                               |
| Paths free                             | (423) 521.88***  | .988 | .031  | .047 |                               |
| Paths constrained                      | (432) 528.53***  | .989 | .030  | .049 | (9) 6.65                      |

These models include controls for youths' science grade, and whether they were in a basic versus honors science course; parents' education and language; and number of parents in the home.

<sup>a</sup>In this model, the path from positivity to adolescents' beliefs about the importance of biology was estimated separately for Caucasian boys compared to the other three groups (who were similar to each other).

\*\*\*  $p < .001$ .

behaviors and the control variables accounted for 7–31% of the variance in adolescents' importance values.

## Discussion

Theories on adolescent motivation and STEM careers posit that individuals' STEM choices throughout the life-span are largely based on their motivational beliefs (Ceci et al., 2009; Wigfield et al., in press). The expectancy-value model also states that families, and parents in particular, are one of the key socializers of youths' motivational beliefs (Wigfield et al., 2015). The findings from this study extend existing work by providing a richer understanding of high school students' motivational beliefs within three core science subdisciplines, the complexity of group differences, and the potential of parental support.

### *Adolescents Do Differentiate Between Science Subdisciplines*

Although scholars have often measured individuals' science choices (e.g., coursework, college major, careers) in specific science subdisciplines, youths' motivation traditionally has been measured in terms of science broadly (e.g., Beghetto, 2007; Britner, 2008). These data suggest that adolescents at the beginning of high school have unique motivational beliefs in biology, chemistry, and physics. Certainly, adolescents' motivational beliefs across these science subdisciplines are related, but assessing adolescents' beliefs in multiple science subdisciplines

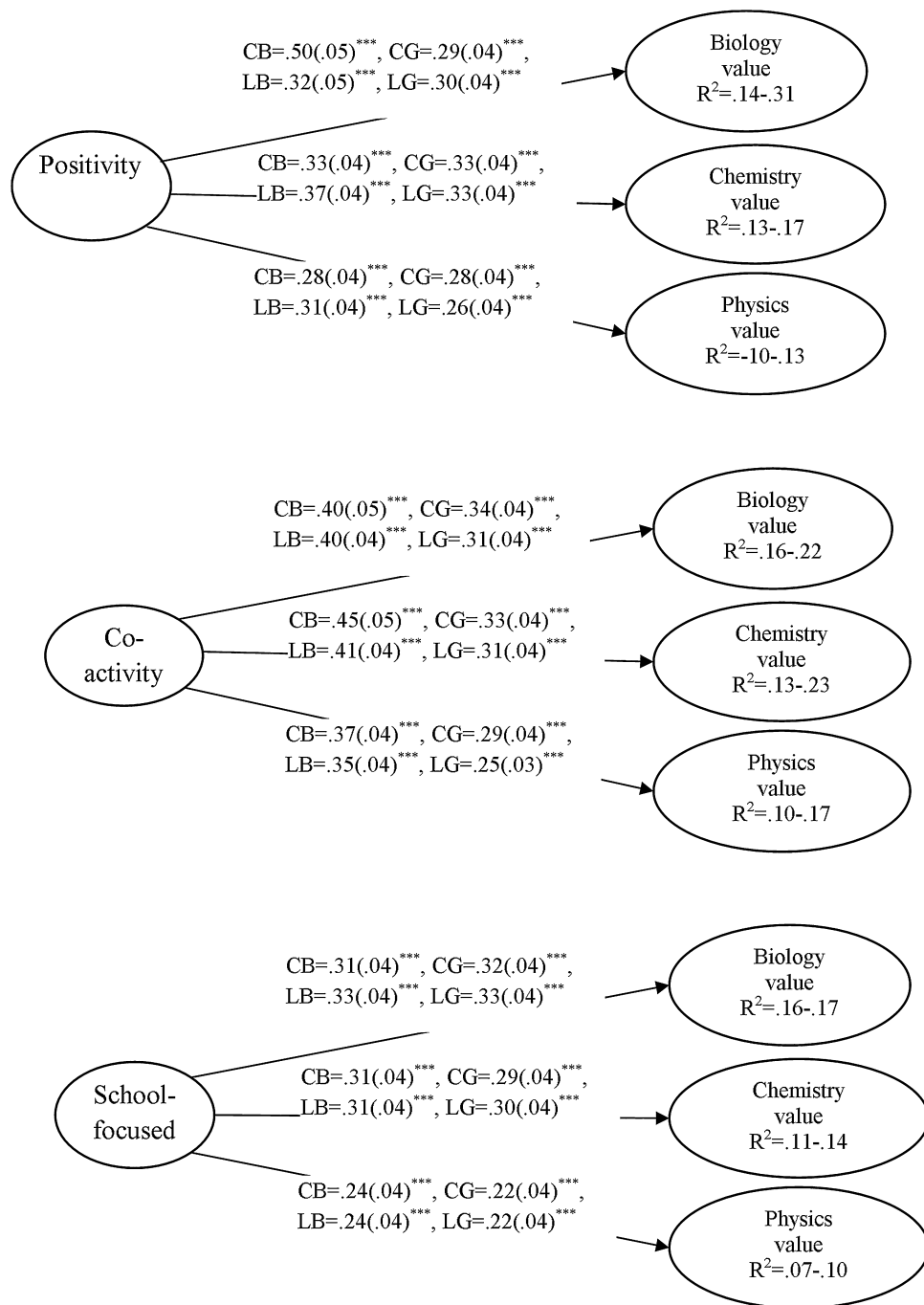


Figure 2. Results showing whether parents' behaviors predict adolescents' importance values. The standardized path estimates and (standard errors) are presented for each group: CB, Caucasian boys; CG, Caucasian girls; LB, Latino boys; LG, Latina girls.  $***p < .001$ .

enabled us to examine differences within science. For example, the gender and ethnic differences in adolescents' ability self-concepts fluctuated across biology, chemistry, and physics, and mirror differences found in the STEM choices of adults (National Science Board, 2014). Examining youths' science motivational beliefs, achievement, and choices in multiple science subdisciplines will help the field pinpoint at what age these differences by science subdiscipline emerge, how they change with age, and possible strategies to help reverse these trends.

### *The Complexity of Group Differences*

One goal of many scholars is to test if the gender and ethnic differences evident in adults' STEM occupational choices can be traced back to differential youth motivation and support. Our findings suggest that there were several differences among the four groups included in this study. But, parent education and Spanish language use partially explained some of the differences that emerged across Latinos and Caucasians within the same gender. For instance, Caucasian boys reported higher parental behaviors and ability self-concepts in all three science areas than Latino boys, but these differences weakened and many changed from statistically significant to non-significant once we accounted for parents' demographic information. Further, the size of nearly all of these differences was reduced at least by half once parents' demographic information was included. The differences between Caucasian and Latina girls also lessened after controlling for parents' demographic information though two differences persisted to be small in size. These reductions suggest that ethnic differences are partly the result of differences in parental resources—and not ethnicity specifically.

The distinction between ethnic-based processes or processes in something related to ethnicity is an important one. Ethnic-based processes include discrimination, stereotypes, or differential treatment based on one's ethnicity. For example, teachers who hold lower expectations of Latino students simply due to their ethnicity is an example of an ethnic-based process as it is a function of the students' ethnicity (Archer et al., 2014; Carlone et al., 2014). There are other processes that are not ethnically-based, such as those related to social class or immigration, that account for ethnic differences. Parent education and resources more broadly are examples of processes that are related to ethnicity, but which are not inherently ethnic-based processes. Our findings suggest that ethnic differences in these constructs are actually partly the result of differences in social class and parental resources, which aligns with previous work (Archer et al., 2014; Carlone et al., 2014; Chang et al., 2014; Weiland, 2015). Put another way, adolescents whose parents have a lower level of education and/or parents who primarily use Spanish may be a group who could benefit from additional supports.

Latina girls continued to be at a disadvantage compared to other groups even after accounting for parents' demographic information. Specifically, Latina girls had lower ability self-concepts in all three science disciplines and value of physics than Caucasian boys, Caucasian girls, and Latino boys. These differences were most pronounced in Latina girls' ability self-concepts where the differences were small to moderate in size even after accounting for parents' demographic information. It is important to note that these indicators are adolescents' beliefs about their abilities and not their actual abilities. The differences found in ability self-concepts may not reflect actual differences in ability or achievement. For example, girls often score similar to or higher than boys on math achievement tests, but boys rate their math ability self-concept higher than girls (e.g., Wigfield et al., 2015). Though our data do not provide insight on why these differences might exist, they align with previous qualitative work suggesting ethnic/racial minority females face many challenges and structural barriers as well as receive messages that they are not "science material" (Johnson et al., 2011, p. 354; Aschbacher et al., 2010). Such experiences may lead Latina females to doubt their abilities and question whether they are good enough.

Our findings on measurement invariance suggest that these differences are not simply the result of bias in the measurement tools. The scales were reliable for all youth in this study. These scales also evidenced strong discriminate validity by distinguishing between the three science disciplines and concurrent validity as evidenced by the expected relations with the control variables (e.g., students' science grade). Researchers should have confidence that the scales in this study capture similar constructs across groups.

In addition, we examined if the strength of parents' behaviors predicting adolescents' beliefs varied across the four groups. Scholars have posited that support outside of school may be particularly critical for female and ethnic/racial minority youth (e.g., Andersen & Ward, 2014; Johnson et al., 2011; Mutegei, 2013; Stake & Mares, 2001). In our data, parents' behaviors were consistent predictors of adolescents' motivational beliefs for all groups, with one exception. Parents' positivity was a significant predictor of adolescents' biology importance values for all groups, but this relation was stronger for Caucasian boys compared to the other three groups (who were similar to each other). We are cautious about this finding because the one path represented only 5.5% of the paths tested. That percent is similar to the Type I error rate (5%), suggesting that this finding may be due to chance. Further, several studies have noted that despite having mean-level group differences, the relations among indicators in math are not different based on gender (Lazarides & Ittel, 2012; Simpkins et al., in press; Watt et al., 2012). Why might there be mean-level differences, but no process differences? This pattern suggests that there are existing differences among the groups—in that one group is higher than another on parent support or motivation. But the lack of process differences means that parents' behaviors have the potential to support adolescents' science motivation for adolescents from all groups included in this study.

When taken from a more applied perspective, the mean-level differences suggest which groups and what phenomena may need extra support. For example, Latina girls had less confidence in their science ability than everyone else. This is a potential topic for an intervention among Latinas. When designing the intervention, one needs to know what supports adolescents' ability self-concepts and whether different supports matter for Latina girls compared to other groups. The lack of process differences suggests that similar interventions focused on parents' behaviors should be beneficial for all adolescents in this study.

### *The Nature of Parents' Behaviors and Their Relations With Adolescents' Motivation*

Adolescents reported their parents engaged in three general parental behaviors: positivity, co-activity, and school-focused. The current findings complement previous research focused on parents' support broadly (Ing, 2014) as they provide specific strategies parents can use to help support their high school students. Parents can help their adolescent by praising them and helping them feel better when things do not go well. Parents can also engage in many school-related tasks that do not require them to help complete the homework or go to their adolescents' high school, such as making sure adolescents have time and space to do their home and that it is complete, or talking to them about how their science class is going. Parent-adolescent science activities, like watching science shows, talking about current events or the importance of doing well in science, can also be helpful. Our work suggests that how often parents use these strategies is related to adolescents' motivation. The work on parents' explanations in museums and goal-orientation provide tips on how to maximize the impact of parents' behaviors and interactions with their adolescent children (e.g., Crowley et al., 2001; Vedder-Weiss & Fortus, 2013). Our data also underscore the myriad of ways parents can effectively support their adolescents' academic success at home (Zarate, 2007). These findings are important for teachers in at least two regards.

First, high school adolescents report their parents are doing something. Previous studies have emphasized the declines in parental involvement in the school (e.g., Hill & Tyson, 2009). While

parents may be pulling back from being on the school campus, many are still doing things at home. Such informal parent-youth opportunities can impact youths' science motivation and achievement, as well as general problem solving skills (Harackiewicz et al., 2012; LeFevre et al., 2009; Zimmerman, 2012). These findings confirm the continued supportive role parents play in high school students' science motivation.

Second, many of the parental behaviors included in this study do not require parents to be science experts. Some parents feel lost trying to help with science homework (Zarate, 2007). Parents' hesitation may be heightened in regard to high school science compared to science at earlier ages and other subjects in high school, because parents often feel the subject matter is too complicated or surpasses their level of education (Zarate, 2007). However, our study suggests that parents can engage in other meaningful ways that do not require mastery of science facts in textbooks and still predict their adolescent's motivation.

### *Limitations and Future Directions*

One central focus of this paper was the differences across four broad demographic groups. This work needs to be complemented by research on differences within each group. The four groups considered in this study—Latino boys, Latina girls, Caucasian boys, and Caucasian girls—are each quite diverse. Although on average Latina girls rated their ability self-concepts lower than all other groups, there are Latina girls who believe they are highly skilled at science and achieve successful science careers (e.g., Johnson et al., 2011). At the same time, there are also some Caucasian boys who have little confidence in their science abilities. It is important to understand what has helped or hindered these adolescents.

We have largely assumed that parental behavior is a precursor to adolescents' motivational beliefs and not the reverse. Researchers have found more parent to child effects for Caucasian children in a variety of domains in elementary school (Simpkins et al., in press). This may change with development and for particular populations. Youths' interest and skills may be more likely to affect parental supports in high school compared to elementary school due to youths' increased autonomy and decision making. Parents may also increase support to help thwart a downward turn or to address a perceived deficit. For example, Zimmerman (2012) found that the mother of a middle school-aged girl actively tried to convince her daughter of the utility of a science career when she started to lose interest. Youth may also play a pivotal role in parental support throughout development for particular populations. Youth in families with foreign-born parents who were not educated in the U.S. may have more power in these relationships if parents know little about the U.S. school system and if youth broker the relations between the schools and parents (Suarez-Orozco, Suarez-Orozco, & Todorova, 2008). Examination of the variability within Latinos might provide insight into what family circumstances might lead to youth having a stronger influence on family processes than is typical among mainstream, US-born families.

Another potential limitation to the study is that all of the data were reported by adolescents. Inclusion of data reported by parents would help strengthen future studies on this topic. Not only are parents better reporters of some family-level indicators like parent income and occupation (Ensminger et al., 2000); parents can also provide their perception of their behaviors and the reasons why they engage in those behavior. Observational data is a good complement to the survey reported data to better understand the quality of the parent-adolescent interactions as seen in the work on interactions in museums (e.g., Crowley et al., 2001). Observational and other methods (e.g., time diaries) can also help address some of the limitations of our measures. For example, the anchors of our parent behavior scale addressed the general frequency at which these behaviors occurred, such as "a little," "a lot," or "always." We used these more general anchors because the frequency at which parents engage in these behaviors varies (e.g., visit a museum versus make



sure you completed your homework) and we wanted to know if adolescents thought these things happened a lot or a little. Our tests of measurement invariance suggest that the items have similar meaning and function in a similar way across groups. But, it is possible that the groups still vary on what they consider is a little or a lot. Having anchors more closely tied to specific frequencies (e.g., times per week) would help ensure that an anchor has a similar meaning across groups; however, researchers will need to consider the statistical implications as the relatively low frequency of some behaviors will result in highly skewed data depending on the specific anchors.

### Conclusions

High school is a turning point in the STEM pipeline (Maltese & Tai, 2011). In 2012, only three states required four years of science in order to graduate with most states requiring two or three years (Snyder & Dillow, 2013), suggesting ample opportunities for students to choose to enroll or not enroll in science courses. High school students who do not enroll in science courses or who are not adequately motivated might inadvertently close the door to future educational and occupational STEM possibilities. Many of the gender and ethnic disparities prevalent in occupational pursuits are present at the beginning of high school. What can be done to address this early, substantial leak in the pipeline? In line with the call to look beyond the classroom (Rennie et al., 2003), our findings suggest that parents are a resource. Teachers can suggest a variety of relatively simple things parents can do to support their adolescents. Because many of these behaviors do not require parents to be science experts, they may be appealing and attainable for parents from diverse educational backgrounds.

This research was supported by a grant DRL-1054798 from the National Science Foundation to Sandra Simpkins. We would like to thank the principals, teachers, students, and parents of the cooperating school districts for their participation in this project as well as the ASU students who helped make this project possible.

### References

- Andersen, L., & Ward, T. J. (2014). Expectancy-value models for the STEM persistence plans of ninth-grade, high-ability students: A comparison between black, Hispanic, and white students. *Science Education*, 98(2), 216–242.
- Archer, L., DeWitt, J., & Willis, B. (2014). Adolescent boys' science aspirations: Masculinity, capital, and power. *Journal of Research in Science Teaching*, 51, 1–30.
- Aschbacher, P. R., Li, E., & Roth, E. J. (2010). Is science me? High school students' identities, participation and aspirations in science, engineering, and medicine. *Journal of Research in Science Teaching*, 47, 564–582.
- Beghetto, R. A. (2007). Factors associated with middle and secondary students' perceived science competence. *Journal of Research in Science Teaching*, 44(6), 800–814.
- Bouchey, H., & Harter, S. (2005). Reflected appraisals, academic self-perceptions, and math/science performance during early adolescence. *Journal of Educational Psychology*, 97, 673–686.
- Britner, S. L. (2008). Motivation in high school science students: A comparison of gender differences in life, physical, and earth science classes. *Journal of Research in Science Teaching*, 45, 955–970.
- Brown, B. A. (2006). "It isn't no slang that can be said about this stuff": Language, identity, and appropriating science discourse. *Journal of Research in Science Teaching*, 43(1), 96–126.
- Carlone, H. B., Scott, C. M., & Lowder, C. (2014). Becoming (less) scientific: A longitudinal study of students' identity work from elementary to middle school science. *Journal of Research in Science Teaching*, 51, 836–869.
- Ceci, S. J., Williams, W. M., & Barnett, S. M. (2009). Women's underrepresentation in science: Sociocultural and biological considerations. *Psychological Bulletin*, 135, 218–261.

- Chang, M. J., Sharkness, J., Hurtado, S., & Newman, C. B. (2014). What matters in college for retaining aspiring scientists and engineers from underrepresented racial groups. *Journal of Research in Science Teaching*, 51, 555–580.
- Crosnoe, R., & López Turley, R. N. (2011). K–12 educational outcomes of immigrant youth. *The Future of Children*, 21(1), 129–152.
- Crowley, K., Callanan, M. A., Tenenbaum, H. R., & Allen, E. (2001). Parents explain more often to boys than to girls during shared scientific thinking. *Psychological Science*, 12(3), 258–261.
- Dabney, K. P., Chakraverty, D., & Tai, R. H. (2013). The association of family influence and initial interest in science. *Science Education*, 97(3), 395–409.
- Else-Quest, N. M., Mineo, C. C., & Higgins, A. (2013). Math and science attitudes and achievement at the intersection of gender and ethnicity. *Psychology of Women Quarterly*, 37, 293–309.
- Ensminger, M. E., Forrest, C. B., Riley, A. W., Kang, M., Green, B. F., Starfield, B., & Ryan, S. A. (2000). The validity of measures of socioeconomic status of adolescents. *Journal of Adolescent Research*, 15(3), 392–419.
- Fortus, D., & Vedder-Weiss, D. (2014). Measuring students' continuing motivation for science learning. *Journal of Research in Science Teaching*, 51(4), 497–522.
- Harackiewicz, J. M., Rozek, C. S., Hulleman, C. S., & Hyde, J. S. (2012). Helping parents to motivate adolescents in mathematics and science: An experimental test of a utility-value intervention. *Psychological Science*, 23(8), 899–906.
- Hill, N. E., & Tyson, D. F. (2009). Parental involvement in middle school: A meta-analytic assessment of the strategies that promote achievement. *Developmental Psychology*, 45, 740–763.
- Ing, M. (2014). Can parents influence children's mathematics achievement and persistence in STEM careers?. *Journal of Career Development*, 41(2), 87–103.
- Jacobs, J. E., Lanza, S., Osgood, D. W., Eccles, J. S., & Wigfield, A. (2002). Changes in children's self-competence and values: Gender and domain differences across grades one through twelve. *Child Development*, 73, 509–527.
- Johnson, A., Brown, J., Carlone, H., & Cuevas, A. K. (2011). Authoring identity amidst the treacherous terrain of science: A multiracial feminist examination of the journeys of three women of color in science. *Journal of Research in Science Teaching*, 48(4), 339–366.
- Lazarides, R., & Ittel, A. (2012). Mathematics interest and achievement: What role does perceived parent and teacher support play? A longitudinal analysis. *International Journal of Gender, Science and Technology*, 5, 207–230.
- Lee, J., & Bowen, N. K. (2006). Parent involvement, cultural capital, and the achievement gap among elementary school children. *American Educational Research Journal*, 43, 193–218.
- LeFevre, J. A., Skwarchuk, S. L., Smith-Chant, B. L., Fast, L., Kamawar, D., & Bisanz, J. (2009). Home numeracy experiences and children's math performance in the early school years. *Canadian Journal of Behavioural Science*, 41, 55–66.
- Little, T. D. (2013). *Longitudinal structural equation modeling: Methodology in social sciences*. New York: Guilford Press.
- Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. F. (2002). To parcel or not to parcel: Exploring the question, weighing the merits. *Structural Equation Modeling: A Multidisciplinary Journal*, 9, 151–173.
- Maltese, A. V., & Tai, R. H. (2010). Eyeballs in the fridge: Sources of early interest in science. *International Journal of Science Education*, 32(5), 669–685.
- Maltese, A. V., & Tai, R. H. (2011). Pipeline persistence: Examining the association of educational experiences with earned degrees in STEM among U. S. students. *Science Education Policy*, 878–906.
- Marin, G., Sabogal, F., Marin, B., Otero-Sabogal, R., & Perez-Stable, E. (1987). Development of a short acculturation scale for Hispanics. *Hispanic Journal of Behavioral Sciences*, 9, 183–205.
- Meece, J. L., Anderman, E. M., & Anderman, L. H. (2006). Classroom goal structure, student motivation, and academic achievement. *Annual Review of Psychology*, 57, 487–503.
- Millsap, R. E. (2011). *Statistical Approaches to Measurement Invariance*. New York: Routledge.

Mutegi, J. W. (2013). "Life's first need is for us to be realistic" and other reasons for examining the sociocultural construction of race in the science performance of African American students. *Journal of Research in Science Teaching*, 50(1), 82–103.

Muthén, L. K., & Muthén, B. O. (1998–2010). Retrieved from Mplus User's Guide. 6<sup>th</sup> ed. Los Angeles, CA: Muthén & Muthén <http://www.statmodel.com/ugexcerpts.shtml>

Muthén, L. K., & Sattora, A. (1995). Sociological methodology. (pp. 267–316) In P. V. Marsden (Ed.), *Complex sample data in structural equation modeling*. Oxford, UK: Clarendon.

National Science Board (2014). Science and Engineering Indicators 2014. Arlington, VA: National Science Foundation (NSB 14-01).

Navarro, R. L., Flores, L. Y., & Worthington, R. L. (2007). Mexican American middle school students' goal intentions in mathematics and science: A test of social cognitive career theory. *Journal of Counseling Psychology*, 54(3), 320–335.

Pew Hispanic Center (2012). Statistical Portrait of Hispanics in the United States, 2010. Retrieved from <http://www.pewhispanic.org/2012/02/21/statistical-portrait-of-hispanics-in-the-united-states-2010/>.

Price, C., & Simpkins, S. (2011). The Role of Parents' Supportive Behaviors in Children's Extracurricular Activity Participation. Poster presented at The Society for Research in Child Development Bi-Annual Conference, Montreal, Canada.

Rennie, L. J., Feher, E., Dierking, L. D., & Falk, J. H. (2003). Toward an agenda for advancing research on science learning in out-of-school settings. *Journal of Research in Science Teaching*, 40, 112–120.

Simpkins, S. D., Davis-Kean, P. E., & Eccles, J. S. (2005). Parents' socializing behavior and children's participation in math, science, and computer out-of-school activities. *Applied Developmental Science*, 9, 14–30.

Simpkins, S. D., Fredricks, J. A., & Eccles, J. S. (in press). Parent beliefs to youth choices: Mapping the sequence of predictors from childhood to adolescence. *Monographs of the Society for Research in Child Development*.

Simpkins, S. D., Fredricks, J. A., & Eccles, J. S. (2012). Charting the Eccles' expectancy-value model from mothers' beliefs in childhood to youths' activities in adolescence. *Developmental Psychology*, 48, 1019–1032.

Simpkins, S. D., Fredricks, J. A., & Eccles, J. S. (2015). Families, schools, and developing achievement related motivations and achievement. In J. E. Grusec, & P. H. Hasting (Eds.). *Handbook of socialization: Theory and research* (2nd ed.). New York: Guilford Press, pp. 614–636.

Snyder, T. D., & Dillow, S. A. Digest of Education Statistics 2012 (NCES 2014-015). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, DC doi: 10.1002/tea.10073

Stake, J. E. (2006). The critical mediating role of social encouragement for science motivation and confidence among high school girls and boys. *Journal of Applied Social Psychology*, 36, 1017–1045.

Stake, J. E., & Mares, K. R. (2001). Science enrichment programs for gifted high school girls and boys: Predictors of program impact on science confidence and motivation. *Journal of Research in Science Teaching*, 38(10), 1065–1088.

Suarez-Orozco, C., Suarez-Orozco, M. M., & Todorova, I. (2008). Learning of new land: Immigrant students in American society. (pp. 426) Cambridge, MA: Belknap Press/Harvard University Press.

Taningco, M. T. (2008). Latinos in STEM professions: Understanding challenges and opportunities for next steps. A qualitative study using stakeholder interviews. The Tomas Rivera Policy Institute, Los Angeles, CA.

Turner, S. L., Steward, J. C., & Lapan, R. T. (2004). Family factors associated with sixth-grade adolescents' math and science career interests. *The Career Development Quarterly*, 53, 41–52.

Vedder-Weiss, D., & Fortus, D. (2011). Adolescents' declining motivation to learn science: Inevitable or not?. *Journal of Research in Science Teaching*, 48, 199–216.

Vedder-Weiss, D., & Fortus, D. (2012). Adolescents' declining motivation to learn science: A follow-up study. *Journal of Research in Science Teaching*, 49, 1057–1095.

Vedder-Weiss, D., & Fortus, D. (2013). School, teacher, peers, and parents' goals emphases and adolescents' motivation to learn science in and out of school. *Journal of Research in Science Teaching*, 50, 952–988.

Watt, H. M. G., Shapka, J. D., Morris, Z. A., Durik, A. M., Keating, D. P., & Eccles, J. S. (2012). Gendered motivational processes affecting high school mathematics participation, educational aspirations, and career plans: A comparison of samples from Australia, Canada, and the United States. *Developmental Psychology*, 48, 1594–1611.

Weiland, I. (2015). An exploration of Hispanic mothers' culturally sustaining experiences at an informal science cent. *Journal of Research in Science Teaching*, 52, 84–106.

Wigfield, A., Eccles, J. S., Fredricks, J., Simpkins, S., Roeser, R., & Schiefele, U. (2015) Development of achievement motivation and engagement. In R. M. Lerner (Series Ed.) & C. Garcia Coll and M. Lamb (Volume Eds.) *Handbook of child psychology: Vol. 3 Social and emotional development* 7<sup>th</sup> ed., New York: John Wiley & Sons Inc., pp. 657–700.

Zarate, M. E. (2007). Understanding Latino parental involvement in education: Perceptions, expectations, and recommendations. Tomas Rivera Policy Institute. University of Southern California, School of Policy, Planning, and Development, Ralph and Goldie Lewis Hall, 650 Childs Way Suite 102, Los Angeles, CA 90089-0626. Retrieved from <http://login.ezproxy1.lib.asu.edu/login?url=http://search.proquest.com/docview/61956918?accountid=4485>.

Zimmerman, H. T. (2012). Participating in science at home: Recognition work and learning in biology. *Journal of Research in Science Teaching*, 49, 597–630.

### Supporting Information

Additional supporting information may be found in the online version of this article.



# Power and identity in immigrant parents' involvement in early years mathematics learning

Miwa Aoki Takeuchi<sup>1</sup>

Published online: 1 August 2017

© Springer Science+Business Media B.V. 2017

**Abstract** This study examined immigrant parents' involvement in early years mathematics learning, focusing on learning of multiplication in in- and out-of-school settings. Ethnographic interviews and workshops were conducted in an urban city in Japan, to examine out-of-school practices of immigrant families. Drawing from sociocultural theory of learning and the concept of appropriation (Wertsch, 1998), the role of power and identity was examined in relation to children's appropriation of an informal multiplication method that was taught by their parents. An intergenerational analysis, between immigrant parents and their children, revealed heterogeneous perspectives towards appropriation. Immigrant parents in this study framed their involvement in their children's early years mathematics learning in relation to their positional identities and the pressures to conform to the mainstream practices of their host country. During their early years of schooling, students in this study were already aware of academic tracking in the school and were aware of what was believed to be legitimate in school mathematics learning. The significance of diversifying mathematics curriculum and pedagogy was discussed to affirm the knowledge and identities of immigrant students and families.

**Keywords** Mathematics learning in and out of school · Parental involvement · Identity · Power

## 1 Mathematics learning in out-of-school contexts

Global population mobility has contributed to a growth in the number of immigrant students in schools internationally. For example, in the United States, 21% of households reported using languages other than English (United States Census Bureau, 2013). In Canada, 20% of the population reported speaking a language other than official languages at home (Statistics Canada, 2012). Certain areas of England are becoming more linguistically diverse: London had the highest proportion (22.1%) with people speaking languages other than English as their

---

✉ Miwa Aoki Takeuchi  
miwa.takeuchi@ucalgary.ca

<sup>1</sup> Werklund School of Education, University of Calgary, EDT 840, 2500 University Drive NW, Calgary, AB T2N1N4, Canada

main language (Office for National Statistics, 2013). In Japan, where the study introduced here was conducted, some industrial areas are becoming ethnically and linguistically diverse, as represented in the percentages of registered immigrants in the following cities: Oizumicho, Gunma (14.5%); Minokamo, Gifu (7.7%); and Kikukawa, Shizuoka (5.4%) (Committee of Localities With a Concentrated Foreigner Population, 2012). In addition to these cities, large cities such as Tokyo, Nagoya, and Osaka have relatively high percentages of registered immigrants.

The Organization for Economic Co-operation and Development (2013) reported that immigrant students' performance in mathematics was lower than their native peers in many countries, although the gap between immigrant students and native students was smaller in Canada, Australia, New Zealand, and Macao-China. This report also revealed that the second generation of immigrant students performed lower than the first generation in certain countries such as the United Kingdom and New Zealand. In order to make mathematics learning accessible to all students, there is a need for research examining curriculum and pedagogy that are responsive to immigrant students' prior knowledge and backgrounds. Taken in this context, the purpose of this research is to highlight mathematical resources that immigrant students access at home and understand how power and identity influence appropriation and the use of those resources at school.

Investigating the connection (and disconnection) between children's out-of-school practices and their school learning is especially significant for immigrant students, whose practices can be different from the norm assumed in school learning and hence whose competence can be invisible in school contexts (Baker, Street, & Tomlin, 2003; Civil & Planas, 2010; de Abreu & Cline, 2005). As previously identified, immigrant students' mathematical performance can be shaped by valued practices at home (Guberman, 2004).

Previous studies examining non-dominant students' practices in and out of school contexts have challenged a deficit perspective towards non-dominant students and have collectively highlighted non-dominant people's and communities' competence in collective practices that involve mathematical tools (Baker et al., 2003; Brenner, 1998; Civil, 2007; Gonzalez, Andrade, Civil, & Moll, 2001; Nasir & Hand, 2008; Saxe, 2012; Saxe & Esmonde, 2005; Taylor, 2009). These studies foreground mathematical competence and "funds of knowledge" (Moll, Amanti, Neff, & Gonzalez, 1992, p.133), which have traditionally been neglected in school contexts. Seminal works in this area have provided ethnographic accounts of the practices in which children from non-Western countries engage. Ethnomathematics studies have challenged an ethnocentric perspective on the development of mathematics and offered emic accounts of mathematics linked to local historical and cultural practices (Ascher, 1994; D'Ambrosio, 2006).

Studies in this area have taken into consideration historical contexts and systemic changes affecting mathematics practices outside the school. For example, historical and longitudinal accounts of the Oksapmin people's 27-body-part counting system illuminate how the counting system has been reproduced and altered along with the shift in political, economic, and educational macro systems in Papua New Guinea (Saxe, 2012; Saxe & Esmonde, 2005). Taylor's (2009) analysis of low-income African American children's purchasing practices in the United States demonstrated the direct influences of macro system (such as concentrations of poverty and taxation policies) on the practices in which these children engage. Nasir and Hand (2008) compared students' practices in mathematics classrooms and basketball games, and highlighted practice-linked identity as one of the significant layers of practice that supported students' engagement. The current study further develops this vein of research by examining whether and how

immigrant students' in- and out-of-school mathematics learning experiences can be integrated by focusing on the role of power and identities.

This research also furthers the current body of literature on immigrant parents' participation in mathematics practices. Previous studies on this topic have highlighted immigrant parents' mathematics knowledge and resources that were embedded in their cultural practices (Civil, 2007; Willey, 2008). This line of research has also pointed out some of the conflict and struggles that immigrant parents experience (de Abreu & Cline, 2005; Civil & Bernier, 2006; Crafter, 2012; Gorgorió & Abreu, 2009). This study adds a new cultural and historical context that can reveal how power and mathematics learning are intertwined locally. By providing an intergenerational perspective on both immigrant parents and their children, I shed light on how parents and children differently appropriated an informal mathematics method. In response to the call by Gutiérrez (2013) for a sociopolitical turn in mathematics education, the current study examines the role of power through the analysis of cultural and historical practices surrounding the appropriation of informal mathematics knowledge. With regards to power, de Abreu and Cline (2007) revealed the process of social valorization wherein different kinds of mathematics (e.g., Brazilian peasant mathematics and school mathematics) are valorized or devalorized with reference to social classification. Set in the context of an urban city in Japan that is gradually becoming linguistically and ethnically diverse, this study examines how power and positional identities influenced early years mathematics learning for Filipina immigrant mothers and their children living in Japan.

## **2 Theoretical framework: Power and positional identities in appropriation of cultural tools**

In this study, I highlight immigrant students' appropriation of out-of-school resources and practices for mathematics learning. By appropriation, I refer to the categorization made by Wertsch (1998), as explained below. One of the central tenets of sociocultural theory is that human learning is mediated by technical and psychological tools including languages and culturally specific ways of approaching mathematics (Vygotsky, 1978). These tools are cultural; they are created, shared, and used in collective practices. Vygotsky maintained that the use of these cultural tools is first developed as an interpsychological process between people and later internalized into an intrapsychological process within a person.

This idea of internalization was later elaborated by Wertsch with careful attention to the tension between cultural tools and learners as active agents. Wertsch distinguished between mastery, appropriation, and resistance of cultural tools. Mastery is described as knowing how to use cultural tools, whereas appropriation is defined as "making a cultural tool one's own" (p. 145). Resistance relates to power and is considered to occur when agents distance themselves from particular cultural tools or when they perform actions with cultural tools under a forced circumstance. For example, in Wertsch's study, Estonians mastered the official and dominant account of Estonia's history of joining the Soviet Union learned in school and exhibited their understandings in forced situations, such as exams. However, they resisted appropriation of the official historical account and viewed it as someone else's history. Highlighted in Wertsch's study is how identity and power are strongly tied with appropriation of cultural tools. Polman (2006) further elaborated on the aspect of identity development in the process of appropriation and maintained that agents take up certain cultural tools while simultaneously creating possibilities for kinds of person one can be in the future.



While there has been a growing collection of literature laying out the relations between identity and learning, I draw on the definition of *positional identities* by Holland, Skinner, Lachicotte, and Cain (1998), which considers the role of power and hierarchy in the process of shaping and developing identity. Positional identities are defined as “the day-to-day and on-the-ground relations of power, deference and entitlement, social affiliation and distance with the social-interactive, social-relational structures of the lived world” (Holland et al., 1998, p. 127). Positional identities are shaped through one’s access to spaces, activities, speech genres, and voices, which are all embedded in the power relations that are also produced and reproduced in moment-by-moment interactions. Holland et al. contrast the positional identities with figurative identities which “have to do with the stories, acts, and characters that make the world a cultural world” (p.127). While figurative identities are “about signs that evoke storylines or plots among generic characters” (p.128), positional identities are “about acts that constitute relations of hierarchy, distance, or perhaps affiliation” (p.129). These two types of identities can be intertwined but this paper will focus more on positional identities. Analyzing both parent and student data will provide insights into how a particular cultural practice and resource were, or were not, appropriated and maintained across generations among transnational families and how power and identity influenced this process.

### 3 Methods

This project was conducted in an urban city of Japan that is increasingly becoming linguistically and ethnically diverse. In this study, my analysis draws from three types of data: (1) semi-structured individual interviews with 12 Filipina women who were living and raising children in Japan, (2) semi-structured individual interviews with nine elementary school-aged children of the women whom I interviewed, and (3) post-interview workshops with the women and their children who participated in the interview. Because the focus of the analysis was on elementary school curriculum, I excluded child interviews with older grade students. However, I included all 12 interviews with parents as they reflected their interactions with their children when the children were still young. Interview questions for parents included participants’ stories of coming to and living in Japan, participants’ practices related to mathematics and language teaching at home, and participants’ experiences with schools in the Philippines and in Japan. Interview questions for children included their experiences of school learning, parent-child communications at home, and out-of-school mathematics learning. Mathematical problem solving (computation problems and word problems) was also part of parent and child interviews. Interview questions were shaped through my ethnographic observations in the participants’ communities and schools. Each parent interview lasted approximately 90 min and each child interview lasted approximately 45 min. All the interviews were audio-recorded and workshops were video-recorded.

All the parent participants were multilingual. Ten participants answered Tagalog as their first language and two of them answered Bikol as their first language. All the participants answered they were comfortable in English as their second language because they received education for subjects such as mathematics and sciences in English. Except for two participants, they all answered that they felt comfortable communicating orally in Japanese but were not comfortable with reading and writing. The majority of the participants felt more comfortable speaking in English and chose to conduct the interviews in English. Interviews and

workshops were mainly conducted in English. If Japanese was used, I translated all quotes into English. Another person who was fluent in Japanese and English confirmed the translations.

The majority of child participants (seven children) were born in Japan. Two children were born in the Philippines. All the child participants were enrolled in Japanese public schools, at the time of this study. For six of the child participants, with one Japanese parent and one Filipino parent, the main home language was Japanese. For the other three participants, the main home language was Tagalog. All the interviews with child participants were conducted in Japanese. After conducting individual interviews, workshops were organized based on the themes that emerged from those interviews. For the purpose of this paper, I focused on part of the workshop data and I included two of the workshop sessions and 152 min of video recorded data. In the Findings section, I provide narratives that capture the details of the workshop interactions.

The analysis focused on two central themes discussed earlier: (a) appropriation of cultural tools (Wertsch, 1998), and (b) positional identities (Holland et al., 1998). Of all the out-of-school practices identified through ethnographic interviews and workshops, this article focuses on the informal finger multiplication method as one example of what these children learn at home. This finger multiplication method will be explained in further detail in the following section. Analysis was centered around two main research questions. The first question focused on whether and how participants appropriated a finger multiplication method. The second question focused on how participants' identities were embedded in relations of power, deference, and social affiliation/exclusion in relation to mathematics learning. Cross-case analysis and coding were conducted by using the qualitative analysis software *MAXQDA* (Verbi GmbH, Berlin, Germany). I analyzed both the commonalities and differences among participants.

## 4 Findings: Power and hierarchy affecting in- and out-of-school mathematics learning

In this section, I present findings obtained from both the interviews and workshops. First, I introduce the mainstream/formal and informal multiplication strategies that child participants encountered in in- and out-of-school contexts. Then, I connect participants' positional identities that affected appropriation of informal multiplication method. Subsequently, I describe whether and how child participants appropriated the informal method, drawing from the interviews and the workshops.

### 4.1 Informal and formal multiplication strategies: Finger multiplication method and *Kuku*

Participants used both the informal and formal multiplication methods—finger multiplication method and *kuku*—in the process of solving mathematical problems in the interview. The following informal method was observed when participants were solving a single-digit multiplication of numbers between six and nine (e.g.,  $9 \times 9$ ). Using two hands (each hand represents one factor), five is represented by the closed hand and any number above five is represented by the number of open fingers (e.g., nine is four fingers open; Fig. 1 is a participant's representation of  $9 \times 9$ ). Participants add the number of open fingers in each hand and multiply this number by ten (product A; e.g., in the case of  $9 \times 9$ , participants calculated

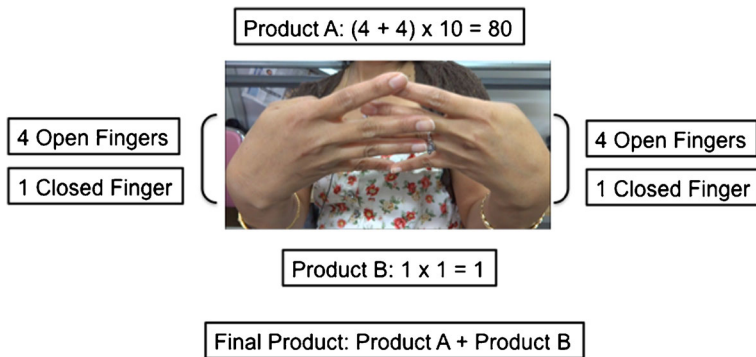


**Fig 1** A parent participant's finger multiplication method ( $9 \times 9$ )

$(4 + 4) \times 10$ ). Then, the participants multiply the number of closed fingers in each hand (product B; e.g., in the case of  $9 \times 9$ , participants calculated  $1 \times 1$ ). The final multiplication product is calculated by adding the above products A and B.

This finger multiplication method can be also extended to the multiplication of numbers between 11 and 15. The closed hand represents ten and the open fingers represent the number above ten. First, add the number of open fingers in each hand and multiply this number by 10 (Product A; in the case of  $14 \times 14$ , participants calculated  $(4 + 4) \times 10$ ). Second, multiply the numbers of open fingers in each hand (Product B; in the case of  $14 \times 14$ , participants calculated  $4 \times 4$ ). The final product is calculated by adding 100, Product A and Product B (see Fig. 2).

Parent participants explained that the finger multiplication method was learned outside of school and used mainly to deal with the pressure in the school to complete computation quickly. For instance, Irene<sup>1</sup> said, "When we were at school and then we were doing some tests...that needs to be quick." Parent participants acquired this method from various sources: family members, friends, and at school. Child participants acquired this method exclusively from their parents. Neither parent nor child participants could identify the origin of this finger multiplication. Three parent participants stated that the method had spread throughout their communities in the Philippines. There is a record indicating that this finger multiplication was commonly used in Florence, Italy (Ball, 1888). This finger multiplication is also known as "Russian or French peasant algorithm" (Davis & Preciado Babb, 2015; Gray, 2001). However, it has not been recorded in English how the method came to spread in some communities in the Philippines.

In contrast to the informal finger multiplication method, there is a formal method to memorize a multiplication table, which is taught in the Japanese school system. In Grade 2, the Japanese mathematics curriculum (the official course of study) covers multiplication of single digit numbers and requires students to recite the entire multiplication table between one and nine. Students use a culturally specific recitation method called *kuku*, which is a language-driven rhythmic chant (Ministry of Education, Culture, Sports, Science and Technology, 2008). Similar rhythmic chants for multiplication are commonly observed in Asian countries. The Japanese version of *kuku* is considered to have originated in China, and there is a historical archive recording the use of *kuku* in the tenth century in Japan. Children learn this *kuku* either

<sup>1</sup> All the participants' names are pseudonyms. These names were chosen from the same language as the participants' real names.

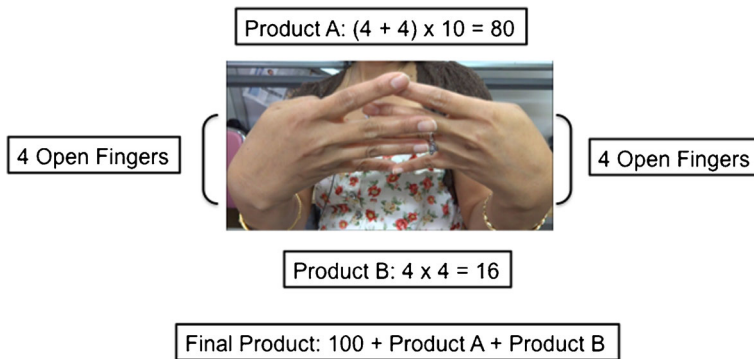


**Fig. 2** Finger multiplication method for two-digit numbers ( $14 \times 14$ )

at school or at home from their family members. In the case of immigrant students in this study, their encounter to *kuku* tended to be only at school.

#### 4.2 Parents' positional identities and home practices

I will first describe the positional identities of Filipina mothers in this study by focusing on the reasons why they came to Japan and their language policies at home. As introduced below, these positional identities influenced these parents' decisions on how they displayed their ways of engaging in mathematics, including finger multiplication. These positional identities also influenced how their children would be involved in various home practices (such as engaging in international currency conversions and calculating international time differences). Women in this study came to work in Japan and the majority (10 of 12 participants) stayed in Japan after marrying Japanese men. Filipino is one of the major and the fastest growing ethnic groups in Japan. Since the late 1970s, Filipina women have been coming to Japan to fill the bride shortage in farm village areas, to work as entertainers in urban cities, and, more recently, to work as nurses, caregivers and English language teachers and tutors. All of the Filipina mothers I interviewed said that they were from a big family of lower socioeconomic status and that financially supporting their family was their main motivation for coming to Japan.

Home language policies were indicative of Filipina women's positional identities at home. In the households where a Filipina woman was married to a Japanese husband, participants' interviews revealed that the husband or husband's parents tended to decide the family language practices, which were often the exclusive use of Japanese (Takeuchi, 2016). This situation was often because their husbands or husbands' parents did not comprehend Filipino (Tagalog), the official language of the Philippines, or other languages in the Philippines. However, some participants reported that, even in the households where the husband understood Tagalog, the exclusive use of Japanese was still common practice. This home language policy influenced Filipina parents' participation in children's school learning. For example, Mariel described her involvement in her daughter's school learning as "I help her only in English."

As revealed through the following interview quotes, parent participants' involvement in their children's mathematics learning was shaped through these positional identities. Parental involvement in children's school learning was reported as limited partially because Filipina women in this study felt they did not know the curriculum and pedagogy in Japanese schools.

For example, in response to my question (“Did you teach mathematics that you learned?”), Mariel said, “No (...) It’s different ways I think.” For the same interview question, Karen said:

Maybe since it’s all in Japanese, we don’t know, really, exactly what kinds, how you solve the mathematics. We don’t understand your ways. One time, I taught my child and he got confused. I thought, maybe it was a different way. So, it’s hard to teach children, if they feel confusions. I think Japanese system, you have your own system.

In this narrative, Karen’s use of pronouns serves as a marker (Fairclough, 1989) to indicate a boundary between the Japanese ways (e.g., your ways, your own system) and her ways, through which she distanced herself from the Japanese system. This distancing from the mainstream was also observed in the following interview excerpt from Irene. She is describing her decision on teaching children mathematics.

It’s up to them. I used to compare. I can’t always tell them or demand all the things I learned. Because life here in Japan is quite different from where I grew up. So I used to compare but if they are okay, then it’s okay. They don’t need to learn whatever I’ve learned.

As these interview quotes represent, many parents described the distance they felt towards the Japanese school system. In addition, as I discussed elsewhere (Takeuchi, 2015), for some parent participants, their positioning as a “foreigner” or “outsider” in Japanese society hindered them from playing an active role in their child’s school learning (as represented in one of the participants’ interview quote, “I’m Filipina and I can’t offer anything as a parent because I’m a foreigner”). Sometimes, children commented that their parents’ ways of doing mathematics were wrong just because it was different from the way they learned at school. For example, Arlene and Karen both reported a difference in how a reminder is notated when computing multi-digit division. Karen said she fought with her son over ways of computing multi-digit division and was told by him, “Mom, yours is not a right way.” Arlene also said she was told by her children, “Mom, you’re wrong.” These episodes suggest that the difference between the Japanese school way and parents’ way of computation was perceived in a hierarchical manner: The parents’ ways were wrong and the Japanese school ways were correct.

Similarly, taking an example of teaching the informal, finger multiplication method, parents’ positional identities also shaped the contexts of their decisions. Parent participants in this study either chose not to teach the finger multiplication method or taught it only to the children who were struggling in school mathematics. All the parent participants positioned the finger multiplication method or the use of fingers as secondary to *kuku*, the formal memorization method for multiplication tables. For example, Nicole explained that she decided to teach the finger multiplication method at home as a “secret.” Karen also described that this method was “only for an emergency purpose” for her children, because using fingers would be considered to be illegitimate in Japanese schools. But because her son was falling behind academically, Karen’s husband taught the finger multiplication method. While teaching this finger multiplication method to her children, Karen said she and her husband also encouraged their children to memorize the multiplication tables with *kuku*, as taught in Japanese schools. Karen said, “You should only use your mind to compute. Or you can use scratch paper—but never fingers, because it’s cheating right?” She also commented, “Maybe it’s not a right technique to use for tests.”

Similarly, Irene taught the method to her child who was struggling with computation and memorization but not to her child who was doing well in mathematics. Regarding this point,

Irene, Ryan's mother, said, "I'm telling Ryan this because his memory is a little bit... slow. So, I told him, 'You can use this one,' and he said, 'Mommy, I think this is harder—I can't. I have to remember.'" As seen in these examples, teaching or not teaching informal knowledge was connected to how parents perceived their children's mathematical competence and became a locus of social valorization (de Abreu & Cline, 2007). In the following section, I describe how child participants appropriated or did not appropriate the finger multiplication method.

### 4.3 Children's appropriation of the informal multiplication method

The following stories from child participants demonstrate the discontinuity between home and school learning, experienced especially by immigrant families. I focus on three children whose parents taught them the finger multiplication method. May, who was in Grade 6 and had come from the Philippines to Japan when she was in Grade 4, had repeated Grade 3 in Japan because her Japanese language proficiency was perceived to be limited. Eric was in Grade 4 and had come from the Philippines to Japan after finishing Grade 1. Ryan was born in Japan. At home, none of them was exposed to the *kuku* method, the mainstream method taught at Japanese schools. Child participants' interviews revealed whether they had appropriated the finger multiplication method. May and Eric both used the method for single digit multiplication between six and nine. They both explained that they learned the finger multiplication method from their parents. Ryan did not use the finger multiplication method but used the *kuku* method. Findings from the child interviews demonstrate how the child participants had to negotiate between what was considered legitimate at school and what was taught at home. For the child participants, this negotiation meant hiding or not appropriating what was taught at home.

The interview with Ryan indicates how computation fluency was used to classify students academically at school. When I asked if he memorized *kuku*, he said he repeatedly practiced to memorize it because he was placed in the slowest group for computation in Grade 2. The following accounts of May and Eric's use of the finger multiplication method at school revealed how they were already aware of what was and was not considered to be legitimate. May and Eric both mentioned that they would not use the method openly at school. Eric said he never showed the method to school teachers. May also reported that she would not use this method during mathematics quizzes because she thought that only computation strategies taught by the teacher were legitimate. She provided an example of  $7 + 8$ . Outside of the school, she said she would usually compute addition by decomposing the number by 5 (such as  $5 + 5 + 2 + 3$ ). But in the mathematics quizzes at school, she would follow the teacher's method, which did not involve decomposing numbers. This example shows how these immigrant children came to be keen observers of what was considered legitimate at school and would strategically hide computation strategies that differed from what their teacher taught them.

The following quote from May provides a further account of how she appropriated the finger multiplication method and used it to maneuver within a competitive school environment. When asked in the interview if she wanted to show her finger multiplication method to the teacher, May said, "No, I don't want to [show it to the teacher]. Everyone else is very fast at computation. I shared this only with those who were slow [at computation]." She added, "Students who go to *juku* [after-school cram schools] are very fast [at computation]." Attending *juku* during after-school hours is common among children in Japan and even among upper-grade elementary school students. At *juku*, students preview and review school subjects and also prepare for entrance exams. Fees range between 5000 YEN and 20,000 YEN per month.



As such, there can be a social class divide between those who can attend a cram school and those who cannot. May described how she observed a gap in computation fluency, partially resulting from inequity in access to additional educational resources. In facing this gap, May selectively shared the finger multiplication method only with students like herself—those who were slower at computation and did not have access to *juku*. By sharing the method with other students, May tactically used the finger multiplication method to create a context where she could use the informal method meaningfully.

#### 4.4 Examining the finger multiplication method through the workshop

Based on the themes that emerged from the interviews, the workshops were organized. In the workshops, participants and I discussed different computational models for multiplication and the base-ten (decimal system) underlying the finger multiplication method. For example, an array model was used to highlight how whole numbers can be decomposed and regrouped (see Fig. 3). By letting  $x$  be one factor (represented with one hand) and letting  $y$  be another factor (represented with the other hand), the second way to understand the finger multiplication method is as  $(x - 5) \times 10 + (y - 5) \times 10 + (10 - x) \times (10 - y) = xy$ . In addition, this finger multiplication method can be examined by a statement of the identity:  $(5 + a)(5 + b) = (5 - a)(5 - b) + 10(a + b)$ .

In the process of engaging in the workshops, I observed resistance from child participants to unlearn the school knowledge, as can be seen in the following workshop narratives. Some child participants were reluctant to learn about this method because they had not learned it at school, as reflected in comments such as Ryan's question, "Do we learn about this at school?" The following narrative from the workshop reveals how child participants internalized the legitimacy of school knowledge over informal knowledge.

The facilitator asked Irene to introduce how she would use the finger multiplication method to compute  $6 \times 8$ . Irene stood up and started to introduce in Tagalog how she used the method. I, as a facilitator, asked Irene's child, Ryan, to translate her explanation into Japanese. Irene explained the method in Tagalog and the participants listened to Irene's

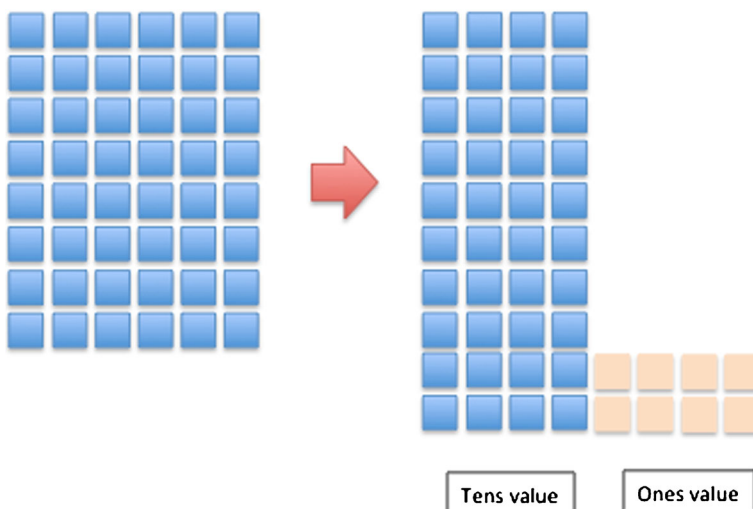


**Fig. 3** An array model to explain the finger multiplication method ( $8 \times 6$ )



explanation while looking at her. Ryan looked at me and said, "I can't translate." I said, "Can't you?" and explained the method in Japanese to the child participants. After the explanation, Ryan asked me, "Do we learn about this at school?" Irene laughed.

Because the children had been told to memorize the multiplication tables in one way (by using *kuku*) at school, they were disinclined to learn any other methods and ways of thinking about multiplication. Despite of the initial resistance, when parents taught the finger multiplication method for single- and multi-digit multiplication at our workshop, the children who did not know about or did not appropriate this method were amazed, as illustrated in the following narrative.

I, as a facilitator, used an example of  $7 \times 7$  and let all child participants try out the finger multiplication method. While watching the child participants trying out the method, Irene was nodding. After a while, Ryan all of the sudden shouted "Ah! You're right—This is amazing." I asked participants to try  $8 \times 9$ . Another child participant, Brian said, "Oh wow." Ryan looked at Irene and said, "I got it." Irene clapped her hands for Ryan.

## 5 Discussion and Implications

The findings presented in this paper offer insights into immigrant students' practices and resources for mathematics learning. Framed by sociocultural theory of learning and especially by focusing on the concept of appropriation, this study showed how appropriation of an informal multiplication method can be a site for negotiation of power and positional identities. By examining the case of Filipina mothers and their children living in Japan, the study offers insights into a global issue regarding mathematics learning that immigrant students experience both inside and outside the school. As the interview results revealed, immigrant parents framed their involvement in their children's learning while contending with the pressures to conform to the mainstream practices of their host country. Some child participants came to understand what is legitimate at school and chose a tacit strategy to maneuver competitive school contexts while also appropriating resources at home. At the same time, the workshop findings highlight that there were other child participants who were reluctant to learn and think about the informal multiplication method, partially because memorization without any external tools is encouraged at school and also because they were aware of what is legitimate and what is not at school. The fact that the curriculum required students to learn one cultural method and teachers had to enact that curriculum in daily teaching practices shows how students were molded into the culturally dominant computation method through schooling. I discuss the findings presented above in relation to power and identity in mathematics learning. I also discuss some limitations of this study and pedagogical implications.

### 5.1 Power and identity in mathematics learning

Highlighting the informal finger multiplication method as one of the examples of what children learn at home, this study illustrates how a seemingly politically neutral multiplication learning can be a space to negotiate identity and power for immigrant families. The findings from this study contribute to advancing the sociopolitical turn in mathematics education (Gutiérrez, 2013) by putting the issues of positional identities at the center of analysis. As previously discussed (Baker et al., 2003; Civil & Planas, 2010; de Abreu & Cline, 2005), by prioritizing certain ways of knowing as legitimate and valued at school, school practices can

suppress other ways of knowing. Because the finger multiplication method was considered to be illegitimate in schools, some immigrant students were taught to repeatedly practice and memorize multiplication tables with a mainstream way. Through the learning of multiplication, students were gradually socialized to conform to the mainstream and, already at Grade 2, some acquired the identity of being a “slow learner,” as the interviews with child participants suggested. At the same time, for another case, child participants’ agency was highlighted in their efforts to create a context in which this socially undervalued cultural tool could be used meaningfully, even when parent participants were reluctant to teach the tool.

By using the concept of positional identities, this study also adds to the ongoing discussion on parental involvement in school and children’s mathematics learning. Immigrant parents in previous studies have tended to value their knowledge and the mathematics they learned in their home countries (Civil, Díez-Palomar, Menéndez, & Acosta-Irqui, 2008; Civil & Planas, 2010; de Abreu & Cline, 2005). However, Filipina mothers in this study tended to undervalue their knowledge and the mathematics they had learned. Not only the finger multiplication method but also other mathematical knowledge they had learned in the Philippines were not openly taught at home. This was partially due to their positional identities in Japan and their lived history: migrating to Japan, which had economic and industrial advantages, in order to financially support their family members in the Philippines. As such, findings from this study adds to the discussion of social valorization (de Abreu & Cline, 2007) by highlighting how different kinds of mathematics are valorized or devalorized with reference to social classification.

Considering that certain parental involvement at home (such as engaging in conversation involving critical thinking) can positively influence students’ academic engagement at school (Galindo & Sonnenschein, 2015; Lee & Bowen, 2006), it is important to understand the positional identities of parents and their impact on parental involvement at home. This intergenerational perspective will help design culturally responsive mathematics teaching that can connect with students’ ways of knowing mathematics, situated in their cultural and linguistic practices (Aguirre & del Rosario Zavala, 2013; Caswell, Esmonde, & Takeuchi, 2011; Gay, 2009).

## 5.2 Limitations

There are several limitations in the current study. First, my data draws from a relatively small number of Filipina mothers and their children living in Japan. This methodological decision allowed me to closely engage with them through this study, by talking with them in depth and designing workshops with them after the interviews. At the same time, I would like to acknowledge that the findings presented are based on this small number of participants and gathering more stories can help to reveal diverse perspectives on the themes discussed.

Second, this study revealed the norm of mathematics learning expressed as the child participants’ reluctance to learn about or even think about mathematics behind the informal finger multiplication method. These findings point to the significance of transforming the cultural practices of schools to embrace diverse ways of knowing. A successful mathematics unit reported by Civil (2007), the garden project, illuminated the possibility of bringing parents’ intellectual resources to schools when teachers view immigrant parents as academically resourceful. Booker and Goldman’s (2016) participatory design research on mathematics workshops with families highlights the significance of attending to the participants’ epistemic authority to confront institutional power. Understanding more about bridges between schools

and communities would be meaningful to achieve equitable mathematics learning opportunities.

### 5.3 Pedagogical implications

With regards to equity in mathematics education, recent reform movements have aimed to promote students' problem solving and conceptual understanding in mathematics. In fact, when teachers are trained to teach mathematics for understanding and use quality curricular resources, teaching for understanding can narrow the achievement gap, as has been shown among students in the United States (Schoenfeld, 2002). The public debate on mathematics education between emphasizing the basics and emphasizing problem solving and conceptual understanding has been observed in many countries and can affect the ways in which non-dominant students access opportunities to learn. Interviews with child participants in this study implied that acquisition of basic computation skills (in this case, memorizing multiplication tables with a specific recitation method) was expected as a necessary step before students moved on to problem solving and conceptual understanding. This context hindered students from mastering and exploring various computation strategies and also restricted opportunities for some students to challenge advanced problem solving until they had mastered basic computation skills in a mainstream way.

The underlying assumption prohibiting the use of the finger multiplication method in the school can be that mathematical thinking has to be "a pure mental activity — something immaterial, independent of the body, occurring in the head" (Radford, 2009, p.111). In school contexts, mathematics is often presented as "existing independently of the people who do it, and independent of their bodies, senses, desires, emotions, and aesthetics — everything that makes a person flesh and blood" (Greer, Mukhopadhyay, & Roth, 2013, p.6). Findings from this study suggest the significance of interrogating the assumption that mathematics is a pure mental activity, in order to enhance opportunities to learn for students who embody specific cultural tools.

This study underlines the significance of affirming and encouraging diverse strategies and methods that students learn at home, in classroom mathematics teaching. Such classroom practices will benefit not only non-dominant students, but all students as the ethnomathematics literature has shown (Ascher, 1994; D'Ambrosio, 2006). For example, unpacking the mechanism of the finger multiplication method highlighted in this study could be useful for challenging students' "fossilized" (Vygotsky, 1978, p. 64) knowledge with a recitation method of multiplication and for diversifying students' ways of approaching multiplication. Diverse ways of mathematical knowing can humanize mathematics and enrich the school mathematics curriculum.

**Acknowledgements** I truly appreciate the participants in this study, who shared with me their insights and experiences. An earlier version of this manuscript was presented at the Eighth International Conference of Mathematics Education and Society and I am grateful for detailed comments and feedback I received there from Dr. Julia Aguirre, Dr. Marta Civil, and Dr. Rochelle Gutiérrez. I am thankful to Dr. Lesley Dookie and Dr. Armando Paulino Preciado Babb for their comments and feedback through our writing group.

#### Compliance with ethical standards

**Funding** This study was supported by the *Grant-in-Aid for Scientific Research* [Grant number: 12 J02927] by the Japan Society for the Promotion of Science. Any opinions, findings and conclusions expressed herein do not necessarily reflect the views of the funding agency.

## References

- Aguirre, J. M., & del Rosario Zavala, M. (2013). Making culturally responsive mathematics teaching explicit: A lesson analysis tool. *Pedagogies: An International Journal*, 8(2), 163–190.
- Ascher, M. (1994). *Ethnomathematics: A multicultural view of mathematical ideas*. Boca Raton: CRC Press.
- Baker, D., Street, B., & Tomlin, A. (2003). Mathematics as social: Understanding relationships between home and school numeracy practices. *For the Learning of Mathematics*, 23(3), 11–15.
- Ball, W. (1888). *A short account of the history of mathematics*. London: Macmillan.
- Booker, A., & Goldman, S. (2016). Participatory design research as a practice for systemic repair: Doing hand-in-hand math research with families. *Cognition and Instruction*, 34(3), 222–235.
- Brenner, M. E. (1998). Meaning and money. *Educational Studies in Mathematics*, 36(2), 123–155.
- Caswell, B., Esmonde, I., & Takeuchi, M. (2011). Towards culturally relevant and responsive teaching of mathematics. In C. Rolheiser, M. Evans, & M. Gambhir (Eds.), *Inquiry into practice: Reaching every student through inclusive curriculum practices* (pp. 64–71). Toronto: Ontario Institute for Studies in Education.
- Civil, M. (2007). Building on community knowledge: An avenue to equity in mathematics education. In N. S. Nasir & P. Cobb (Eds.), *Improving access to mathematics: Diversity and equity in the classroom* (pp. 105–117). New York: Teachers College Press.
- Civil, M., & Bernier, E. (2006). Exploring images of parental participation in mathematics education: Challenges and possibilities. *Mathematical Thinking and Learning*, 8(3), 309–330.
- Civil, M., Diez-Palmar, J., Menéndez, J., & Acosta-Irqui, J. (2008). Parents' interactions with their children when doing mathematics. *Adults Learning Mathematics: An International Journal*, 3(2a), 41–58.
- Civil, M., & Planas, N. (2010). Latino/a immigrant parents' voices in mathematics education. In E. Grigorenko & R. Takanishi (Eds.), *Immigration, diversity, and education* (pp. 130–150). New York: Routledge.
- Committee of Localities With a Concentrated Foreigner Population [Gaikokujin Shujyu Toshi Kaigi]. 2012. *Report on the 2012 Tokyo conference for the committee of localities with a concentrated foreigner population* [Gaikokujin Shujyu Toshi Kaigi Tokyo 2012 Houkokusho]. Retrieved September 29, 2016, from <http://www.shujutoshi.jp/>.
- Crafter, S. (2012). Parental cultural models and resources for understanding mathematical achievement in culturally diverse school settings. *Educational Studies in Mathematics*, 81(1), 31–46.
- D'Ambrosio, U. (2006). *Ethnomathematics: Link between traditions and modernity*. Rotterdam: Sense Publishers.
- Davis, B., & Preciado Babb, A. P. (2015). Secondary mathematics instruction and student diversity. In J. J. W. Andrews & J. L. Lupart (Eds.), *Diversity education: Understanding and addressing diversity* (pp. 520–547). Toronto: Nelson Education.
- de Abreu, G., & Cline, T. (2005). Parents' representations of their children's mathematics learning in multiethnic primary schools. *British Educational Research Journal*, 31(6), 697–722.
- de Abreu, G., & Cline, T. (2007). Social valorization of mathematics practices: The implications for learners in multicultural schools. In N. S. Nasir & P. Cobb (Eds.), *Improving access to mathematics: Diversity and equity in the classroom* (pp. 118–132). New York: Teachers College Press.
- Fairclough, N. (1989). *Language and power*. New York: Longman.
- Galindo, C., & Sonnenschein, S. (2015). Decreasing the SES math achievement gap: Initial math proficiency and home learning environments. *Contemporary Educational Psychology*, 43, 25–38.
- Gay, G. (2009). Preparing culturally responsive mathematics teachers. In B. Greer, S. Mukhopadhyay, S. Nelson-Barber, & A. Powell (Eds.), *Culturally responsive mathematics education* (pp. 189–206). New York: Routledge.
- Gonzalez, N., Andrade, R., Civil, M., & Moll, L. (2001). Bridging funds of distributed knowledge: Creating zones of practices in mathematics. *Journal of Education for Students Placed at Risk (JESPAR)*, 6(1), 115–132.
- Gorgorió, N., & Abreu, G. (2009). Social representations as mediators of practice in mathematics classrooms with immigrant students. *Educational Studies in Mathematics*, 72(1), 61–76.
- Gray, E. (2001). Cajun multiplication: A history, description, and algebraic verification of a peasant algorithm. *The LATM Journal*, 1(1), 1–7.
- Greer, B., Mukhopadhyay, S., & Roth, W. M. (2013). Celebrating diversity, realizing alternatives. In W. M. Roth, L. Verschaffel, & S. Mukhopadhyay (Eds.), *Alternative forms of knowing (in) mathematics: Celebration of diversity of mathematical practices*. Sense: Rotterdam.
- Guberman, S. R. (2004). A comparative study of children's out-of-school activities and arithmetical achievements. *Journal for Research in Mathematics Education*, 35(2), 117–150.
- Gutiérrez, R. (2013). The sociopolitical turn in mathematics education. *Journal for Research in Mathematics Education*, 44(1), 37–68.

- Holland, D., Skinner, D., Lachicotte Jr., W., & Cain, C. (1998). *Identity and agency in cultural worlds*. Cambridge: Harvard University Press.
- Lee, J. S., & Bowen, N. K. (2006). Parent involvement, cultural capital, and the achievement gap among elementary school children. *American Educational Research Journal*, 43(2), 193–218.
- Ministry of Education, Culture, Sports, Science and Technology. (2008). *The courses of study: Arithmetic*. Retrieved December 13, 2015, [http://www.mext.go.jp/a\\_menu/shotou/new-cs/youryou/syo/san.htm](http://www.mext.go.jp/a_menu/shotou/new-cs/youryou/syo/san.htm)
- Moll, L., Amanti, C., Neff, D., & Gonzalez, N. (1992). Funds of knowledge for teaching: Using a qualitative approach to connect homes and classrooms. *Theory Into Practice*, 31(2), 132–141.
- Nasir, N. S., & Hand, V. (2008). From the court to the classroom: Opportunities for engagement, learning, and identity in basketball and classroom mathematics. *The Journal of the Learning Sciences*, 17(2), 143–179.
- Office for National Statistics. (2013). Language in England and Wales: 2011. Retrieved September 29, 2016, from <http://www.ons.gov.uk/peoplepopulationandcommunity/culturalidentity/language/articles/languageinenglandandwales/2013-03-04>
- Organisation for Economic Co-operation and Development. (2013). *PISA 2012 results: Excellence through equity: Giving every student a chance to succeed*. Paris: OECD Publishing.
- Polman, J. L. (2006). Mastery and appropriation as means to understand the interplay of history learning and identity trajectories. *The Journal of the Learning Sciences*, 15(2), 221–259.
- Radford, L. (2009). Why do gestures matter? Sensuous cognition and the palpability of mathematical meanings. *Educational Studies in Mathematics*, 70(2), 111–126.
- Saxe, G. B. (2012). *Cultural development of mathematical ideas: Pupa New Guinea studies*. New York: Cambridge University Press.
- Saxe, G. B., & Esmonde, I. (2005). Studying cognition in flux: A historical treatment of Fu in the shifting structure of Oksapmin mathematics. *Mind, Culture, and Activity*, 12(3), 171–225.
- Schoenfeld, A. H. (2002). Making mathematics work for all children: Issues of standards, testing, and equity. *Educational Researcher*, 31(1), 13–25.
- Statistics Canada. (2012). *Linguistic characteristics of Canadians*. Ottawa: Canada Statistics Canada.
- Takeuchi, M. (2015). Non-dominant students' and their parents' mathematical practices at home. In T. G. Bartell, K. N. Bieda, R. T. Putnam, K. Bradfield, & H. Dominguez (Eds.), *Proceedings of the 37<sup>th</sup> annual meeting of the north American chapter of the International Group for the Psychology of mathematics education* (pp. 566–570). East Lansing: Michigan State University.
- Takeuchi, M. (2016). Transformation of discourse: Multilingual resources and practices among Filipino mothers in Japan. *International Journal of Bilingual Education and Bilingualism*, 19(3), 235–248.
- Taylor, E. V. (2009). The purchasing practice of low-income students: The relationship to mathematical development. *The Journal of the Learning Sciences*, 18(3), 370–415.
- United States Census Bureau. (2013). *Language use in the United States 2011*. Retrieved December 13, 2015, from <http://www.census.gov/prod/2013pubs/acs-22.pdf>
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge: Harvard University Press.
- Wertsch, J. (1998). *Mind as action*. New York: Oxford University Press.
- Willey, C. (2008). Immigrant Latina mothers' participation in a community mathematization project. *Adults Learning Mathematics: An International Journal*, 3(2a), 29–40.

Educational Studies in Mathematics is a copyright of Springer, 2018. All Rights Reserved.

# New Money and Energy to Help Schools Connect With Families

Engaging parents draws new energy.

**By Francisco Vara-Orta**  
From *Education Week*

It's indisputable that most students perform better academically when they have parents or adults to help with homework and to be advocates with teachers and principals.

But in many communities, parents who juggle multiple jobs, don't speak much English, or have low levels of education often don't have the time or resources to make meaningful connections to their child's schooling experience.

That's why some districts have made it their job to reach out to families and create more

welcoming and accessible ways for parents to be part of their children's schooling.

In Washoe County, NV, for example, the school district's family-engagement work includes organizing home visits by teachers—and training those teachers to make the most of those face-to-face encounters in students' homes.

In Federal Way, WA, the leader of family-engagement efforts taps a diverse array of parents to serve on committees or task forces that inform major decision making in the district, including high-level hires.

Still, the specialized field of parent and family engagement

---

*Francisco Vara-Orta is a staff writer for Education Week. Condensed, with permission, from Education Week, 38 (September 25, 2018). Copyright 2018 Editorial Projects in Education, Inc. For more information, visit [www.edweek.org](http://www.edweek.org).*



has mostly been driven by ambitious leaders at the district level. And even in districts with robust programming, resources to support the work are often tight.

### A Bigger Push

But new and potentially bigger forces are building around the need for schools and educators to forge deeper connections with parents and community members.

Philanthropists—in particular the W. K. Kellogg Foundation and the Carnegie Foundation of New York—are championing the flow of more money into family-engagement initiatives, including research to identify what efforts are effective.

And the federal budget has set aside \$10 million to help fund efforts by several state education agencies and outside partners to develop strong parent and community programming.

The Every Student Succeeds Act also directs states and districts to develop plans to work with families and surrounding communities—a requirement that has spawned a multi-state endeavor to create guidelines and exemplars for schools and districts to follow.

Advocates for building strong

ties between schools and families say it's a major opportunity for a proven, yet underutilized strategy to make schools better.

“There is a lot of excitement, and more of an evolution in where both policymakers and funders feel like they want to increasingly put their money,” said Vito Borrello, the executive director for the National Association for Family, School, and Community Engagement.

Leaders in Mississippi and South Carolina are already taking steps to spread successful parent-engagement efforts to communities across their states, said Kelli Gauthier, a spokeswoman for the Council of Chief State School Officers, which is working with those two states and more than a dozen others to craft the guidelines for family engagement.

In Mississippi, officials who run the state's early-childhood education programs are working to expand the kind of hands-on efforts they use with parents of children from birth to 5 years to families of students in all grades. As students age, establishing connections to parents gets more challenging and school-led efforts to do so tends to drop off, said Borrello. ►

### **Philanthropic Backing**

South Carolina leaders are tapping into the state's religious community as one tactic to help support students and families. They are recruiting churches to adopt schools and assist them in helping meet students' basic needs. More than 1,500 churches across South Carolina have joined the effort.

"We ask churches to perhaps be a reading buddy to students, ask them if they may be able to do a backpack program where they fill backpacks with non-

---

### **Philanthropists are championing the flow of more money into family-engagement initiatives.**

---

perishable items and, if possible, include a book, as we have a lot of kids who are not reading when not in school," said Yolandé Anderson, the head of the office for family engagement in South Carolina's education agency.

Although there's enthusiasm about the new momentum around family engagement, especially from policymakers, it doesn't come without challenges.

The \$10 million infusion of federal money is dwarfed by earlier government investments in similar initiatives, said Borello. Before being defunded in 2011, states shared \$40 million in federal money to support entities known as "parental information resource centers."

And under the requirements of the new ESSA-related grants, state education agencies can't directly apply for the funding, said Anderson. Independent organizations that partner with states must seek the money, making it difficult for states to ensure there's an equitable distribution of resources, she said.

That's why philanthropic sources of funding are especially appealing.

Officials with the Kellogg Foundation said they have given about \$25 million over the last five years to support family-engagement efforts, including the multi-state endeavor to write guidelines.

The foundation is also directly funding research, including a study published in 2016 that found that teachers who share their students' racial identity or linguistic backgrounds are generally more successful at building trusting relationships with parents and families, said

## Helping Schools Connect with Families

Jenefer O'Dell, a program officer with the Kellogg Foundation.

"We want to help the school system move away from looking at family engagement as a one-time program or collection of random events—like fundraisers such as a bake sale—and focus more on looking at sustainable ways in how parents and families are constantly incorporated in every aspect of the learning settings within the school," she said.

The Carnegie Corporation of New York has funded family-engagement programs in the past. But officials there increasingly see it as a priority, thanks to research showing its effectiveness and ESSA's push for states to consider ways to get "stakeholders" more involved, chiefly parents, said Ambika Kapur, an education program officer at Carnegie Corporation.

The foundation wanted to first get a snapshot of where family engagement was in the philanthropic world, and surveyed 150 foundations. Carnegie found that they collectively poured about \$230 million into family engagement, and nearly half were newer foundations pumping money into the cause—a confirmation that the support for this work was real.

"The more we went deeper in

learning about research about successful educational reforms, we found that the greatest influence on students is the family," Kapur said.

In just the past year, Carnegie has worked with DonorsChoose.org to offer about \$500,000 toward matching—dollar for dollar—what teachers raise themselves, and supporting burgeoning nonprofits. Such nonprofits include EdNavigator, an organization that sends advisers into parents' workplaces—with employers' cooperation and financial support—to offer help and advice on how to advocate for their children at school.

### Making Equity a Priority

While family engagement again may be fashionable in education reform, educators in districts that have long championed the approach have a few suggestions for those jumping on the bandwagon.

"It's vital to have a culturally responsive lens in however you shape the outreach," said Trise Moore, the head of family and community engagement for the Federal Way school district near Seattle.

O'Dell, of Kellogg, agreed, saying it's vital for policymakers and funders to incorporate awareness of racial inequity into

family-engagement programs, as it's part of the foundation's "DNA."

To help, Kellogg has issued its own set of guiding principles for promoting racial equity in family engagement to help peers working in education to address such nuanced challenges.

Moore also emphasized that in a data-driven education reform culture, it's important to remember that some positive outcomes are not easily quantifiable, such as the "self-efficacy that a parent will gain" through family engagement work.

"You can't measure a parent's hopefulness, you can't measure a parent's confidence," Moore said. "You can't measure a student's competence based on the parent's confidence."

Patricia Spradley, the chief of parent and community engagement in the Springfield school district in Massachusetts, said it's important for the superintendent to be on board with championing family engagement and for that work to be a formal part of a district's strategic goals.

"That allows a mechanism for enforcement," Spradley said, regarding how policymakers can approach supporting family engagement.

As for the potential for new

funding sources, Spradley said: "For those of us who have been the forerunners in the state of parent engagement, we are called upon to do training for others."

"We have had very little professional-development opportunities to take this work to the next level that funding could help. At the local level, family engagement still feels like we are on our own, a bit of an afterthought, stand-alone part of the system that needs better integration." ■



"I feel a report card questions my work ethic."

Copyright of Education Digest is the property of Prakken Publications and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.

# A Randomized, Controlled Trial of the Family Check-Up Model in Public Secondary Schools: Examining Links Between Parent Engagement and Substance Use Progressions From Early Adolescence to Adulthood

Marie-Hélène Véronneau  
Université du Québec à Montréal

Thomas J. Dishion  
Arizona State University

Arin M. Connell  
Case Western Reserve University

Kathryn Kavanagh  
University of Oregon

**Objective:** Substance use in adulthood compromises work, relationships, and health. Prevention strategies in early adolescence are designed to reduce substance use and progressions to problematic use by adulthood. This report examines the long-term effects of offering Family Check-up (FCU) at multiple time points in secondary education on the progression of substance use from age 11 to 23 years. **Method:** Participants ( $N = 998$ ; 472 females) were randomly assigned individuals to intervention or control in Grade 6 and offered a multilevel intervention that included a classroom-based intervention (universal), the FCU (selected), and tailored family management treatment (indicated). Among intervention families, 23% engaged in the selected and indicated levels during middle school. **Results:** Intention to treat analyses revealed that randomization to the FCU was associated with reduced growth in marijuana use ( $p < .05$ ), but not alcohol and tobacco use. We also examined whether engagement in the voluntary FCU services moderated the effect of the intervention on substance use progressions using complier average causal effect (CACE) modeling, and found that engagement in the FCU services predicted reductions in alcohol, tobacco, and marijuana use by age 23. In comparing engagers with nonengagers: 70% versus 95% showed signs of alcohol abuse or dependence, 28% versus 61% showed signs of tobacco dependence, and 59% versus 84% showed signs of marijuana abuse or dependence. **Conclusion:** Family interventions that are embedded within public school systems can reach high-risk students and families and prevent progressions from exploration to problematic substance use through early adulthood.

## What is the public health significance of this article?

This study suggests that family centered interventions designed to be embedded within the public school service system can have long-term preventive effects on reducing risk for marijuana use especially, but also tobacco and alcohol. By actively and respectfully encouraging at-risk families to participate, those most likely to benefit will engage and have motivation to change; thus, optimizing the use of resources while maintaining the significant impact of the intervention.

**Keywords:** drug use, drug dependence, adaptive intervention, middle schools, motivational interviewing

Substance use before age 15 is among the best predictors of progression to abuse and dependence by early adulthood (Anthony, Warner, & Kessler, 1997; Robins & Przybeck, 1985), and initiating substance use in late adolescence is associated with

increased likelihood of criminal behavior and physical health problems in adulthood (Tucker, Ellickson, Orlando, Martino, & Klein, 2005). In the late teens and early 20s, alcohol, marijuana, and tobacco use reaches a peak (Compton, Thomas, Stinson, &

This article was published Online First April 7, 2016.

Marie-Hélène Véronneau, Département de Psychologie, Université du Québec à Montréal; Thomas J. Dishion, Department of Psychology, Arizona State University; Arin M. Connell, Department of Psychological Sciences, Case Western Reserve University; Kathryn Kavanagh, Department of Child and Family Center, University of Oregon.

Funding was provided by grant DA07031 from the National Institute on Drug Abuse to TJD, and by a start-up grant for new professors-researchers from the Faculty of Human Sciences, Université du Québec à Montréal, and a

Research Scholar Junior 1 career award from the Québec Research Funds—Health, to MHV. We are deeply grateful for the hard work of the Project Alliance staff, study families, and participating schools; without them this study would not have been possible. Thanks to Cheryl Mikkola and to Brittany Lewis for editorial assistance in the preparation of this article.

Correspondence concerning this article should be addressed to Marie-Hélène Véronneau, Université du Québec à Montréal, Département de Psychologie, C.P. 8888, Succursale Centre-Ville, Montréal (QC) H3C 3P8, Canada. E-mail: [veronneau.marie-helene@uqam.ca](mailto:veronneau.marie-helene@uqam.ca)

Grant, 2007). Substance use, even at a low frequency, is a major disruptor of nearly every aspect of the transition into adulthood, including lack of educational achievement, disruption of work, interpersonal relationships and family life, and progression to problematic substance use (Kandel et al., 1999; Newcomb & Bentler, 1988; Tucker et al., 2005; Yamaguchi & Kandel, 1985). In addition, the costs associated with substance use are high. In 2002, economic costs of illicit drug abuse in the United States were estimated at \$180.9 billion (Office of National Drug Control Policy, 2004). This represents, among others, costs related to the criminal justice system, costs incurred by victims of drug-related crimes, and health care costs for substance use—related problems.

Because only a small minority of adolescents and young adults seeks treatment for emerging substance use problems (Teesson, Baillie, Lynskey, Manor, & Degenhardt, 2006), considerable investment has been put into the design and testing of effective early prevention. A key principle is to develop models of early onset substance use and then to design interventions that target etiological factors that are malleable (Dishion & Patterson, 1999; Stanis & Andersen, 2014). This study focused on a family centered approach to prevention of early onset substance use and on the evaluation of the long-term impact on the progression of substance use from early adolescence to adulthood.

### Etiology of Substance Use

The etiology of substance use in adolescence and early adulthood is complex in that it involves individual risk factors (e.g., early onset persistent antisocial behaviors, academic failure, alienation and rebelliousness, positive attitudes about drugs, and early adolescent drug use), family risk factors (e.g., family behaviors and attitudes about substance use, family management practices, family conflict, and bonding to the family), and extra familial factors (weak commitment to school, early peer rejection, and affiliation with drug-using peers; for reviews see Hawkins, Catalano, & Miller, 1992; Sloboda, Cottler, Hawkins, & Pentz, 2009). Further, these domains of risk are interdependent. For instance, Dishion, Capaldi, Spracklen, and Li (1995) found that several risk factors were associated with early onset tobacco, alcohol, and marijuana use, with a unique constellation of risk for each substance. Although major studies of the etiology of substance use have been based on global measures of substance use (Catalano, Kosterman, Hawkins, Newcomb, & Abbott, 1996; Tarter et al., 2003), studying the unique etiology related to the use of various substances can be quite informative. For example, Dishion et al. (1995) showed that although tobacco, alcohol, and marijuana use were predicted by childhood antisocial behavior and involvement with deviant peers, tobacco use was uniquely predicted by peer rejection, alcohol use by inconsistent and harsh discipline, and marijuana use by disrupted families (divorce and remarriage). Several studies of risk have found that antisocial behavior is often the key predictor of substance use (Hawkins & Catalano, 1992; Kellam, Brown, Rubin, & Ensminger, 1983; Smith & Fogg, 1979). The central role of antisocial behavior in the development of early onset substance use has been tested as a dynamic cascade model (Dodge et al., 2009) showing that antisocial behavior leads to negative developmental sequelae, such as school failure and poor peer relationships, which lead to association with substance-using peers.

Studies have revealed a process of premature autonomy that underlies the progression of multiple forms of problem behavior in adolescence and young adulthood. Patterson, Reid, and Dishion (1992) described a “cascade of effects” of antisocial behavior in middle childhood on adolescent progressions to more serious problem behavior. Specifically, youth with a history of problem behavior tend to become marginalized in school by teachers and peers and subsequently seek unsupervised contexts that involve peers and deviance. Longitudinal studies revealed that a combination of problematic parenting in adolescence and involvement with deviant peers or siblings leads to increases in problem behavior later in adolescence and into young adulthood. Researchers assessed number of daily meals with parents, daily discussions with parents about activities, affection with parents, and time spent with peers unsupervised by adults. By far, the best predictor of growth in substance use was the number of unsupervised hours with peers. In the absence of intervention to reduce youth problem behavior, time spent with peers and emergence of problem behavior leads to further deterioration in parent—adolescent relationships, which contributes to escalating problem behavior (Bradley & Corwyn, 2013; Dishion, Bullock, & Kiesner, 2008; Dishion, Nelson, & Bullock, 2004; Keijsers et al., 2012; Low, Snyder, & Shortt, 2012).

Parenting skills stand out as a key intervention target for the prevention of substance use. Early adolescence is a crucial period to intervene with parents, because it is late enough for risk factors to be reliably identified but early enough to intervene before substance use is initiated or before it escalates. Furthermore, embedding parenting interventions in a school-based prevention program strengthens the program’s ability to act on the mutual influences among adolescents, family, and their extrafamilial context (Hawkins et al., 1992).

Several programs have been developed to support parents during the early adolescence transition. By far, the most common strategy is to implement universal parenting programs that engage parents within the public school system (e.g., Fleming, White, Haggerty, Abbott, & Catalano, 2012; Hawkins, Von Cleve, & Catalano, 1991; Gonzales et al., 2012; Park et al., 2000; Spoth, Greenberg, Bierman, & Redmond, 2004; Spoth, et al., 2013; Spoth & Redmond, 2002). There is considerable evidence that universal approaches to supporting families in public school settings have long-term benefits (e.g., Brown, Catalano, Fleming, Haggerty, & Abbott, 2005; Hawkins, Catalano, Kosterman, Abbott, & Hill, 1999; Spoth, Trudeau, Gyll, Shin, & Redmond, 2009). Although early intervention is necessary to prevent substance use before its emergence, intervention effects tend to disappear by early adulthood if prevention efforts are not pursued into adolescence (Hawkins, Kosterman, Catalano, Hill, & Abbott, 2005; Hawkins et al., 2007; O’Donnell, Hawkins, Catalano, Abbott, & Day, 1995). Universal approaches to supporting parenting practices face two key challenges. One is that the most at-risk parents often do not show up for universal parenting programs (Hawkins et al., 1992) unless paid staff exerts extensive and expensive efforts to engage them (Eddy, Reid, Stoolmiller, & Fetrow, 2003). Second, it is difficult for universal programs to address the myriad intervention needs of high-risk parents and families. Failure to attend to the multiple risk domains of high-risk families is associated with their poor response to psychosocial intervention (Forgatch & Patterson, 2010; G. E. Miller & Prinz, 1990).



## The Family Check-Up: An Adaptive Approach to Intervention and Engagement

Linking universal prevention with engagement of high-risk participants requires a systematic, economical, and respectful approach to screening. Multiple gating for schools was designed to build on the extensive risk prediction literature to identify subgroups of students and families who would most benefit from additional intervention resources (Dishion & Patterson, 1993; Loeber, Dishion, & Patterson, 1984). Similar to multistage personnel selection through assessments (Cronbach & Gleser, 1965), the least expensive measures are used first to identify a subgroup worthy of more consideration. In the Family Check-up model in schools (FCU; Dishion & Kavanagh, 2003; Dishion, Kavanagh, & Kiesner, 1999), teachers provide the first “gate” of assessment. Students whom teachers see no risk are passed over, and the remaining groups are assessed by parents. If parents also are concerned about student risk, then further assessment involves the parent and child (i.e., the FCU). The FCU multilevel model and engagement process are detailed below.

Major challenges arise when evaluating intervention effects with an adaptive and tailored approach to engagement and intervention. When family services are provided to the entire population, only a minority of families requires more intensive family based services. Thus, a traditional intention to treat (ITT) analytic strategy does not address whether engagement in the intervention increased effect sizes. Using a traditional ITT design when only part of the intervention group is expected to engage in the FCU decreases the statistical power to detect intervention effects (Angrist, Imbens, & Rubin, 1996). An alternative analytic strategy has been suggested to analyze intervention effects in such designs: complier average causal effect (CACE) modeling (Imbens & Rubin, 1997; Jo, 2002; Little & Yau, 1998). CACE modeling facilitates the analysis of client engagement as a moderator of intervention effects by use of longitudinal mixture modeling of self-reported drug use from ages 11 through 23 years, with predefined “engager” and “nonengager” classes within the intervention group and estimated engager and nonengager classes in the control group. A critical assumption in CACE modeling is that nonengagement with the FCU, for example, does not change behavior. Holding that assumption, longitudinal classes of control engager- and nonengager-equivalent groups are formulated. Within this longitudinal framework it is valid to compare the intervention engagers with the control engager-equivalent group with respect to their longitudinal trajectories, retaining the virtues of random assignment to the intervention condition.

In a previous study using this sample (Project Alliance 1; Connell, Dishion, Yasui, & Kavanagh, 2007), we used CACE modeling and found that youth whose family engaged in the FCU had less growth in alcohol, tobacco, and marijuana use from age 11 through 17 years, fewer substance use diagnoses by age 19, and less likelihood of having a police record by age 16–17 than did the adolescents from the engager-equivalent control group whose family was not offered the FCU. CACE analyses also revealed that positive intervention effects generalized to other important areas of adolescent development in that sample. Participants whose family engaged in the FCU had stable grade point averages (GPAs) and improved school attendance between ages 11 and 17 years, whereas matched control participants experienced a decrease in

GPA and an increase in absenteeism (Stormshak, Connell, & Dishion, 2009). Some of these results regarding substance use were replicated with a different sample (Project Alliance 2; Stormshak et al., 2011) on the basis of data collected when participants were age 11 through 13 years. Less growth in substance use and antisocial behavior was observed among participants whose family engaged in the FCU than among matched participants from the control group. In the same sample, long-term intervention effects were found using an ITT approach, and researchers concluded that reductions in family conflict mediated long-term reductions in antisocial behavior by age 18–19 years (Van Ryzin, Stormshak, & Dishion, 2012).

One question that remains unanswered based on past research is whether the positive intervention effects of the FCU on substance use observed throughout the teenage years are maintained when participants transition into early adulthood. A 10-year follow-up assessment such as the one presented here that encompasses two major life transitions (from middle to high school, and from adolescence to adulthood) is exceptional in that a follow-up occurring from 18 to 24 months after the intervention is commonly referred to as *long-term*. Because some well-known and promising prevention programs have failed to yield a significant reduction in substance use or abuse when participants reached late adolescence or early adulthood (Eckenrode et al., 2010; Webster-Stratton, Rinaldi, & Reid, 2011), we must recognize that the maintenance of FCU effects after the transition to adulthood is not guaranteed and should be verified based on new data now available. In addition, the diversity of substance use patterns during adolescence (Tucker et al., 2005) makes it essential to reassess FCU effects in early adulthood, because some groups of at-risk adolescents are difficult to identify earlier in adolescence (e.g., late-increasing users). Some seemingly low-risk youth who engage in low-stable or declining patterns of substance use throughout adolescence are still at higher risk for substance-related problems in adulthood than are abstainers (Tucker et al., 2005), hence the importance of looking at the impact of the FCU not only on growth in substance use, but also on substance abuse and dependence in adulthood.

## The Present Study

The goal of this study was to test the hypotheses that family engagement in the FCU reduces the growth in substance use during adolescent years and protects against substance abuse or dependence once participants reach adulthood (age 23 years). These hypotheses were tested by applying both ITT and CACE modeling to the longitudinal data and considering tobacco, alcohol, and marijuana use separately.

## Method

### Participants

Participants were 998 adolescents and their families recruited in Grade 6 ( $M$  age = 12.2 years,  $SD$  = 0.37) from three middle schools in an ethnically diverse urban community in the Northwest region of the United States to participate in the Project Alliance 1 study. We approached the parents of all Grade 6 students in two cohorts (years 1996 and 1998) for participation, and 90% consented to participate (see Figure 1). The sample included 472

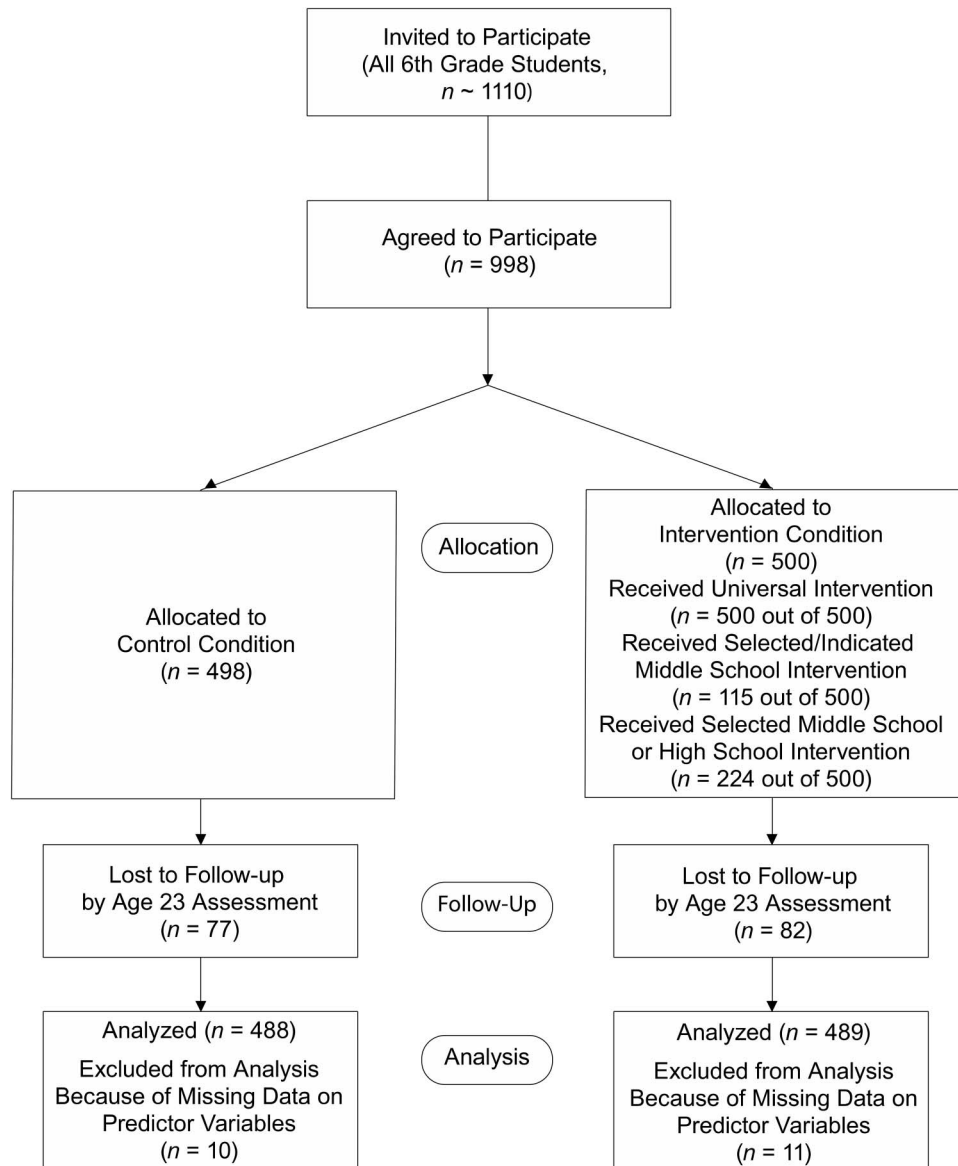


Figure 1. Flowchart of participants through each stage of the study.

females (47.3%) and 526 males (52.7%). According to youth self-report, there were 423 European Americans (42.3%), 291 African Americans (29.1%), 68 Latinos (6.8%), 52 Asian Americans (5.2%), and 164 (16.4%) adolescents of other ethnicities (including biracial). Participants lived with their biological father in 585 families (58.6%). During the spring of Grade 6, we randomly assigned each participant to either a control classroom (498 youth) or an intervention classroom (500 youth) for the next year (Grade 7), in collaboration with each middle school. Participants in intervention classrooms were then exposed to the universal intervention program in class (see Dishion & Kavanagh, 2003, and the Intervention Protocol subsection of this article for more detail), and their parents would have access to a family resource center. Public schools agreed to randomization of families to specific Grade 7 home rooms and the associated resource center because it

reduced the need for services at the school-wide level. In the initial agreement, the research staff agreed not to deny family resource center services to the control group if requested. During the course of the middle school period, only one control parent requested services, and that was via a telephone call to the project director (Dr. Kavanagh) and not by a visit to the family resource center in the school.

Approximately 80% of youth were retained across the longitudinal span of our study (age 13,  $n = 857$ ; age 14,  $n = 829$ ; age 15,  $n = 820$ ; age 17,  $n = 794$ ; age 19,  $n = 735$ ; age 22,  $n = 818$ ; and age 23,  $n = 839$ ). Gross annual household income measured during high school ranged from \$4,999 or less to \$90,000 or more, with a median value of \$30,000–\$39,999, and primary caregivers' education ranged from "no formal schooling" to "graduate degree," with a median value corresponding to "partial college."

Although some participants were lost to attrition by the last wave of data collection, the demographic composition of the sample remained essentially the same.

### Intervention Protocol

The first level of the program, a universal intervention, established a family resource center in each of the three participating public middle schools. The entire intervention group had access to parent-centered services of the family resource center, but this center was not promoted to the families assigned to the control group, who therefore, did not request its services. These services included brief consultations with parents, such as telephone consultations, FCUs with parents, and access to videotapes and books relevant to parents' concerns. Parent consultants were selected to match the most prevalent ethnic groups in the sample (European American, African American, or Hispanic). The parent consultant also engaged students in six in-class lessons called the Success, Health, Active coping, and Peace Curriculum (SHAPE; see Dishion & Kavanagh, 2003). This intervention was modeled on the Life Skills Training program described by Botvin, Baker, Dusenbury, Tortu, and Botvin (1990), but it was reduced in scope (six lessons in SHAPE vs. 16 in Life Skills Training). Each component of the SHAPE was accompanied by a home practice exercise that emphasized parent—student interactions to support family management. The six sessions focused on the following topics: (a) school success, (b) health decisions, (c) building positive peer groups, (d) the cycle of respect, (e) coping with stress and anger, and (f) solving problems peacefully. Brief parent—student activities designed to motivate and engage discussions supportive of family management were included in this intervention.

The selected intervention consisted of the FCU. This brief, three-session intervention is based on motivational interviewing and was modeled on the Drinker's Check-Up (W. R. Miller & Rollnick, 2002). All families in the intervention could request an FCU, but families of high-risk youth were specifically approached and offered the FCU in Grades 7 and 8. Youth deemed to be at high risk had been rated as such by teachers using the within-classroom standardized scores on the teacher report of risk behavior (TRISK; see the "Measures" subsection later in this article), so they were about equally distributed among classrooms. Participants were selected as high risk based on their relative ranking in their own classroom, and we made sure they were equally distributed across genders. We predetermined that as many as 300 participants (i.e., about one-third of the full sample) could potentially be considered "high risk" and that these youth would be equally distributed across the intervention and control groups. Participants who ranked highest on the overall TRISK questionnaire for their gender were progressively included until the high-risk subgroup was filled. However, a cutoff of 1 *SD* above the mean on the TRISK was established to identify high-risk status, so the final number of high-risk participants was 272, which represents 27.2% of the sample (27.4% of the participants assigned to the intervention group). Families of high-risk adolescents who were invited to participate in the FCU represented 40.9% of those who engaged in the FCU, while 59.1% were families who were mostly referred by school staff, but not considered high risk using our own rating system. Of the 137 high-risk youth assigned to the intervention condition, 34.3% ( $n = 47$ ) engaged with the FCU and

65.7% ( $n = 90$ ) did not. Of the 363 "low-risk" youth assigned to the intervention condition, 18.7% ( $n = 68$ ) engaged with the FCU and 81.3% ( $n = 295$ ) did not. Thus, the density of high-risk families engaged in the FCU during middle school (34.3%) was greater than expected by chance  $\chi^2(1) = 13.62, p < .001$ . In other words, although most of the families who engaged in the FCU were low-risk (59.1%), families of high-risk children were significantly more likely to enroll (34.3%) than were families of low-risk children (18.7%).

To maintain the randomized component of the study, none of the families in the control group were offered the FCU, even if more than one-quarter of them were considered to be high-risk participants. It is telling that none of the parents randomly assigned to the control group actively requested services from the parent consultant. These numbers suggest that invitations to a brief family service were partially successful in reaching high-risk families. A large part of our resources were used to help families in greatest need of our services without excluding those families who were at lower risk according to our screening procedure and who thought the FCU could help them support their youth's positive development.

The three FCU sessions included (a) an initial interview (20–30 min), (b) an assessment session (60 min), and (c) a feedback session involving the consultant and the parents (usually 60 min or longer, if needed). The three sessions were scheduled as close in time as possible, usually within 1 to 2 weeks. However, when families' availability was limited, it could take up to 3 months to complete all three sessions. In the initial interview, a parent consultant explored parent concerns and stage of change and encouraged the parents to engage in a family assessment in the home. In the assessment session, family members were videotaped while they engaged in discussions about eight topics that were meant to help evaluate parent—child interactions. Topics included planning a family fun activity, discussing a family problem identified by the parent, and discussing how parents could help their adolescent improve in an area of personal growth identified by the youth. During the feedback session with the parent, the therapist summarized the results of the assessment while using motivational interviewing strategies to support reflection about behavior change. An essential objective of the feedback session was to explore potential intervention services to support family management practices.

The FCU is designed as a gateway to more intensive family interventions when needed, including the Everyday Parenting curriculum (EPC; Dishion et al., 2011), which consists of 12 parent management sessions. The EPC is grounded in the Adolescent Transitions Program parenting intervention (Dishion & Andrews, 1995) and the Parent Management Training–Oregon group parent training (Forgatch & Patterson, 2010). Following the FCU, sessions were identified and delivered to parents on the basis of the results of the assessment and their motivation to engage in services. These services were provided in Grades 6, 7, 8, or 9 by parent consultants. The selection and offering of specific sessions within the EPC varied as a function of family needs and parent preferences. In addition, some parents chose to make changes in their family management practices without further contact with the parent consultant. Because of the diversity of session content and number of sessions, this study focused on engagement in the FCU as a general indicator of intervention compliance.

In the intervention condition, 115 families (23%) chose to receive the FCU during middle school, and 88 (77%) of them received further intervention services after the FCU. For Cohort 1, 46% of FCUs were completed after the Grade 7 family assessment, 53% were completed after the Grade 8 family assessment, and 1% were completed after the Grade 9 family assessment. For Cohort 2, 93% of FCUs were completed after the Grade 7 family assessment, and 7% were completed after the Grade 8 family assessment. In addition to the FCU sessions, the total length of in-person or phone contacts between the engager families and the intervention staff varied widely during the course of the study, ranging from 40 min to 67 hr per family ( $M = 11.47$  hr;  $Mdn = 6.67$  hr;  $SD = 11.52$  hr). Most of the interactions between families and the consultant were in person,  $M = 71\%$  of contact hours,  $Mdn = 75\%$ . Contrary to expectations, most families elected to receive brief consultations and periodic FCU meetings rather than more intensive treatment. FCUs were also offered in high school (in Grades 10–11) for those families remaining in the school district. During high school, 170 families (34%) received the FCU, 109 of whom had not received it during middle school; therefore, 224 families (45%) received the FCU in middle school, high school, or both. The covariation between teacher rated risk status and engagement in the FCU in high school was not reliable, indicating that the density of high and low risk families engaging was the same as would be expected by chance.

When youth were age 16–17 we offered a Teen Check-up (TCU), similar to and complementary to the FCU; 174 youth (35%) elected to participate in the TCU, including 58 who did not participate in the FCU either in middle or high school. The TCU included the same three sessions as those in the FCU (initial interview, assessment, and feedback session), and it directly involved the adolescent (although parents could also receive a feedback session). Because this study sought to assess the effects of a family intervention on substance use outcomes, participation in the TCU in and of itself was not considered an indicator of engagement in the intervention.

## Assessment Procedures

Before data collection, this study underwent evaluation and received approval from the University of Oregon's Internal Review Board. Participants and their parents or guardians provided informed consent by signing a consent form. There were no exclusion criteria; all youth and families who were enrolled in the participating public schools in regular education classes were recruited for participation in this prevention trial. In the spring semester of Grades 6 through 9 and again in Grade 11, students were surveyed with an instrument developed by colleagues at the Oregon Research Institute (Metzler, Biglan, Rusby, & Sprague, 2001). Most assessments were conducted in the schools. If students moved out of their original schools, they were followed up at their new location. For assessments conducted at ages 19, 22, and 23, questionnaires were mailed to the participants, who mailed them back to our research office. Participants were paid for completing each assessment. Completion and retention rates were similar for the intervention and the control groups.

## Measures

**Adolescent substance use.** Youth completed a self-report survey about their drug use at ages 11, 12, 13, 14, 16–17, 19, and 22. Each year they were asked to report the frequency with which they had used alcohol (number of drinks), tobacco (number of cigarettes), and marijuana (number of times smoked) in the previous month.

**Child gender.** Child gender was coded as 0 = "male" and 1 = "female."

**Child ethnicity.** Youth reported about their ethnicity, which was coded as 0 = "European American" and 1 = "ethnic minority."

**Father presence.** Youth reported about biological father presence in their primary residence in Grade 6, which was coded as 0 = "biological father not present" and 1 = "biological father present."

**Teacher report of risk behavior (TRISK) in Grade 6.** Teachers were asked to use a 16-item questionnaire to rate their full roster of Grade 6 students on a variety of risk behaviors associated with problem behavior in adolescence. This measure was revised from an earlier version of the TRISK measure developed by Soberman (1994). The frequency with which youth engaged in these problem behaviors was reported using a 5-point scale ranging from 1 (*never/almost never*) to 5 (*always/almost always*). Items included aggression, oppositionality, peer relationship problems, disliking school, and moodiness. The mean for this sample was 1.85 ( $SD = 0.85$ ). High internal consistency reliability was found for this scale ( $\alpha = .95$ ), and total scores were standardized. This variable was standardized within classroom and mean centered for use in analyses.

**Deviant peer involvement in Grade 6.** Youth reports of deviant peer involvement during Grade 6 were measured averaging across four items, that is, participants' reports of the number of times in the past week they had spent time with peers who (a) get into trouble, (b) fight a lot, (c) take things that do not belong to them, and (d) smoke cigarettes or chew tobacco. Responses ranged from 0 (*never*) to 7 (*more than seven times*). The mean for this sample was 0.76 ( $SD = 1.11$ ). Good internal reliability was found for this scale ( $\alpha = .79$ ). Deviant peer involvement was centered about its mean for use in all analyses.

**Family conflict in Grade 6.** Youth reports of family conflict during Grade 6 were measured averaging across five items. Items reflected the frequency with which family members engaged in a variety of conflict behaviors (e.g., "got angry with each other," "argued at the dinner table"). Responses ranged from 0 (*never*) to 7 (*more than seven times*). Good internal reliability was found for this scale ( $\alpha = .81$ ). This variable was mean centered for use in analyses.

**Intervention status.** Random assignment was coded as 0 = "control," and 1 = "intervention."

**Engagement status.** Although any family in the intervention condition could elect to receive the FCU, parent consultants used the previously described teacher rating of students' risk behavior to identify youth and families in the intervention group whom they actively invited to participate in the FCU. The at-risk students and families were invited to participate in more intensive assessments, and then in turn, in a feedback session based on their assessments. The procedure was initiated in Grade 7 and then repeated in Grade



8 (middle school) and in Grade 11 (high school). There were two levels of potential refusal. One was to not engage in the assessment. Because the FCU is based on feedback, if a parent did not engage in the family assessment, feedback was not possible. The second was to have the assessment but decline feedback about the assessment. All intervention families who participated in the assessment were equally recruited into a 1-hr feedback session. Despite the brief nature of the feedback session, 52.1% of the families declined the feedback after completing an assessment in middle school. However, at any time, a family could request an FCU despite prior refusals to engage in either the assessment or feedback sessions. In fact, 44.7% of families who declined the FCU in middle school after completing an assessment decided to participate in the FCU or the TCU later on, in high school.

Although the concept of engagement can be defined using a continuous score that reflects a combination of behavioral and psychological involvement with the program (Byrnes, Miller, Aalborg, Plasencia, & Keagy, 2010), the statistical framework used in this study (CACE models) requires a stricter, dichotomous operationalization of this concept (i.e., engager or nonengager). Engagement status was coded to reflect family participation in the FCU at any time the service was offered during the middle school period (and further intervention services, as warranted). Families in the intervention condition who elected to receive the FCU were coded 1 ( $n = 115$ ), and families in the intervention condition who did not receive the FCU were coded 0 ( $n = 385$ ). Another specificity of our operationalization of the concept of engagement relative to that of other studies is that control engager- and nonengager-equivalent groups were formulated using the CACE statistical modeling protocol developed by Jo (2002). In other words, mixture modeling made it possible to assign families from the control group to either the engager or the nonengager class, even though they had not been offered the intervention. This assignment is crucial to the estimation of treatment effects within the CACE framework.

**Problematic substance use in early adulthood.** We created three scores that would reflect the degree of abuse or dependence for tobacco, alcohol, and marijuana use reported at age 23. Questions were those asked in the Composite International Diagnostic Interview (CIDI) version 2.1 (World Health Organization, 1997). They included, "Have you tried to stop using [a substance] and found you could not?" (used for all substances), "How many times have you had five or more drinks in a row?" (used for alcohol), "When you drink alcohol, do you usually get buzzed?" (used for alcohol), "When you used marijuana, did you get high?" (used for marijuana), and "Have you found that you can't get as high (or buzzed) on [this substance] as you used to?" (used for alcohol and marijuana), "Have you ever gone to school or work when you were high (or drunk) on [this substance]?" (used for alcohol and marijuana), and "Have you ever had any problems related to school or work, such as not doing assignments or forgetting things because of this substance?" (used for marijuana). Those questions were answered by *yes* (coded 1) or *no* (coded 0). For the "... did you get high?" (marijuana) and "... do you usually get buzzed?" (alcohol) items, a follow-up question was provided to individuals who answered "yes," asking "How high (buzzed) did you get?" Using a 3-point scale, participants indicated whether they got "a little," "quite a bit," or "very much" high or drunk. Participants' responses to this question were combined with the previous one and placed on a scale between 0 and 1. Possible scores included

.33 (*a little bit*), .66 (*quite a bit*), and 1 (*very much*). Answers to all questions were summed such that total scores could range from 0 to 1 for tobacco, from 0 to 5 for alcohol, and from 0 to 6 for marijuana on the early adulthood problematic substance use scales. Therefore, problematic substance use scores were dichotomous for tobacco (i.e., participants' report that they tried to stop using tobacco but could not) and continuous for alcohol and marijuana.

**Analytic strategy.** CACE analyses were conducted as mixture models using Mplus version 6, with the maximum likelihood robust estimator and full information maximum likelihood (FIML) estimation to account for missing data. This enabled us to run the CACE model on all participants with complete data on all predictor variables ( $n = 977$ ). As described in further detail by Jo (2002), CACE modeling is predicated on a number of assumptions that are required for the CACE analyses to provide an unbiased estimate of the intervention effect for the complier group. These assumptions include (a) assignment to treatment is random; (b) potential outcomes for each participant are independent of the outcomes for other participants; (c) there is no effect for "nonengagement" in the intervention group; (d) there are no "defiers," that is, individuals who will always do the opposite of instructions regardless of the instruction; and (e) the average causal effect of assignment to intervention on the actual receipt of intervention is not zero. The third assumption ("c"), known as the *exclusion restriction*, is critical to the validity of the CACE model findings (Jo, 2002). In this study, we assumed that there was no effect on families or youth for declining the FCU service. To make our CACE models even more reliable, we also included several predictors of compliance status. Including significant predictors of compliance provides many benefits: It improves the prediction of compliance class, it increases power to detect treatment effects among participants in the "complier" class, and it helps protect against potential biases that could arise if the exclusion restriction were violated (Jo, 2002). For more information about the identification of relevant predictors of compliance for our CACE models, see the Results section under the subhead "Comparison of engager and nonengager families."

Observed engagement/nonengagement with the FCU in the intervention condition was used as a "training" variable in Mplus. This information was available for families in the intervention group but missing for control group families because the latter were not offered the intervention, so they did not have a chance to either accept or decline the FCU. Using mixture modeling, Mplus estimates the likelihood that individuals in the control condition would have engaged with the FCU if they had been assigned to the intervention group, based upon the observed engagement in the intervention group and covariates, to identify individuals in the control group most likely to have engaged with the FCU, if they had had the opportunity to do so. Using a standard visual presentation for mixture modeling (e.g., Muthén & Muthén, 1998–2012), the general model applied for each substance separately is shown in Figure 2.

## Results

### Preliminary Analyses

**Missing data analysis.** A missing-value analysis was conducted using SPSS version 21. The Little's MCAR test conducted

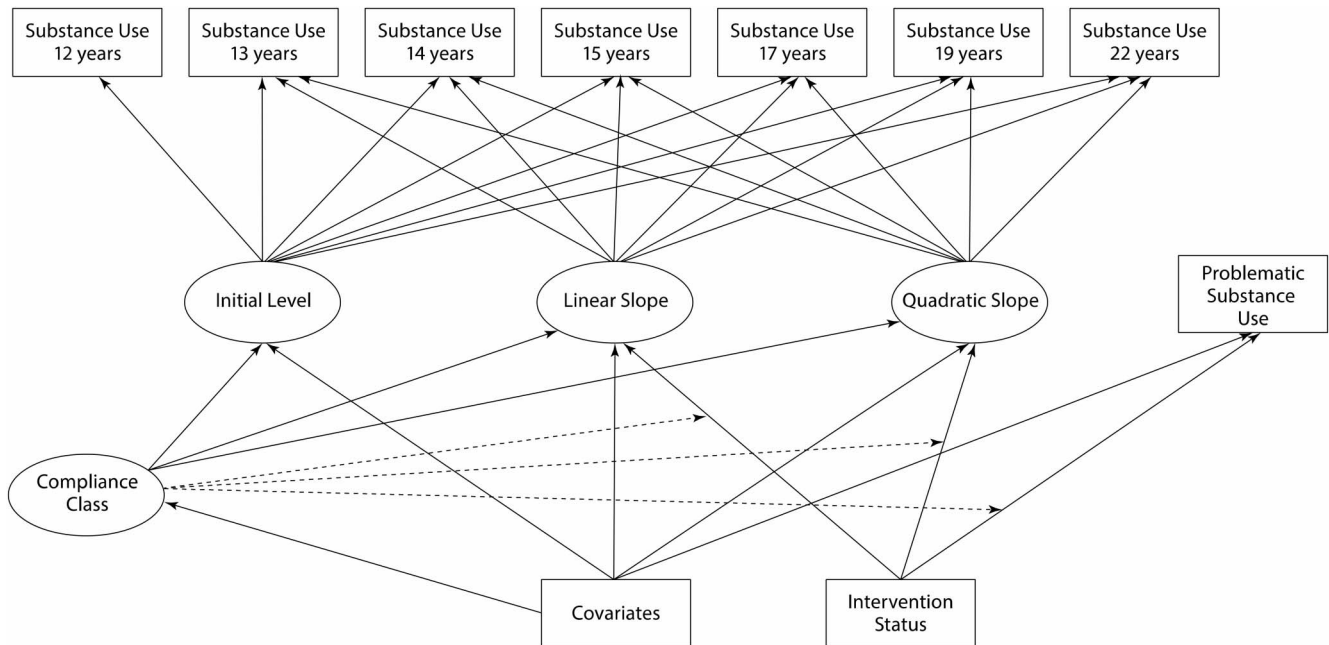


Figure 2. General complier average causal effect (CACE) model applied to each type of substance. Dotted lines show the moderation effect of compliance class on the relation between intervention status and substance use (i.e., linear and quadratic growth in adolescence, and problematic substance use in early adulthood).

on all measures (excluding categorical variables, i.e., gender, ethnicity) revealed that the pattern of missing values was not completely random,  $\chi^2(1973) = 2345.14, p < .001$ . Using a variable that summed the number of missing values for each participant, we found weak (.07 to .16) but significant correlations between missingness and risk behavior, the male gender, being a member of a minority ethnic group, and absence of biological father. Substance use was correlated with missing data for each of our three models (i.e., alcohol, tobacco, and marijuana). Therefore, the missing data pattern was likely “missing at random” (MAR), such that the inclusion of several predictors of missingness in our primary models made it reasonable to assume that FIML would successfully address our missing data issue.

**Descriptive statistics.** Means and *SDs*, available in Table 1, indicate that participants increased their use of all substances across adolescence. Table 1 also presents bivariate correlations. The upper section presents intercorrelations among the variables that had been shown in past research to predict engagement in the FCU and that were retained to play that role again in this study. To these four variables, we added two demographic variables, gender and ethnicity, and the variable representing intervention group. As expected, the correlations between all these variables and the intervention variable were close to zero. The lower section of Table 1 shows how substance use correlates with demographic variables and predictors of engagement in the intervention. For all three substances (alcohol, tobacco, and marijuana), we included the five measures of substance use in adolescence and two measures of substance abuse or dependence in early adulthood.

**Comparison of engager and nonengager families.** We first examined differences between families who engaged or did not engage with the FCU when randomly assigned to the intervention

condition. Ultimately, variables distinguishing engagers and non-engagers in the intervention group would help assign participants in the control group to the engager or nonengager subgroups in the CACE models. Prior work with CACE modeling in this sample identified several significant predictors of engagement at baseline, including family conflict, deviant peer association, and the presence of the biological father at home (Connell et al., 2007). As would be expected based on the multiple gating engagement strategy, teacher rating of risk was predictive of FCU engagement in middle school. Table 2 shows that when the subgroup of participants who were assigned to the intervention was examined, these variables were indeed significantly related to engagement status. In fact, some participants with risk factors in their background (i.e., father absence, high levels of family conflict, and more deviant peers) were more likely to engage in the intervention, even after controlling for the significant contribution of teacher rating of risk. Table 2 shows that proportions of females and minority youth did not differ for engagers and nonengagers.

**Intent to treat (ITT) analyses.** To verify whether the intervention had significant effects on change in substance use in adolescence and problematic substance use by early adulthood regardless of participants’ engagement in the intervention, we ran traditional ITT analyses. Specifically, for each of the three substances, we modeled growth in substance use from age 12 through age 22 using a linear and a quadratic term. A positive quadratic term reflects acceleration of substance use over time, whereas a negative quadratic term reflects its deceleration. We also included a variable reflecting problematic substance use in early adulthood. Treatment assignment (along with all control variables) was simultaneously regressed on the linear and quadratic slopes and on problematic substance use at age 23.

Table 1  
Descriptive Statistics and Bivariate Correlations

| Variable                           | <i>M</i> | <i>SD</i> | Intervention | Gender  | Ethnicity | Family conflict<br>age 11 | Deviant peer<br>association<br>age 11 | Teacher risk<br>perception<br>age 11 | Biological<br>father presence<br>age 11 |
|------------------------------------|----------|-----------|--------------|---------|-----------|---------------------------|---------------------------------------|--------------------------------------|-----------------------------------------|
| Intervention                       | .50      | .50       | —            |         |           |                           |                                       |                                      |                                         |
| Gender                             | .47      | .50       | -.02         | —       |           |                           |                                       |                                      |                                         |
| Ethnicity                          | .42      | .49       | .01          | -.02    | —         |                           |                                       |                                      |                                         |
| Family conflict                    | .91      | 1.03      | .02          | .01     | -.16***   | —                         |                                       |                                      |                                         |
| Deviant peer association           | .75      | 1.11      | -.01         | -.10**  | -.15***   | .46***                    | —                                     |                                      |                                         |
| Teacher risk perception            | .00      | .98       | .02          | -.25*** | -.19***   | .19***                    | .28***                                | —                                    |                                         |
| Biological father presence         | .59      | .49       | -.06*        | -.06*   | .16***    | -.09**                    | -.05                                  | -.23***                              | —                                       |
| Alcohol use                        |          |           |              |         |           |                           |                                       |                                      |                                         |
| Wave 1                             | .55      | 1.76      | .03          | -.03    | .09**     | .28***                    | .30***                                | .14***                               | .00                                     |
| Wave 2                             | .61      | 1.69      | .09**        | -.01    | -.02      | .12***                    | .15***                                | .11**                                | .02                                     |
| Wave 3                             | .65      | 1.82      | -.02         | .01     | .05       | .12***                    | .15***                                | .10**                                | -.03                                    |
| Wave 4                             | .70      | 1.99      | -.02         | .05     | .10**     | .04                       | .06†                                  | .09**                                | -.09**                                  |
| Wave 6                             | 1.10     | 2.32      | .04          | -.03    | .20***    | .01                       | .03                                   | .03                                  | .01                                     |
| Wave 7                             | 3.80     | 4.80      | .03          | -.16*** | .28***    | -.03                      | -.04                                  | -.02                                 | .06                                     |
| Wave 8                             | 6.88     | 4.99      | -.04         | -.21*** | .26***    | .00                       | .01                                   | -.01                                 | .18***                                  |
| Problematic alcohol use (Wave 9)   | 1.42     | 1.07      | -.02         | -.15*** | .18***    | .04                       | .03                                   | .00                                  | .08*                                    |
| Tobacco use                        |          |           |              |         |           |                           |                                       |                                      |                                         |
| Wave 1                             | .50      | 2.19      | .04          | .03     | -.09**    | .20***                    | .32***                                | .11***                               | -.01                                    |
| Wave 2                             | .70      | 2.59      | .04          | .03     | -.04      | .11***                    | .20***                                | .13***                               | -.01                                    |
| Wave 3                             | .60      | 2.44      | .00          | .07†    | .01       | .12***                    | .17***                                | .15***                               | -.08*                                   |
| Wave 4                             | 1.13     | 3.75      | .00          | .06†    | .08*      | .04                       | .13***                                | .15***                               | -.16***                                 |
| Wave 6                             | 2.24     | 5.37      | .05          | .06     | .10**     | .08*                      | .16***                                | .12***                               | -.05                                    |
| Wave 7                             | 3.51     | 6.50      | .01          | .02     | .13***    | .08*                      | .12**                                 | .11**                                | -.06                                    |
| Wave 8                             | 5.11     | 7.47      | .03          | -.06†   | .08*      | .09*                      | .17***                                | .14***                               | -.07*                                   |
| Problematic tobacco use (Wave 9)   | .20      | .40       | .05          | -.05    | .01       | .06                       | .12***                                | .13***                               | -.03                                    |
| Marijuana use                      |          |           |              |         |           |                           |                                       |                                      |                                         |
| Wave 1                             | .22      | 1.26      | .03          | -.02    | -.08**    | .17***                    | .26***                                | .14***                               | -.06†                                   |
| Wave 2                             | .34      | 1.50      | .10**        | .04     | -.11***   | .07*                      | .18***                                | .11**                                | -.03                                    |
| Wave 3                             | .46      | 1.77      | .01          | -.01    | -.04      | .12***                    | .16***                                | .16***                               | -.07†                                   |
| Wave 4                             | .69      | 2.30      | -.03         | .06†    | -.01      | .04                       | .12***                                | .13***                               | -.10**                                  |
| Wave 6                             | 1.34     | 3.31      | .00          | -.04    | .07*      | .06†                      | .09*                                  | .09*                                 | -.03                                    |
| Wave 7                             | 1.92     | 4.02      | -.03         | -.12*** | .09*      | .04                       | .09*                                  | .08*                                 | .01                                     |
| Wave 8                             | 3.26     | 5.16      | -.06         | -.14*** | .10**     | .01                       | .04                                   | .10**                                | -.03                                    |
| Problematic marijuana use (Wave 9) | 1.18     | 1.29      | -.03         | -.12*** | .10**     | .08*                      | .08*                                  | .12***                               | .04                                     |

Note. Intervention: 0 = no, 1 = yes; gender: 0 = male, 1 = female; ethnicity: 1 = European American, 0 = minority.

†  $p < .10$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

For alcohol and tobacco use, randomized assignment to the intervention group was not significantly related to growth in substance use during adolescence or to problematic substance use by early adulthood. No significant results emerged when looking at European Americans and minority participants separately. Nevertheless, participants' assignment to the intervention group was associated with a deceleration in the growth of marijuana use observed from early adolescence to adulthood ( $\beta = -.09$ ,  $p < .05$ ).

## CACE Models Results

Separate models were conducted for two formulations of engagement in the FCU and for each of the substance use outcomes. The first version of engagement was more restrictive in that it was based on participation in the FCU as part of the middle school intervention, in the context of which our team was able to provide indicated services. The second operationalization was based on participation in the FCU as part of either the middle

Table 2  
Comparison of Engager and Nonengager Randomized to the Intervention Condition

| Variable                               | Nonengagers ( $n = 385$ ) |                        | Engagers ( $n = 115$ ) |                        | Omnibus test                           |
|----------------------------------------|---------------------------|------------------------|------------------------|------------------------|----------------------------------------|
|                                        | %                         | <i>M</i> ( <i>SD</i> ) | %                      | <i>M</i> ( <i>SD</i> ) |                                        |
| Female gender                          | 44.9                      |                        | 51.3                   |                        | $\chi^2(1, N = 500) = 1.44, ns$        |
| Ethnic minority status                 | 55.6                      |                        | 62.6                   |                        | $\chi^2(1, N = 500) = 1.79, ns$        |
| Biological father present              | 61.1                      |                        | 40.4                   |                        | $\chi^2(1, N = 494) = 15.27, p < .001$ |
| Family conflict (6th grade)            |                           | .84 (.93)              |                        | 1.25 (1.28)            | $F(1, 494) = 14.09, p < .001$          |
| Deviant peers (6th grade)              |                           | .66 (1.05)             |                        | 1.01 (1.26)            | $F(1, 495) = 9.45, p < .01$            |
| Teacher perception of risk (6th grade) |                           | -.07 (.96)             |                        | .31 (1.01)             | $F(1, 494) = 13.88, p < .001$          |



school or the high school intervention. Because the FCU in high school was not followed by follow-up services offered by our team, this is a liberal operationalization of engagement in the intervention.

**Engagement in middle school FCU.** Tables 3 through 5 show the relation between each predictor and participants' class membership (i.e., engager or nonengager). They also show the relation between predictors and the growth in substance use throughout adolescence. More important, these tables show whether intervention status relates to growth in substance use. Because the participants were randomly assigned to either the intervention or the control group at the beginning of the study, we can assume that treatment assignment is unrelated to participants' class membership, so this relationship has been fixed to zero. Similarly, intervention group can be assumed to be unrelated to the intercept of substance use in the growth model, which was thus fixed to zero. In line with the exclusion restriction assumption of CACE modeling, the relation between intervention status and growth in substance use or problematic substance use was assumed to be null in the nonengager class, and these parameters were fixed to zero.

CACE models are based on mixture modeling. Therefore, available fit indices are different from the absolute and comparative fit indices that are usually reported for structural equation modeling. The fit index used for the current analyses was entropy, which represents the probability that a participant belongs to the group to which it was assigned. In this model, the classes were engagers and nonengagers. Entropy values ranged from 0 to 1.0, and although specific cutoffs for adequate entropy have not yet been established, higher values indicate better model fit because it means that, on average, participants from the control group can be efficiently assigned to their class (engager or nonengager), with a low probability of error (Muthén & Muthén, 1998–2012). For all three models tested here, entropy values were high: .93 for the alcohol model, .98 for the tobacco model, and .96 for the marijuana model.

**Predictors of engagement.** In each model, Grade 6 predictors were used to discriminate participants' class membership. These analyses were conducted using a logistic regression framework in which the nonengager class was the reference group. Across all three models (alcohol, tobacco, and marijuana), participants were more likely to be assigned to the engager class when their biological father was absent from home and when their teacher reported higher levels of risk. As expected based on the school engagement strategy, these predictors were at least marginally significant across the three models. Females and youth who reported higher levels of family conflict were at least marginally more likely to belong to the engager class in the alcohol and tobacco models. Last, youth who had more deviant peers were more likely to be assigned to the engager class in the tobacco model.

**Predictors of within-class variation.** The key question in all three CACE models was whether random assignment to the intervention (FCU) predicted variation in substance use, abuse, and dependence within the engager and nonengager classes. The answer to this question is depicted in Figures 3 and 4, which illustrates the results reported in Tables 3 to 5. In the alcohol model (Figure 3, Panel A), engagers in the control group had a steeper linear increase in alcohol use than did engagers in the intervention group. There was a marginally significant quadratic effect, suggesting that engagers in the intervention group delayed initiation of alcohol use, but they tended to "catch up" with engagers in the control group in early adulthood. To compute the treatment effect size, we used the difference between alcohol use among engagers in the treatment group and alcohol use among engagers in the control group, at the last time point of measurement in the growth model (i.e., age 22). The difference in alcohol use was medium to large range,  $d = 0.62$  (Cohen, 1988). Problematic alcohol use was also lower for engagers in the treatment group than for engagers in the control group, with a large associated effect size,  $d = 1.20$ . Panel A in Figure 4 shows the percentage of participants who displayed at least one symptom of alcohol abuse/dependence by age 23, separately for the four groups (engagers and

Table 3

*CACE Model Testing Effect of Intervention on Growth in Alcohol Use During Adolescence and on Problematic Alcohol Use in Early Adulthood*

| Intervention status, variable, and parameter | Class membership<br>Engager vs. nonengager logit (SE) | Within-class variation |                        |                           |                              |                     |                        |                           |                              |
|----------------------------------------------|-------------------------------------------------------|------------------------|------------------------|---------------------------|------------------------------|---------------------|------------------------|---------------------------|------------------------------|
|                                              |                                                       | Nonengager class       |                        |                           |                              | Engager class       |                        |                           |                              |
|                                              |                                                       | Intercept est. (SE)    | Linear slope est. (SE) | Quadratic slope est. (SE) | Problematic alcohol use (SE) | Intercept est. (SE) | Linear slope est. (SE) | Quadratic slope est. (SE) | Problematic alcohol use (SE) |
| Intervention status                          | Fixed at 0                                            | Fixed at 0             | Fixed at 0             | Fixed at 0                | Fixed at 0                   | Fixed at 0          | Fixed at 0             | Fixed at 0                | Fixed at 0                   |
| Variable                                     |                                                       |                        |                        |                           |                              |                     |                        |                           |                              |
| Gender (female)                              | -.38 (.22) <sup>†</sup>                               | -.05 (.11)             | .24 (.09)**            | -.05 (.01)***             | -.33 (.08)***                | .10 (.35)           | .08 (.30)              | -.02 (.04)                | -.33 (.25)                   |
| Ethnicity                                    | -.17 (.22)                                            | -.09 (.10)             | .08 (.07)              | .02 (.01)*                | .40 (.09)***                 | -.13 (.47)          | .60 (.40)              | -.03 (.05)                | .20 (.25)                    |
| Biological father present (6th grade)        | .37 (.22) <sup>†</sup>                                | .31 (.12)              | -.30 (.08)***          | .04 (.01)***              | .03 (.09)                    | -.09 (.49)          | -.47 (.33)             | .06 (.04)                 | .39 (.25)                    |
| Family conflict (6th grade)                  | -.30 (.10)**                                          | .32 (.09)              | -.16 (.05)**           | .02 (.01)**               | .01 (.06)                    | .07 (.19)           | -.02 (.12)             | -.01 (.02)                | .08 (.11)                    |
| Deviant peers (6th grade)                    | -.01 (.11)                                            | .28 (.07)              | -.07 (.05)             | .00 (.01)                 | .04 (.05)                    | .47 (.17)**         | -.13 (.13)             | .02 (.02)                 | -.04 (.16)                   |
| Teacher report of risk (6th grade)           | -.27 (.11)*                                           | .12 (.07)              | .02 (.04)              | .00 (.01)                 | -.04 (.05)                   | .05 (.17)           | .00 (.14)              | -.01 (.02)                | .00 (.11)                    |
| Parameter                                    |                                                       |                        |                        |                           |                              |                     |                        |                           |                              |
| Intercept/threshold                          | 1.75 (.23)***                                         | .48 (.10)***           | -.26 (.09)**           | .10 (.01)***              | 1.32 (.09)***                | .78 (.33)*          | 1.02 (.68)             | -.03 (.08)                | 2.50 (.52)***                |
| Residual variance                            | —                                                     | .74 (.23)**            | .23 (.11)*             | .01 (.00)***              | 1.01 (.07)***                | .74 (.23)**         | .23 (.11)*             | .01 (.00)***              | 1.01 (.07)***                |

Note. CACE = complier average causal effect.

<sup>†</sup>  $p < .10$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

Table 4

*CACE Model Testing Effect of Intervention on Growth in Tobacco Use During Adolescence and on Problematic Tobacco Use in Early Adulthood*

| Intervention status, variable, and parameter | Class membership | Within-class variation |                        |                           |                              |                     |                        |                           |                              |
|----------------------------------------------|------------------|------------------------|------------------------|---------------------------|------------------------------|---------------------|------------------------|---------------------------|------------------------------|
|                                              |                  | Nonengager class       |                        |                           |                              | Engager class       |                        |                           |                              |
|                                              |                  | Intercept est. (SE)    | Linear slope est. (SE) | Quadratic slope est. (SE) | Problematic tobacco use (SE) | Intercept est. (SE) | Linear slope est. (SE) | Quadratic slope est. (SE) | Problematic tobacco use (SE) |
| Intervention status                          | Fixed at 0       | Fixed at 0             | Fixed at 0             | Fixed at 0                | Fixed at 0                   | Fixed at 0          | Fixed at 0             | Fixed at 0                | Fixed at 0                   |
| Variable                                     |                  |                        |                        |                           |                              |                     |                        |                           |                              |
| Gender (female)                              | -.51 (.21)*      | .13 (.14)              | .19 (.10)*             | -.03 (.01)**              | -.27 (.21)                   | .54 (.41)           | .14 (.39)              | -.01 (.06)                | -.10 (.46)                   |
| Ethnicity                                    | -.27 (.22)       | -.17 (.12)             | .17 (.09)*             | .00 (.01)                 | .11 (.21)                    | -.57 (.42)          | .92 (.35)**            | -.04 (.04)                | .10 (.44)                    |
| Biological father present (6th grade)        | .80 (.21)***     | .06 (.14)              | -.16 (.11)             | .01 (.01)                 | -.10 (.65)                   | .98 (.57)†          | -.36 (.39)             | .01 (.05)                 | .75 (.49)                    |
| Family conflict (6th grade)                  | -.16 (.09)†      | .20 (.11)†             | -.12 (.14)             | .02 (.01)†                | -.08 (.12)                   | -.25 (.26)          | .35 (.19)†             | -.05 (.02)*               | .08 (.21)                    |
| Deviant peers (6th grade)                    | -.23 (.09)*      | .55 (.14)***           | -.22 (.09)*            | .03 (.01)*                | .20 (.10)†                   | .53 (.21)**         | -.34 (.20)†            | .06 (.02)**               | -.10 (.18)                   |
| Teacher-reported risk (6th grade)            | -.32 (.10)***    | .04 (.09)              | .04 (.07)              | .01 (.01)                 | .18 (.11)                    | .38 (.23)           | -.04 (.19)             | .00 (.02)                 | .36 (.21)†                   |
| Parameter                                    |                  |                        |                        |                           |                              |                     |                        |                           |                              |
| Intercept/threshold                          | 1.85 (.22)***    | .47 (.13)***           | -.21 (.12)†            | .08 (.01)***              | 1.44 (.21)***                | .20 (.34)           | 4.68 (1.33)***         | -.42 (.18)*               | -.42 (.18)*                  |
| Residual variance                            | —                | 1.24 (.57)*            | .71 (.21)***           | .01 (.00)***              | —                            | 1.24 (.57)*         | .71 (.21)***           | .01 (.00)***              | —                            |

Note. CACE = complier average causal effect.

†  $p < .10$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

nonengagers from the intervention group, and control-equivalent groups for each). Engager-equivalent participants in the control group displayed strikingly higher rates of abuse/dependence.

In the tobacco model, engagers in the control group showed a steeper linear increase in tobacco use compared with engagers in the intervention group. There was also a significant quadratic effect, revealing that the rapid increase in tobacco use among engagers in the control group was followed by a decrease in tobacco use when they entered adulthood (Figure 3, Panel B). In contrast, engagers in the intervention group used relatively small quantities of tobacco during adolescence, but their usage

accelerated into early adulthood. The effect size associated with the difference in tobacco use by age 22 between the two groups was large,  $d = 1.14$ . By age 23, engagers in the intervention group displayed less problematic tobacco use than did engagers in the control group, with an effect size of  $d = 0.69$ , which is in the medium to large range. Panel B in Figure 4 shows the percentage of participants who displayed tobacco dependence by age 23, separately for the four groups. Engager-equivalent participants in the control group displayed strikingly higher rates of dependence.

In the marijuana model (Figure 3, Panel C), engagers in the control group had a steeper linear increase in marijuana use than

Table 5

*CACE Model Testing Effect of Intervention on Growth in Marijuana Use During Adolescence and on Problematic Marijuana Use in Early Adulthood*

| Intervention status, variable, and parameter | Class membership | Within-class variation |                        |                           |                                |                     |                        |                           |                                |
|----------------------------------------------|------------------|------------------------|------------------------|---------------------------|--------------------------------|---------------------|------------------------|---------------------------|--------------------------------|
|                                              |                  | Nonengager class       |                        |                           |                                | Engager class       |                        |                           |                                |
|                                              |                  | Intercept est. (SE)    | Linear slope est. (SE) | Quadratic slope est. (SE) | Problematic marijuana use (SE) | Intercept est. (SE) | Linear slope est. (SE) | Quadratic slope est. (SE) | Problematic marijuana use (SE) |
| Intervention status                          | Fixed at 0       | Fixed at 0             | Fixed at 0             | Fixed at 0                | Fixed at 0                     | Fixed at 0          | Fixed at 0             | Fixed at 0                | Fixed at 0                     |
| Variable                                     |                  |                        |                        |                           |                                |                     |                        |                           |                                |
| Gender (female)                              | -.22 (.26)       | .02 (.09)              | .10 (.06)              | -.03 (.01)**              | -.24 (.11)*                    | .22 (.17)           | .47 (.23)*             | -.08 (.03)**              | -.27 (.28)                     |
| Ethnicity                                    | -.25 (.20)       | -.07 (.08)             | -.07 (.06)             | .03 (.01)**               | .32 (.10)**                    | -.24 (.15)†         | .39 (.23)†             | -.04 (.03)                | .23 (.26)                      |
| Biological father present (6th grade)        | .50 (.21)**      | -.06 (.10)             | -.03 (.07)             | .00 (.01)                 | .10 (.11)                      | -.07 (.18)          | -.14 (.22)             | .01 (.03)                 | .28 (.28)                      |
| Family conflict (6th grade)                  | -.27 (.09)       | .07 (.06)              | -.10 (.04)*            | .01 (.01)†                | .08 (.06)                      | .04 (.11)           | .02 (.10)              | -.02 (.02)                | -.03 (.14)                     |
| Deviant peers (6th grade)                    | -.09 (.08)       | .27 (.08)***           | -.04 (.05)             | .00 (.01)                 | -.02 (.05)                     | .21 (.11)*          | .04 (.10)              | .01 (.02)                 | .15 (.13)                      |
| Teacher report of risk (6th grade)           | -.23 (.10)*      | .09 (.05)†             | .01 (.04)              | .00 (.01)                 | .15 (.06)**                    | .12 (.08)           | .13 (.11)              | -.03 (.02)                | .11 (.15)                      |
| Parameter                                    |                  |                        |                        |                           |                                |                     |                        |                           |                                |
| Intercept/threshold                          | 1.62 (.22)***    | .33 (.10)***           | -.07 (.07)             | .04 (.01)***              | 1.01 (.11)***                  | .11 (.12)           | 1.31 (.56)*            | -.01 (.08)                | 1.96 (.51)***                  |
| Residual variance                            | —                | .62 (.27)*             | .17 (.10)†             | .01 (.00)***              | 1.53 (.09)***                  | .62 (.27)*          | .17 (.10)†             | .01 (.00)***              | 1.53 (.09)***                  |

Note. CACE = complier average causal effect.

†  $p < .10$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

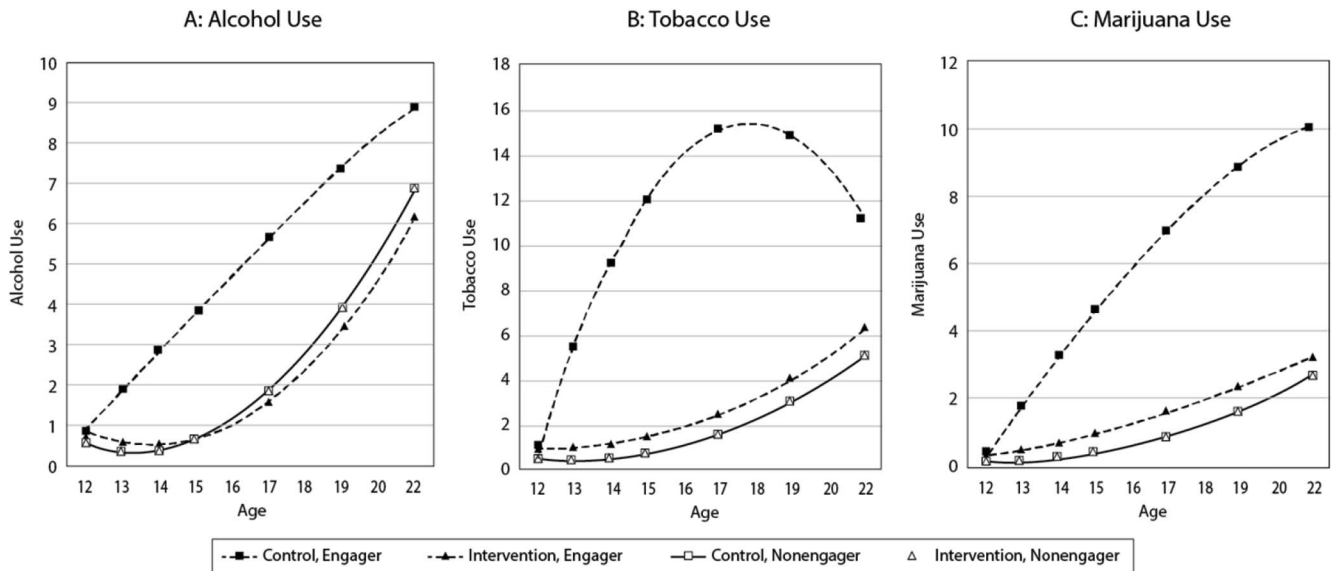


Figure 3. Change in substance use over time for engagers and nonengagers within the intervention groups and the engager- and nonengager-equivalent control participants, according to the complier average causal effect (CACE) models. Values on the Y axis represent number of drinks (Panel A), cigarettes (Panel B), or frequency of marijuana smoking (Panel C) during the past month. For tobacco use, values greater than 10 represent number of packs of cigarettes (e.g., 11 = one pack; 12 = two packs; 13 = three packs). Differences between the intervention and control groups are expected to emerge only for engagers, because nonengagers in the control and intervention condition are equivalent, as assumed in the statistical model (Jo, 2002).

did engagers in the intervention group. The effect size associated with the difference between the two groups at age 22 was large,  $d = 1.17$ . By age 23, engagers in the intervention group had less problematic marijuana use than did engagers in the control group. This result is marginally significant, but the effect is medium in size,  $d = 0.53$ . Panel C in Figure 4 shows the percentage of participants who displayed at least one symptom of marijuana abuse/dependence by age 23, separately for the four groups. Engager-equivalent participants in the control group displayed strikingly higher rates of abuse/dependence.

**Engagement in middle or high school FCU.** Overall, CACE model results obtained when the more liberal formulation of FCU engagement was used tended to yield results similar to those obtained with a stricter definition of engagement (i.e., middle school only). For the alcohol use model, entropy dropped to .54 when this more liberal definition of engagement was used. Also, intervention was unrelated to linear or quadratic change in alcohol use during adolescence and to problematic alcohol use by age 23. The tobacco model yielded an entropy value of .83 and confirmed that the intervention protected engagers in the intervention group against a linear growth in tobacco use, although this result was marginally significant ( $b = -.81, p = .09$ ). The intervention had no effect on acceleration in tobacco use, but we confirmed that engagers in the intervention group were protected against problematic tobacco use by age 23 ( $b = -1.60, p < .001$ ). In the marijuana model, entropy remained high (.89). The intervention effect on linear increase in marijuana use was no longer significant, but engagement in the FCU in either middle or high school protected against acceleration of marijuana use during adolescence ( $b = -.11, p < .001$ ), a finding that did not emerge when

considering middle school engagement only. Again, the intervention predicted less problematic marijuana use by age 23 ( $b = -1.09, p < .001$ ).

## Discussion

### Intervention Effects

The goal of this study was to test the hypothesis that a multi-level, family centered prevention strategy offered in public middle schools decreased substance use, abuse, and dependence from early adolescence until early adulthood (age 23). It is noteworthy that over 90% of the community of families enrolled in the three targeted schools agreed to participate in research assessments, and 80% of those were retained through early adulthood. Thus, the findings apply to the preventive impact of embedding family services within schools for all students within this community. When we simply used ITT models to compare the longitudinal pattern of alcohol, tobacco, and marijuana use through early adulthood, we found that the intervention youth used less marijuana during the 10-year follow-up period. These results are encouraging for the prevention of substance use because it is rare for early adolescent interventions to have such enduring effects (Hawkins et al., 2005, 2007; O'Donnell et al., 1995). However, no significant effects were detected on alcohol and tobacco use in the ITT models, perhaps because of the legality of those substances and potential for normative use in late adolescence.

When applying CACE modeling, engagement in the FCU increased the effect size of treatment impact on all substances. Youth whose families engaged in the FCU in middle school used less

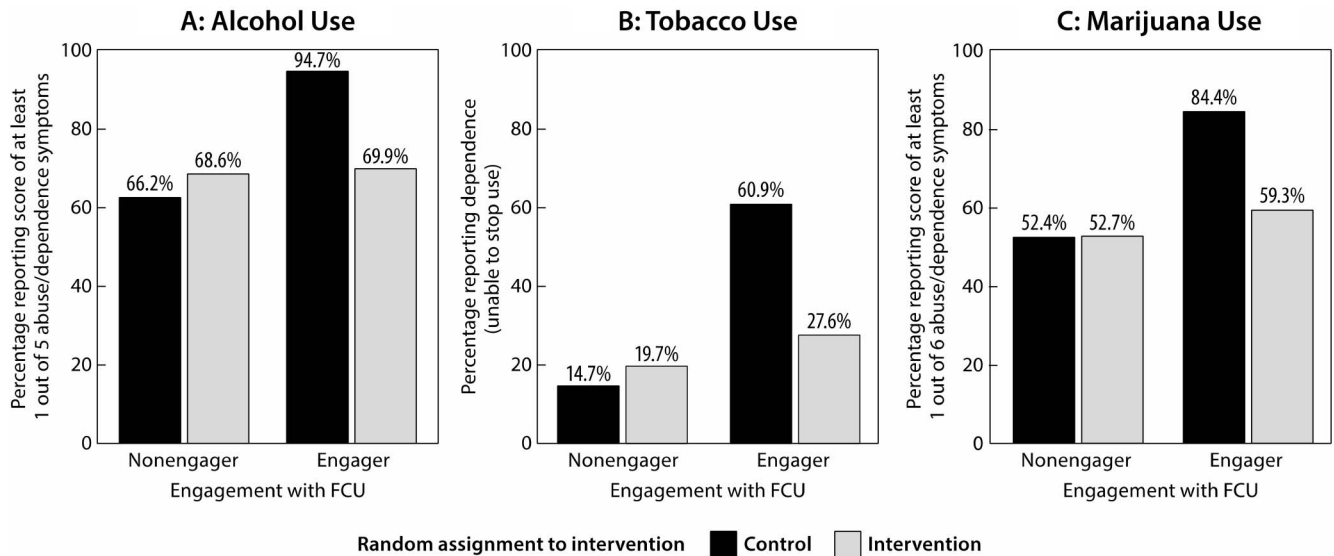


Figure 4. Percentage of participants who presented at least one symptom of substance abuse or dependence at age 23 for engagers and nonengagers in the intervention groups and the engager- and nonengager-equivalent control participants, according to the complier average causal effect (CACE) models. Values on the Y axis represent percentage of participants within each of the four groups. Differences between the intervention and control groups are expected to emerge only for engagers, because nonengagers in the control and intervention conditions are equivalent, as assumed in the statistical model (Jo, 2002).

tobacco, alcohol, and marijuana in adolescence. They were also less likely to be dependent or to experience negative consequences of substance use by age 23, a finding based on the number of symptoms of abuse and dependence reported at that age. One major difference between these findings and past results based on this sample during the adolescent period only (Connell et al., 2007) is that only the linear term of the growth models was significant in the previous study, whereas the current study estimated the quadratic term that captures acceleration and deceleration in substance use. An analysis of quadratic trends in the context of the CACE models suggested that intervention effects on tobacco and alcohol were diminishing because of acceleration of use of these legal substances in the intervention group during early adulthood. However, despite these acceleration trends, the findings suggest enduring effects of the FCU on preventing progressions in problematic use and dependence of tobacco, alcohol, and marijuana.

The use of CACE modeling (Jo, 2002) to study engagement is a recent statistical tool that is particularly effective for the analysis of public health-oriented preventive interventions in which every individual in the community is availed the opportunity to use a service, and engagement in the service for the intervention group is completely voluntary. In this study, even though all the high-risk families assigned to the intervention group were equally invited to participate in the FCU, only a subgroup agreed to do so during middle school (33.4% of high-risk families) or high school (31.0% of high-risk families). Findings from this study suggest that engagement of high-risk families is indeed possible yet imperfect. High-risk families were initially invited to participate, but also families were referred during the school year if student behavior or academic problems emerged. Thus, as would be expected, baseline characteristics of the participants revealed that engagers were generally higher risk longitudinally than nonengagers. It is note-

worthy that it is difficult to disentangle efforts to reach out to families of students that teachers identified as at risk from school referral processes and family motivation to engage. However, it is critical for future research to identify optimal, respectful strategies for identifying and engaging parents who would most benefit from the FCU and other parenting services.

It is worth noting that the formulation of the engager- and nonengager-equivalent control participants is a specific application of mixture modeling of longitudinal data. Engagement and non-engagement within the intervention group is estimated as a categorical latent variable, based upon the longitudinal trajectories of substance use and status on baseline predictors, as well as the assumption that not engaging in an intervention does not have a causal effect on the outcomes of interest (Jo, 2002). In these models, some of the baseline predictors of engagement were consistent across the three models, whereas others were not. In all three models, biological father's absence predicted engagement in the FCU. We hypothesized that our program would be particularly appealing for families with an absent father and a single mother burdened by raising children alone who is keen to get extra support from a parent consultant. Single mothers may also be attracted to this school-based program that includes home visits, because it requires less time and presents fewer obstacles than does visiting a professional's office. Similarly, family disadvantage might predict engagement because the FCU services were freely available to all families. These findings suggest that evidence-based family support services embedded within school systems could be one strategy for reducing health disparities. It is noteworthy that ethnicity of the family did not predict engagement, or not.

It is not surprising that teacher ratings of risk were associated with engagement, given the multiple gating strategy for engagement. By way of comparison, other family centered researchers



note that as little as 17% of families identified will participate in family research, even though they may be assigned to the control group (Spath et al., 2013). The fact that 34.3% of all identified high risk families engaged is promising, even though two-thirds of high-risk families did not engage in the FCU, despite its repeated availability. We have since revised the multiple gating approach to begin with parents assessment of student readiness at school entry, which is then followed by teacher assessments later in the school year (see Moore et al., 2016).

Female gender and ethnic minority group membership also helped distinguish among engagers and nonengagers in the alcohol and tobacco models. Based on gender norms, the threshold at which parents of girls become worried about their substance use may be lower than it would be for boys, so parents of girls may be motivated to participate in the FCU even when their daughter shows relatively low levels of problem behavior (Kulis, Marsiglia, & Hecht, 2002). This finding is also consistent with a commonly reported trend that compared with parents of adolescent boys, parents of adolescent girls monitor their children more carefully (Dishion, Ha, & Véronneau, 2012). Cultural norms and lower prevalence of substance use among some ethnic groups, including African Americans (Miller-Day & Barnett, 2004; Roberts, Roberts, & Xing, 2006), could have a similar effect and motivate parents of some minority students to seek external support when they witness relatively minor warning signs.

Deviant peer affiliation was predictive of engagement only in the CACE model of tobacco use. This outcome could have resulted because the teacher-reported measure—which also functioned as a screening instrument that helped us reach out to families at risk—included items about friendships with peers who smoked cigarettes. Because cigarette smoking is known to be a socially contagious behavior (Dishion et al., 1995; Rowe, Chassin, Presson, Edwards, & Sherman, 1992), this item might have helped us identify adolescents who were at particularly high risk for this behavior and reach out to them. If this is true, including items in the screening tool about other risk behaviors among participants' friends may be an efficient way to target at-risk participants.

### Other Predictors of Substance Use

Besides assignment to the treatment group, several other variables contributed to predicting change in substance use throughout adolescence and problematic substance use in adulthood. Consistent with available epidemiological data (Wallace et al., 2002) and with previous findings based on this sample (Connell et al., 2007), our study data indicated that European Americans in the engager group were at higher risk than were participants from minority groups to have a steep increase in tobacco and marijuana use. Among nonengagers, an even stronger pattern was revealed, with European American adolescents increasing their use of all substances more steeply and with greater acceleration than did minority participants. They were also more likely to present symptoms of abuse of or dependence on alcohol and marijuana. Normative beliefs and values about substance use in some minority groups might help keep substance use at lower levels, even among non-engager participants (Miller-Day & Barnett, 2004).

CACE models showed that deviant peers were the most consistent risk factor for substance use across engagers and nonengagers, even after controlling for participants' own problem behavior,

perhaps because peer pressure for deviant behaviors, such as substance use, is a mechanism that was in place before the intervention. Deviant peers predicted higher levels of tobacco and marijuana use at the onset of the study, and past research suggests that deviancy training may start as early as kindergarten (Snyder et al., 2005). It could be hard for a middle-school intervention to counteract deviant peer influence that may have been at work for several years before parents were offered the FCU, and some peer influences may have been deeply ingrained.

### Strengths and Limitations

The randomized design and the measurement of engagement in this prevention trial made it possible to gain unique insights about the development of substance use among normative youth and to observe moderation effects of engagement in the FCU, the targeted component of an adaptive, ecological prevention program that is school based and family focused. Our 12-year longitudinal design and very high retention rate provided a rare opportunity to study changes in substance use from early adolescence to early adulthood. Even more important, the study revealed the effects of a brief intervention—fewer than 12 hr per family on average over several years—on substance use 10 years later. The multiethnic sample helped us test for ethnic differences in intervention effects and to reflect on the power of cultural norms and values as a protective factor against substance use among minority students. Modeling the growth in substance use from age 11 through 22 and problematic substance use at age 23 separately for alcohol, tobacco, and marijuana use is also a strength of this study in that specific effects of the FCU on each substance were identified.

Despite its strengths, this study also presents some limitations. Participants' yearly retrospective self-reports about their substance use may introduce some measurement error; from that perspective time line follow back approach would improve accuracy of recall in future studies. In addition, because levels of socioeconomic status were not measured at baseline, we could not include this variable as a baseline predictor of engagement or substance use. It is likely that families with limited resources are particularly attracted to free services like the FCU and follow-up interventions; this possibility and its implications for implementation of such programs need to be tested. Limitations related to the CACE modeling framework also must be noted. First, it is difficult to be sure that declining participation (nonengager class) did not influence outcomes (exclusion restriction). However, as can be seen from all analyses, the nonengager group was generally less risky than those who engaged, and therefore, it seems most likely that the FCU simply was not relevant to the families' needs or concerns. In addition, by identifying several predictors of engagement and including them in the model as covariates, the results from this model are more likely to be valid. Second, CACE models do not currently allow inclusion of mediators that would make it possible to test for mechanisms that explain observed differences among engagers from the control versus the intervention group. When these analytic options are available, it will become possible to test whether aspects of family dynamics that are influenced by the FCU mediate the effects of intervention, when taking engagement into account. Aspects of family dynamics that have been shown to be influenced by the FCU include the quality of family relationships, family conflict, and parental monitoring (e.g., Caruthers,

Van Ryzin, & Dishion, 2014; Dishion, Nelson, & Kavanagh, 2003; Van Ryzin et al., 2012).

Last, CACE models do not yet provide the opportunity to look at complex patterns of compliance over time, and the comparison of results using various formulations of compliance is preliminary. Although intervention components such as the TCU and the high school FCU may have contributed to some extent to the long-term intervention effects above and beyond the impact of middle school FCU, the powerful effect of middle school FCU cannot be denied. Specifically, this intervention was powerful enough to significantly reduce antisocial behavior and substance use at age 16–17, that is, before the delivery of high school FCU and TCU (Connell et al., 2007). Furthermore, the sensitivity analyses used to examine different definitions of engagement (FCU in middle school only, FCU in middle or high school, and FCU or TCU) suggested that the strongest intervention effects are observed when we limit our definition of engagement to FCU in middle school. Engager-equivalent participants in the control group could not be as clearly identified when our definition of engagement was broadened and intervention effects were attenuated, which means that high school FCU and TCU do not fully explain the long-term intervention effects reported here. This suggests that the effects of these additional components are mixed, perhaps because of diverse and complex patterns of compliance that are difficult to capture with available techniques or because of varying levels of efficacy across the FCU and TCU. Yet to be explored, however, is the added value of engaging in the FCU many times rather than just once, or of engaging in the TCU in addition to the FCU. These questions are beyond the scope of this study; nevertheless, forthcoming methodological developments (e.g., Lin, Ten Have, & Elliott, 2008) could facilitate the examination of time-varying compliance in future studies.

## Implications

Response to Intervention (RTI) is a general strategy for addressing the varying needs of students within a public school environment (Brown-Chidsey & Steege, 2011). Our data suggest that a similar strategy (i.e., multiple gating) could be applied to address the social and emotional needs of students in middle school. Interventions such as the FCU that are data driven, and target and successfully engage high-risk families is a promising public health strategy for the prevention of substance use progressions, antisocial behavior, and depression. We contend that family interventions should be embedded within public school systems in such a way that would seamlessly engage parents and improve their monitoring and support of students within a well-coordinated system of family centered services (Dishion, 2011).

We suspect that our study reflects a conservative estimate of the potential of the FCU model to influence prevention effects. We hypothesize that offering FCU and parent management services every year in a seamless, nonstigmatizing fashion in the public school environment would enable parents to turn around risk trajectories that lead to a variety of problem behaviors, including early substance use and abuse. One of the major barriers, however, in moving forward with evidence-based family interventions in the public school, is the lack of identified staff with the training and professional mandate to successfully engage parents to complement efforts in schools to manage and retain high risk students in

the mainstream learning environment. In a randomized trial of 41 public middle schools, implementation of the FCU by school staff was compromised by the lack of school counselors training in working with parents, staff turnover and the lack of school district support for parent engagement in evidence based support services (Dishion et al., 2015). We hypothesize that school district support for the integration of evidence-based family services with a range of other positive behavior management services would significantly improve the mental health and reduce the risk for substance use and dependence among young people at the community level.

## References

- Angrist, J. D., Imbens, G. W., & Rubin, D. B. (1996). Identification of causal effects using instrumental variables. *Journal of the American Statistical Association*, 91, 444–455. <http://dx.doi.org/10.1080/01621459.1996.10476902>
- Anthony, J., Warner, L. A., & Kessler, R. C. (1997). Comparative epidemiology of dependence on tobacco, alcohol, controlled substances, and inhalants: Basic findings from the National Comorbidity Survey. In G. A. Malatt & G. R. V. Bos (Eds.), *Addictive behaviors: Readings on etiology, prevention, and treatment* (pp. 3–39). Washington, DC: American Psychological Association. <http://dx.doi.org/10.1037/10248-001>
- Botvin, G. J., Baker, E., Dusenbury, L., Tortu, S., & Botvin, E. M. (1990). Preventing adolescent drug abuse through a multimodal cognitive-behavioral approach: Results of a 3-year study. *Journal of Consulting and Clinical Psychology*, 58, 437–446. <http://dx.doi.org/10.1037/0022-006X.58.4.437>
- Bradley, R. H., & Corwyn, R. (2013). From parent to child to parent . . . : Paths in and out of problem behavior. *Journal of Abnormal Child Psychology*, 41, 515–529. <http://dx.doi.org/10.1007/s10802-012-9692-x>
- Brown, E. C., Catalano, R. F., Fleming, C. B., Haggerty, K. P., & Abbott, R. D. (2005). Adolescent substance use outcomes in the Raising Healthy Children project: A two-part latent growth curve analysis. *Journal of Consulting and Clinical Psychology*, 73, 699–710. <http://dx.doi.org/10.1037/0022-006X.73.4.699>
- Brown-Chidsey, R., & Steege, M. W. (2011). *Response to intervention: Principles and strategies for effective practice*. New York, NY: Guilford Press.
- Byrnes, H. F., Miller, B. A., Aalborg, A. E., Plasencia, A. V., & Keagy, C. D. (2010). Implementation fidelity in adolescent family-based prevention programs: Relationship to family engagement. *Health Education Research*, 25, 531–541. <http://dx.doi.org/10.1093/her/cyq006>
- Caruthers, A. S., Van Ryzin, M. J., & Dishion, T. J. (2014). Preventing high-risk sexual behavior in early adulthood with family interventions in adolescence: Outcomes and developmental processes. *Prevention Science*, 15(Suppl. 1), 59–69. <http://dx.doi.org/10.1007/s11211-013-0383-9>
- Catalano, R. F., Kosterman, R., Hawkins, J. D., Newcomb, M. D., & Abbott, R. D. (1996). Modeling the etiology of adolescent substance use: A test of the social development model. *Journal of Drug Issues*, 26, 429–455. <http://dx.doi.org/10.1177/002204269602600207>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.
- Compton, W. M., Thomas, Y. F., Stinson, F. S., & Grant, B. F. (2007). Prevalence, correlates, disability, and comorbidity of DSM-IV drug abuse and dependence in the United States: Results from the national epidemiologic survey on alcohol and related conditions. *Archives of General Psychiatry*, 64, 566–576. <http://dx.doi.org/10.1001/archpsyc.64.5.566>
- Connell, A. M., Dishion, T. J., Yasui, M., & Kavanagh, K. (2007). An adaptive approach to family intervention: Linking engagement in family-centered intervention to reductions in adolescent problem behav-

- ior. *Journal of Consulting and Clinical Psychology*, 75, 568–579. <http://dx.doi.org/10.1037/0022-006X.75.4.568>
- Cronbach, L. J., & Glesar, G. C. (1965). *Psychological tests and personnel decisions*. Urbana, IL: University of Illinois Press.
- Dishion, T. J. (2011). Promoting academic competence and behavioral health in public schools: A strategy of systemic concatenation of empirically based intervention principles [Special issue]. *School Psychology Review*, 40, 590–597.
- Dishion, T. J., & Andrews, D. W. (1995). Preventing escalation in problem behaviors with high-risk young adolescents: Immediate and 1-year outcomes. *Journal of Consulting and Clinical Psychology*, 63, 538–548. <http://dx.doi.org/10.1037/0022-006X.63.4.538>
- Dishion, T. J., Bullock, B. M., & Kiesner, J. (2008). Vicissitudes of parenting adolescents: Daily variations in parental monitoring and the early emergence of drug use. In M. Kerr, H. Stattin, & R. C. M. E. Engels (Eds.), *What can parents do?* (pp. 113–133). Hoboken, NJ: Wiley. <http://dx.doi.org/10.1002/9780470774113.ch5>
- Dishion, T. J., Capaldi, D., Spracklen, K. M., & Li, F. (1995). Peer ecology of male adolescent drug use. *Development and Psychopathology*, 7, 803–824. <http://dx.doi.org/10.1017/S0954579400006854>
- Dishion, T. J., Garbacz, A., Moore, K., Stormshak, E., Kim, H., Gau, J. & Seeley, J. (2015). *Implementation of a school-wide positive family support system in public middle schools: A call for system change to facilitate parent-school collaboration*. Manuscript in preparation.
- Dishion, T. J., Ha, T., & Véronneau, M.-H. (2012). An ecological analysis of the effects of deviant peer clustering on sexual promiscuity, problem behavior, and childbearing from early adolescence to adulthood: An enhancement of the life history framework. *Developmental Psychology*, 48, 703–717. <http://dx.doi.org/10.1037/a0027304>
- Dishion, T. J., & Kavanagh, K. (2003). *Intervening in adolescent problem behavior: A family-centered approach*. New York, NY: Guilford Press.
- Dishion, T. J., Kavanagh, K., & Kiesner, J. (1999). Prevention of early adolescent substance use among high-risk youth: A multiple gating approach to parent intervention. In R. S. Ashery (Ed.), *Research meeting on drug abuse prevention through family interventions* (NIDA Research Monograph No. 177) (pp. 208–228). Washington, DC: U.S. Government Printing Office.
- Dishion, T. J., Nelson, S. E., & Bullock, B. M. (2004). Premature adolescent autonomy: Parent disengagement and deviant peer process in the amplification of problem behaviour. *Journal of Adolescence*, 27, 515–530. <http://dx.doi.org/10.1016/j.adolescence.2004.06.005>
- Dishion, T. J., Nelson, S. E., & Kavanagh, K. (2003). The Family Check-up with high-risk young adolescents: Preventing early-onset substance use by parent monitoring. *Behavior Therapy*, 34, 553–571. [http://dx.doi.org/10.1016/S0005-7894\(03\)80035-7](http://dx.doi.org/10.1016/S0005-7894(03)80035-7)
- Dishion, T. J., & Patterson, G. R. (1993). Antisocial behavior: Using a multiple gating strategy. In M. I. Singer, L. T. Singer, & T. M. Anglin (Eds.), *Handbook for screening adolescents at psychosocial risk* (pp. 375–399). New York, NY: Lexington.
- Dishion, T. J., & Patterson, G. R. (1999). Model building in developmental psychopathology: A pragmatic approach to understanding and intervention. *Journal of Clinical Child Psychology*, 28, 502–512. [http://dx.doi.org/10.1207/S15374424JCCP2804\\_10](http://dx.doi.org/10.1207/S15374424JCCP2804_10)
- Dishion, T. J., Stormshak, E. A., & Kavanagh, K. A. (2011). *Everyday parenting: A professional's guide to building family management skills*. Champaign, IL: Research Press.
- Dodge, K. A., Malone, P. S., Lansford, J. E., Miller, S., Pettit, G. S., & Bates, J. E. (2009). A dynamic cascade model of the development of substance-use onset. *Monographs of the Society for Research in Child Development*, 74, vii–119.
- Eckenrode, J., Campa, M., Luckey, D. W., Henderson, C. R., Jr., Cole, R., Kitzman, H., . . . Olds, D. (2010). Long-term effects of prenatal and infancy nurse home visitation on the life course of youths: 19-year follow-up of a randomized trial. *Archives of Pediatrics & Adolescent Medicine*, 164, 9–15. <http://dx.doi.org/10.1001/archpediatrics.2009.240>
- Eddy, J. M., Reid, J. B., Stoolmiller, M., & Fetrow, R. A. (2003). Outcomes during middle school for an elementary school-based preventive intervention for conduct problems: Follow-up results from a randomized trial. *Behavior Therapy*, 34, 535–552. [http://dx.doi.org/10.1016/S0005-7894\(03\)80034-5](http://dx.doi.org/10.1016/S0005-7894(03)80034-5)
- Fleming, C. B., White, H. R., Haggerty, K. P., Abbott, R. D., & Catalano, R. F. (2012). Educational paths and substance use from adolescence into early adulthood. *Journal of Drug Issues*, 42, 104–126. <http://dx.doi.org/10.1177/0022042612446590>
- Forgatch, M. S., & Patterson, G. R. (2010). Parent Management Training–Oregon Model: An intervention for antisocial behavior in children and adolescents. In J. R. Weisz & A. E. Kazdin (Eds.), *Evidence-based psychotherapies for children and adolescents* (2nd ed., pp. 159–177). New York, NY: Guilford Press.
- Gonzales, N. A., Dumka, L. E., Millsap, R. E., Gottschall, A., McClain, D. B., Wong, J. J., . . . Kim, S. Y. (2012). Randomized trial of a broad preventive intervention for Mexican American adolescents. *Journal of Consulting and Clinical Psychology*, 80, 1–16. <http://dx.doi.org/10.1037/a0026063>
- Hawkins, J. D., & Catalano, R. F. J. (1992). *Communities that care: Action for drug abuse prevention*. San Francisco, CA: Jossey-Bass.
- Hawkins, J. D., Catalano, R. F., Kosterman, R., Abbott, R., & Hill, K. G. (1999). Preventing adolescent health-risk behaviors by strengthening protection during childhood. *Archives of Pediatrics & Adolescent Medicine*, 153, 226–234. <http://dx.doi.org/10.1001/archpedi.153.3.226>
- Hawkins, J. D., Catalano, R. F., & Miller, J. Y. (1992). Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: Implications for substance abuse prevention. *Psychological Bulletin*, 112, 64–105. <http://dx.doi.org/10.1037/0033-2909.112.1.64>
- Hawkins, J. D., Kosterman, R., Catalano, R. F., Hill, K. G., & Abbott, R. D. (2005). Promoting positive adult functioning through social development intervention in childhood: Long-term effects from the Seattle Social Development Project. *Archives of Pediatrics & Adolescent Medicine*, 159, 25–31. <http://dx.doi.org/10.1001/archpedi.159.1.25>
- Hawkins, J. D., Smith, B. H., Hill, K. G., Kosterman, R., Catalano, R. F., & Abbott, R. D. (2007). Promoting social development and preventing health and behavior problems during the elementary grades: Results from the Seattle Social Development Project. *Victims & Offenders*, 2, 161–181. <http://dx.doi.org/10.1080/15564880701263049>
- Hawkins, J. D., Von Cleve, E., & Catalano, R. F. J., Jr. (1991). Reducing early childhood aggression: Results of a primary prevention program. *Journal of the American Academy of Child & Adolescent Psychiatry*, 30, 208–217. <http://dx.doi.org/10.1097/00004583-199103000-00008>
- Imbens, G. W., & Rubin, D. B. (1997). Estimating outcome distributions for compliers in instrumental variables models. *The Review of Economic Studies*, 64, 555–574. <http://dx.doi.org/10.2307/2971731>
- Jo, B. (2002). Statistical power in randomized intervention studies with noncompliance. *Psychological Methods*, 7, 178–193. <http://dx.doi.org/10.1037/1082-989X.7.2.178>
- Kandel, D. B., Johnson, J. G., Bird, H. R., Weissman, M. M., Goodman, S. H., Lahey, B. B., . . . Schwab-Stone, M. E. (1999). Psychiatric comorbidity among adolescents with substance use disorders: Findings from the MECA Study. *Journal of the American Academy of Child & Adolescent Psychiatry*, 38, 693–699. <http://dx.doi.org/10.1097/00004583-199906000-00016>
- Keijsers, L., Branje, S., Hawk, S. T., Schwartz, S. J., Frijns, T., Koot, H. M., . . . Meeus, W. (2012). Forbidden friends as forbidden fruit: Parental supervision of friendships, contact with deviant peers, and adolescent delinquency. *Child Development*, 83, 651–666.
- Kellam, S. G., Brown, C. H., Rubin, B. R., & Ensminger, M. E. (1983). Paths leading to teenage psychiatric symptoms and substance use: De-



- developmental epidemiological studies in Woodlawn. In S. B. Guze, F. J. Earls, & J. E. Barrett (Eds.), *Childhood psychopathology and development* (pp. 7–51). New York, NY: Raven Press.
- Kulis, S., Marsiglia, F. F., & Hecht, M. L. (2002). Gender labels and gender identity as predictors of drug use among ethnically diverse middle school students. *Youth & Society*, 33, 442–475. <http://dx.doi.org/10.1177/0044118X02033003005>
- Lin, J. Y., Ten Have, T. R., & Elliott, M. R. (2008). Longitudinal nested compliance class model in the presence of time-varying noncompliance. *Journal of the American Statistical Association*, 103, 462–473. <http://dx.doi.org/10.1198/016214507000000374>
- Little, R. J., & Yau, L. H. (1998). Statistical techniques for analyzing data from prevention trials: Treatment of no-shows using Rubin's causal model. *Psychological Methods*, 3, 147–159. <http://dx.doi.org/10.1037/1082-989X.3.2.147>
- Loeber, R., Dishion, T. J., & Patterson, G. R. (1984). Multiple gating: A multistage assessment procedure for identifying youths at risk for delinquency. *Journal of Research in Crime and Delinquency*, 21, 7–32. <http://dx.doi.org/10.1177/0022427884021001002>
- Low, S., Snyder, J., & Shortt, J. W. (2012). The drift toward problem behavior during the transition to adolescence: The contributions of youth disclosure, parenting, and older siblings. *Journal of Research on Adolescence*, 22, 65–79. <http://dx.doi.org/10.1111/j.1532-7795.2011.00757.x>
- Metzler, C. W., Biglan, A., Rusby, J. C., & Sprague, J. R. (2001). Evaluation of a comprehensive behavior management program to improve school-wide positive behavior support. *Education & Treatment of Children*, 24, 448–479.
- Miller, G. E., & Prinz, R. J. (1990). Enhancement of social learning family interventions for childhood conduct disorder. *Psychological Bulletin*, 108, 291–307. <http://dx.doi.org/10.1037/0033-2909.108.2.291>
- Miller, W. R., & Rollnick, S. (2002). *Motivational interviewing: Preparing people for change* (2nd ed.). New York, NY: Guilford Press.
- Miller-Day, M., & Barnett, J. M. (2004). "I'm not a druggie": Adolescents' ethnicity and (erroneous) beliefs about drug use norms. *Health Communication*, 16, 209–228. [http://dx.doi.org/10.1207/S15327027HC1602\\_5](http://dx.doi.org/10.1207/S15327027HC1602_5)
- Moore, K. J., Garbacz, S. A., Gau, J. M., Dishion, T. J., Brown, K. L., Stormshak, E. A., & Seeley, J. R. (2016). Proactive parent engagement in public schools: Using a brief student strengths and needs assessment in a multiple-gating risk management strategy. *Journal of Positive Behavior Interventions*. Advance online publication. <http://dx.doi.org/10.1177/1098300716632590>
- Muthén, L. K., & Muthén, B. O. (1998–2012). *MPlus users' guide* (7th ed.). Los Angeles, CA: Muthén & Muthén.
- Newcomb, M. D., & Bentler, P. M. (1988). *Consequences of adolescent drug use: Impact on the lives of young adults*. Thousand Oaks, CA: Sage.
- O'Donnell, J., Hawkins, J. D., Catalano, R. F., Abbott, R. D., & Day, L. E. (1995). Preventing school failure, drug use, and delinquency among low-income children: Long-term intervention in elementary schools. *American Journal of Orthopsychiatry*, 65, 87–100. <http://dx.doi.org/10.1037/h0079598>
- Office of National Drug Control Policy. (2004). *The economic costs of drug abuse in the United States, 1992–2002*. (207303). Washington, DC: Executive Office of the President. Retrieved from [https://www.ncjrs.gov/ondcppubs/publications/pdf/economic\\_costs.pdf](https://www.ncjrs.gov/ondcppubs/publications/pdf/economic_costs.pdf)
- Park, J., Kosterman, R., Hawkins, J. D., Haggerty, K. P., Duncan, T. E., Duncan, S. C., & Spoth, R. (2000). Effects of the "Preparing for the Drug Free Years" curriculum on growth in alcohol use and risk for alcohol use in early adolescence. *Prevention Science*, 1, 125–138. <http://dx.doi.org/10.1023/A:1010021205638>
- Patterson, G. R., Reid, J. B., & Dishion, T. J. (1992). *Antisocial boys*. Eugene, OR: Castalia.
- Roberts, R. E., Roberts, C. R., & Xing, Y. (2006). Prevalence of youth-reported DSM-IV psychiatric disorders among African, European, and Mexican American adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry*, 45, 1329–1337. <http://dx.doi.org/10.1097/01.chi.0000235076.25038.81>
- Robins, L. N., & Przybeck, T. R. (1985). Age of onset of drug use as a factor in drug and other disorders. *National Institute on Drug Abuse Research Monograph Series*, 56, 178–192.
- Rowe, D. C., Chassin, L., Presson, C. C., Edwards, D., & Sherman, S. J. (1992). An "epidemic" model of adolescent cigarette smoking. *Journal of Applied Social Psychology*, 22, 261–285. <http://dx.doi.org/10.1111/j.1559-1816.1992.tb01539.x>
- Sloboda, Z., Cottler, L. B., Hawkins, J. D., & Pentz, M. A. (2009). Reflections on 40 years of drug abuse prevention research. *Journal of Drug Issues*, 39, 179–195. <http://dx.doi.org/10.1177/002204260903900114>
- Smith, G. M., & Fogg, C. P. (1979). Psychological antecedents of teen-age drug use. *Research in Community and Mental Health*, 1, 87–102.
- Snyder, J., Schrepferman, L., Oeser, J., Patterson, G., Stoolmiller, M., Johnson, K., & Snyder, A. (2005). Deviancy training and association with deviant peers in young children: Occurrence and contribution to early-onset conduct problems. *Development and Psychopathology*, 17, 397–413. <http://dx.doi.org/10.1017/S0954579405050194>
- Soberman, L. (1994). *Psychometric validation of a brief teacher screening instrument (TRISK)* [Unpublished doctoral dissertation]. University of Oregon, Eugene, OR.
- Spoth, R., Greenberg, M., Bierman, K., & Redmond, C. (2004). PROSPER community-university partnership model for public education systems: Capacity-building for evidence-based, competence-building prevention. *Prevention Science*, 5, 31–39. <http://dx.doi.org/10.1023/B:PREV.0000013979.52796.8b>
- Spoth, R. L., & Redmond, C. (2002). Project Family prevention trials based in community-university partnerships: Toward scaled-up preventive interventions. *Prevention Science*, 3, 203–221. <http://dx.doi.org/10.1023/A:1019946617140>
- Spoth, R., Redmond, C., Shin, C., Greenberg, M., Feinberg, M., & Schainker, L. (2013). PROSPER community-university partnership delivery system effects on substance misuse through 6 1/2 years past baseline from a cluster randomized controlled intervention trial. *Preventive Medicine*, 56, 190–196. <http://dx.doi.org/10.1016/j.ypmed.2012.12.013>
- Spoth, R., Trudeau, L., Gyll, M., Shin, C., & Redmond, C. (2009). Universal intervention effects on substance use among young adults mediated by delayed adolescent substance initiation. *Journal of Consulting and Clinical Psychology*, 77, 620–632. <http://dx.doi.org/10.1037/a0016029>
- Stanis, J. J., & Andersen, S. L. (2014). Reducing substance use during adolescence: A translational framework for prevention. *Psychopharmacology*, 231, 1437–1453. <http://dx.doi.org/10.1007/s00213-013-3393-1>
- Stormshak, E. A., Connell, A., & Dishion, T. J. (2009). An adaptive approach to family-centered intervention in schools: Linking intervention engagement to academic outcomes in middle and high school. *Prevention Science*, 10, 221–235. <http://dx.doi.org/10.1007/s11121-009-0131-3>
- Stormshak, E. A., Connell, A. M., Véronneau, M.-H., Myers, M. W., Dishion, T. J., Kavanagh, K., & Caruthers, A. S. (2011). An ecological approach to promoting early adolescent mental health and social adaptation: Family-centered intervention in public middle schools. *Child Development*, 82, 209–225. <http://dx.doi.org/10.1111/j.1467-8624.2010.01551.x>
- Tarter, R. E., Kirisci, L., Mezzich, A., Cornelius, J. R., Pajer, K., Vanyukov, M., . . . Clark, D. (2003). Neurobehavioral disinhibition in childhood predicts early age at onset of substance use disorder. *The American Journal of Psychiatry*, 160, 1078–1085. <http://dx.doi.org/10.1176/appi.ajp.160.6.1078>

- Teesson, M., Baillie, A., Lynskey, M., Manor, B., & Degenhardt, L. (2006). Substance use, dependence and treatment seeking in the United States and Australia: A cross-national comparison. *Drug and Alcohol Dependence, 81*, 149–155. <http://dx.doi.org/10.1016/j.drugalcdep.2005.06.007>
- Tucker, J. S., Ellickson, P. L., Orlando, M., Martino, S. C., & Klein, D. J. (2005). Substance use trajectories from early adolescence to emerging adulthood: A comparison of smoking, binge drinking, and marijuana use. *Journal of Drug Issues, 35*, 307–332. <http://dx.doi.org/10.1177/002204260503500205>
- Van Ryzin, M. J., Stormshak, E. A., & Dishion, T. J. (2012). Engaging parents in the family check-up in middle school: Longitudinal effects on family conflict and problem behavior through the high school transition. *Journal of Adolescent Health, 50*, 627–633. <http://dx.doi.org/10.1016/j.jadohealth.2011.10.255>
- Wallace, J. M., Jr., Bachman, J. G., O'Malley, P. M., Johnston, L. D., Schulenberg, J. E., & Cooper, S. M. (2002). Tobacco, alcohol, and illicit drug use: Racial and ethnic differences among U.S. high school seniors, 1976–2000. *Public Health Reports, 117*(Suppl. 1), S67–S75.
- Webster-Stratton, C., Rinaldi, J., & Reid, J. M. (2011). Long-term outcomes of incredible years parenting program: Predictors of adolescent adjustment. *Child and Adolescent Mental Health, 16*, 38–46. <http://dx.doi.org/10.1111/j.1475-3588.2010.00576.x>
- World Health Organization. (1997). *Composite International Diagnostic Interview (CIDI, ver. 2.1)*. Geneva, Switzerland: World Health Organization.
- Yamaguchi, K., & Kandel, D. B. (1985). On resolution of role incompatibility: A life event history analysis of family roles and marijuana use. *American Journal of Sociology, 90*, 1284–1325. <http://dx.doi.org/10.1086/228211>

Received December 13, 2013

Revision received October 8, 2015

Accepted January 29, 2016 ■

### Members of Underrepresented Groups: Reviewers for Journal Manuscripts Wanted

If you are interested in reviewing manuscripts for APA journals, the APA Publications and Communications Board would like to invite your participation. Manuscript reviewers are vital to the publications process. As a reviewer, you would gain valuable experience in publishing. The P&C Board is particularly interested in encouraging members of underrepresented groups to participate more in this process.

If you are interested in reviewing manuscripts, please write APA Journals at [Reviewers@apa.org](mailto:Reviewers@apa.org). Please note the following important points:

- To be selected as a reviewer, you must have published articles in peer-reviewed journals. The experience of publishing provides a reviewer with the basis for preparing a thorough, objective review.
- To be selected, it is critical to be a regular reader of the five to six empirical journals that are most central to the area or journal for which you would like to review. Current knowledge of recently published research provides a reviewer with the knowledge base to evaluate a new submission within the context of existing research.
- To select the appropriate reviewers for each manuscript, the editor needs detailed information. Please include with your letter your vita. In the letter, please identify which APA journal(s) you are interested in, and describe your area of expertise. Be as specific as possible. For example, “social psychology” is not sufficient—you would need to specify “social cognition” or “attitude change” as well.
- Reviewing a manuscript takes time (1–4 hours per manuscript reviewed). If you are selected to review a manuscript, be prepared to invest the necessary time to evaluate the manuscript thoroughly.

APA now has an online video course that provides guidance in reviewing manuscripts. To learn more about the course and to access the video, visit <http://www.apa.org/pubs/authors/review-manuscript-ce-video.aspx>.

# Family economic status and parental involvement: Influences of parental expectation and perceived barriers

**Yiji Wang**

East China Normal University, China

**Ciping Deng**

East China Normal University, China

**Xiangdong Yang**

East China Normal University, China

School Psychology International

2016, Vol. 37(5) 536–553

© The Author(s) 2016

Reprints and permissions:

sagepub.co.uk/journalsPermissions.nav

DOI: 10.1177/0143034316667646

spi.sagepub.com



## Abstract

Parental involvement in children's education is a critical factor associated with children's socio-emotional and educational outcomes. However, low parental involvement occurs more often among economically disadvantaged families. It is unclear what mechanisms may explain the association between family economic status and parents' educational involvement. Using a large low-income sample from northwestern China ( $N = 12,724$ ), we examined the influence of two proximal processes in parents – expectation for children's highest educational attainment and perceived barriers to involve – in linking family economic status and the involvement of parents in children's education. We also examined whether these relations may vary by parents' level of education. Results of structural equation modeling suggested that parents' expectation and perceived barriers mediated the relationship between family economic status and parental involvement. These relations were particularly prominent among highly educated mothers. Findings elucidate proximal processes in parents and highlight the unique effects of economic status and parents' level of education in understanding the link between family economic status and parental educational involvement in Chinese families.

---

## Corresponding author:

Yiji Wang, Institute of Curriculum and Instruction at Faculty of Education, School of Psychology and Cognitive Sciences, Junxiu Building 213, 3663 North Zhongshan Road, East China Normal University, Shanghai, 200062, China.

Email: yjwang@psy.ecnu.edu.cn

**Keywords**

educational expectation, family economic status, parental involvement, perceived barriers

Children's adjustment reflects the influence of various levels of environmental contexts, such as families, schools, neighborhoods, and societies (Bronfenbrenner, 1994). The connection that parents and schools form, in particular, has been emphasized to promote children's socio-emotional and educational outcomes (Cook, Herman, Phillips, & Settersen, 2002). Parental involvement, or parents' interaction with their children and schools to promote children's academic achievement (Hill et al., 2004), is one such critical factor that links family and school contexts. The involvement of parents in their children's education is essential to children's academic achievement and socio-emotional adjustment (Grolnick, Friendly, & Bellas, 2009; Pomerantz, Kim & Cheung, 2012; Van Voorhis et al., 2013). This is particularly salient for children from low-income families because, in the face of multiples stressors, parental involvement functions as a key protective factor by fostering children's cognitive and emotional resilience (Shumow, Vandell, & Posner, 1999). However, low parental educational involvement often occurs in economically disadvantaged families (Camacho-Thompson, Gillen-O'Neel, Gonzales, & Fuligni, 2016; Kohl, Lengua, & McMahon, 2000). Understanding mechanisms that underlie the association of family economic stress and low parental involvement in children's education is therefore of particular importance to promote socio-emotional and educational adjustment for children from low-income families. This study explicitly examined this.

Our study is situated in the framework of bioecological theory, which stresses that distal contextual factors influence children's adjustment indirectly via promoting proximal processes (Bronfenbrenner & Morris, 1998). Consistent with this approach, we used survey data from a large urban sample in China to examine the impact of family economic stress on parents' involvement in their children's education through proximal processes within the family context – parents' perceived barriers and expectations for children's ultimate educational attainment.

This study has two features. First, although the importance of economic context in the study of educational psychology has been emphasized (Murdock, 2000), few empirical studies truly focus on the unique function of economic context (Murdock, 2000). Instead, family economic status was commonly combined with other sociodemographic characteristics (e.g. parents' education and race/ethnicity) to indicate socioeconomic status (SES) and was treated as a control variable rather than a variable of main interest. SES is a broad construct representing an individual's relative position and power within the economic and social hierarchy (Murdock, 2000). We thus used economic status to denote one's economic situation in this study. Second, although some parental involvement research has been conducted in China (e.g., Lau, Li, & Rao, 2011; Pomerantz, Ng, Cheung, & Qu, 2014), most extant research on parental involvement relied on US samples (see Hill & Tyson, 2009; Pomerantz et al., 2012 for reviews). This limitation in sampling confines our understanding of parental involvement when it pertains to

economically disadvantaged families outside of the United States. Using a large sample in China, this study contributes to our understandings of parental involvement from an international perspective.

## **Parental involvement in the United States and China**

Although there are numerous ways to operationalize parental involvement in extant research, two most consistently included ones are home-based and school-based involvement strategies (Hill et al., 2004; Seginer, 2006). Consistent with Epstein's (1987; Epstein & Sanders, 2002) and Comer's (1995) frameworks, *home-based involvement* represents parents' efforts to support children's learning, to guide school-relevant behavior, and to promote children's motivation for learning at home (Seginer, 2006). This usually includes helping with homework and engaging in other education-related activities at home (Hill et al., 2004; Seginer, 2006). Epstein's (1987) and Comer's (1995) frameworks also include *school-based involvement*. It consists of activities parents perform at school that aim to advance children's educational achievement (Seginer, 2006), such as volunteering at school, attendance at parent-teacher conferences, and involvement in school governance.

Although the positive impact of parental involvement on children's social and educational adjustment has been documented both in the United States and China, extant literature shows that, relative to American parents, Chinese parents are on average more involved in children's learning, beginning as early as early childhood (Lau et al., 2011) and continuing throughout adolescence (Pomerantz et al., 2014). Along with parents of other countries in East Asia, Chinese parents tend to frequently engage in learning-related activities with their children and to value educational successes over social functioning (Pomerantz et al., 2014; Pomertanze et al., 2012). A study with kindergarten children also shows that Chinese parents are more likely to exhibit home-based involvement than school-based involvement (Lau et al., 2011). This may be because Chinese schools tend to be reluctant to get parents involved in school management (Ng, 1999). However, few studies have examined the involvement of parents from economically disadvantaged Chinese families. This study thus focused on this rarely examined population.

## **Parental involvement and its relation to family economic status**

Parental involvement in education is particularly important for children in economically disadvantaged families. Longitudinal studies with low-income pre-schoolers, primary-schoolers, and adolescents show that active parental involvement promotes long-term academic benefits, including global academic achievement (Englund, Luckner, Whaley, & Egeland, 2004), literacy performance (Dearing, Kreider, Simpkins, & Weiss, 2006), and cumulative high school grades and educational attainment (Benner, Boyle, & Sadler, 2016). These benefits may occur because active parental involvement protects children from contextual stressors (Shumow et al.,



1999), lessens the discontinuity between home and school environments (Mendez & Fogle, 2002), instills in children positive educational values (Cheung & Pomerantz, 2015), and promotes their perceived competence and motivation (Gonzalez-DeHass, Willems, & Doan Holbein, 2005). However, low-income parents are typically less involved in their children's education than affluent parents (Camacho-Thompson et al., 2016; Kohl et al., 2000), which may explain, in part, poor academic performance among low-income children (Jeynes, 2007). What proximal mechanisms may account for the relation between disadvantaged economic status and low parental involvement in children's education? We now turn to this question.

### **Mechanisms: The role of expectation and perceived barriers**

Informed by Eccles and Harold's (1996) model of parental involvement, the association between family economic stress and low parental involvement may reflect the processes of distal contextual factors influencing parents' involvement by proximal factors internal to them, including perceptions. Two such proximal processes may be at work here. First, economic hardship may undermine parents' involvement by disrupting their expectations for children's future educational attainment. The expectations represent parents' beliefs of children's future educational attainment that are constructed upon an assessment of supporting resources and children's academic capacities (Yamamoto & Holloway, 2010). Among low-income parents, disadvantaged economic status is associated with a lack of sense of efficacy in helping children to succeed in school, particularly as children enter higher grades (Bandura, 1997). High sense of self-efficacy promotes high expectations for children, whereas low sense of self-efficacy disrupts parents' expectations for their children even when children's academic performance is relatively high (Bandura, Barbaranelli, Caprara, & Pastorelli, 1996). Indeed, relative to affluent parents, low-income parents, on average, tend to report lower expectation for their children's educational achievement (Benner & Mistry, 2007; Crosnoe, Mistry, & Elder, 2002), particularly among those with low self-efficacy (Crosnoe et al., 2002). This less optimistic view of children's educational attainment in turn predicts parents' low engagement in educational activities with their children (Bronfenbrenner & Morris, 1998; Crosnoe et al., 2002), both at home and at school.

A second process pertains to parents' perceived barriers to get involved in children's education. For low-income parents, low educational involvement may reflect their high perceived barriers as related to disadvantaged economic status. Low-income parents tend to experience time and energy constraints associated with work (Waanders, Mendez, & Downer, 2007), low social support, and increased stress associated with a lack of financial resources (Reynolds, 1992). All of these constraints may disrupt parents' motivation and self-efficacy to be involved in their children's education (Bandura, 1997). Indeed, low-income parents have been shown to display low self-efficacy when it relates to children's education. They are more likely to view teachers as experts in education (Crozier, 1999) and to feel uncomfortable with or incapable of helping children with homework



(Conger, Ge, Elder, Lorenz, & Simons, 1994) compared to affluent counterparts. Informed by this body of research, this study thus examined whether the link between family economic status and parents' involvement in children's education will be mediated by parents' expectation and perceived barriers.

### **Variation by parents' education**

Parental involvement in children's education may vary across parental education levels. Extant research suggests that parents' level of education is associated with their capabilities to foster children's adjustment. In general, highly educated parents, even low-income ones, form more realistic views regarding the actual performance of their children (Alexander, Entwisle, & Bedinger, 1994), have higher expectations for children's educational outcomes (Halle, Kurtz-Costes, & Mahoney, 1997), create more cognitively stimulating home environment (Davis-Kean, 2005), and experience lower parenting stress (Parkes, Sweeting, & Wight, 2015), relative to low educated parents. Jointly, research implies that, in the face of environmental stressors, highly-educated mothers function better than low-educated mothers to form reasonable expectations for children's educational outcomes and to cope with stress and barriers effectively, which in turn may predict their higher involvement in children's education. Yet, there is a dearth of literature examining the relationship between parents' level of education and their involvement in children's education (Waanders et al., 2007). Parents' education was treated as a determinant of their involvement along with other parental characteristics (Waanders et al., 2007). It is thus unclear whether family economic status and parents' education may play different roles in promoting their involvement in children's education. In this study, we thus examined the potential difference in the association of family economic status, educational involvement, and parents' expectation and perceived barriers across parental education groups.

### **The current study**

This study examined processes through which family economic status influenced parental involvement in children's education and how these associations may vary by parental characteristics, such as education. Three hypotheses were tested. First, the association between family economic status and parental involvement will be mediated by parents' perceived barriers (Hypothesis 1). High perceived barriers as related to low family economic status may undermine parents' involvement in children's education. Second, the association between family economic status and parental involvement will be mediated by parents' expectation for children's ultimate educational attainment (Hypothesis 2). Low economic status may predict low expectation for children's educational achievement, which in turn may predict their low involvement. Third, the associations among family income, parental perceived barriers, expectation, and educational involvement will vary across groups with low versus high levels of parental education (Hypothesis 3). These relations may be particularly prominent among low educated parents.

## Methods

### Participants

Participants in the study were parents of seventh and eighth graders from 53 schools in a medium-sized city in northwestern China ( $N = 12,724$ ). After receiving permission from the city's Ministry of Education, we sent out consent forms and questionnaires to classroom teachers, who then distributed both materials to parents. Parents were ensured of confidentiality and that the data would be exclusively used for research. Parental questionnaires along with signed consent forms were completed at home and then collected by classroom teachers one week later. Fifty-seven percent of questionnaires were completed by mothers and 43% were responded by fathers. Data reported by both parents were used in the analyses.

This sample had comparable boys (47.1%) and girls (52.9%) as well as comparable seventh (51.6%) and eighth graders (48.4%). On average, mothers and fathers had 10.05 ( $SD = 3.29$ ) and 11.15 ( $SD = 3.43$ ) years of education, respectively, both were equivalent to some high school education. Most families had an annual income lower than \$17,000 (89.5%) with an average of \$7,937 (in US dollars; the average annual income for Chinese families was approximately \$12,838 in 2012, based on 6.3 exchanging rate; National Bureau of Statistics of China, 2015), which suggested that this was a relatively disadvantaged sample.

Cases with missing data on all indicators of parental involvement, the outcome variable, were eliminated ( $n = 1,073$ ). Compared to parents who had missing values on the outcome variable, those with complete data ( $n = 11,651$ ) had higher mothers' education,  $F(1) = 6.389$ ,  $p = .011$ . However, they did not differ on their children's grades,  $F(1) = .21$ ,  $ns$ , children's gender,  $F(1) = .088$ ,  $ns$ , nor the annual income,  $F(1) = 2.533$ ,  $ns$ .

### Measures

*Family economic status and parental education.* The family economic status was measured by parent-reported household annual income on a nine-point scale (1 = below 10,000 in Chinese Yuan; 2 = 10,000 to 30,000; 3 = 30,000 to 50,000; 4 = 50,000 to 70,000; 5 = 70,000 to 90,000; 6 = 90,000 to 110,000; 7 = 110,000 to 200,000; 8 = 200,000 to 500,000; 9 = above 500,000; 1 Chinese Yuan approximately equals to 0.15 US dollars). Parents also reported on years of education mothers and fathers had completed. Since mothers' and fathers' education were highly correlated ( $r = .72$ ,  $p < .001$ ), we used mothers' education (reported by mothers or fathers) to avoid redundancy.

*Parental involvement.* Following existing frameworks (Comer, 1995; Epstein, 1987; Epstein & Sanders, 2002), parental involvement consisted of two indicators – home-based and school-based involvement. Home-based involvement measured parents' involvement in learning-related activities at home, whereas school-based

involvement measured parents' involvement at school. First, on a four-point scale (0 = *never or rarely*, 1 = *sometimes*, 2 = *often*, 3 = *most or all of the time*), parents reported the extent to which they engaged in education-related activities with their children at home (e.g. reading for children, helping with homework, and assigning extra homework). This consisted of seven items. The internal consistency was good (Cronbach's  $\alpha = .78$ ). Second, parents reported on four items the extent to which they engaged in activities organized by schools (e.g. teacher-parent conference, seminar for parents, volunteering at school, and involvement in the school decision-making) from 0 (*never or rarely*) to 3 (*most or all of the time*) ( $\alpha = .76$ ).

**Parental perceived barriers.** Parents reported on whether they experienced barriers that impeded them from being involved in their children's education. Drawn from a large questionnaire that measured parents' perceptions on children's school performance and extra-curriculum activities, five dichotomous items (1 = *yes*, 0 = *no*) measured three aspects of perceived barriers ( $\alpha = .71$ ), including limited time and resources, limited knowledge, and communication problems. First, parents reported on whether they felt they had limited time and resources that hinder them from involving in their children's education ("I am too busy on work", "I have limited resources to support my child"). Second, parents reported on whether they perceived children's homework to be beyond the scope of their knowledge ("My child's homework is beyond the scope of my knowledge"). Third, parents reported on whether they felt they had difficulty communicating with their children ("my child won't talk to me"; "I don't know how to communicate with my child"). A total count value represented each aspect of perceived barriers.

**Expectation for children's ultimate educational attainment.** Parents rated their expectation for children's highest degree from 1 to 5 (1 = *secondary school*, 2 = *vocational high school*, 3 = *high school*, 4 = *college*, 5 = *graduate degree*).

### Analysis plan

Structural equation modeling (SEM) was conducted in Mplus (Muthén & Muthén, 1998–2012). Maximum likelihood estimation with robust standard errors was used to handle skewed data. Missing data was handled using full information maximum likelihood (FIML), which enables the inclusion of all available data in the analyses (Enders, 2001). Fit indices for SEM models include the chi-square ( $\chi^2$ ) value, comparative fit indices (CFI), and the root-mean-square error of approximation (RMSEA). A close approximate fit is indicated by  $CFI \geq .95$  and  $RMSEA \leq .06$  (Hu & Bentler, 1999).

The analyses proceeded in three steps. First, preliminary analyses were conducted to examine descriptive statistics and correlations among major study variables. A measurement model was examined to test the validity of latent variables – parental

perceived barriers and involvement. Second, a SEM model was used to examine whether parental perceived barriers and expectation will mediate the relation between family economic status and parental involvement (Hypotheses 1 & 2). We tested indirect effects from family economic status to parental involvement and examined significant indirect paths. Consistent with MacKinnon, Lockwood, Hoffman, West, and Sheets (2002), the inference of indirect effects was based on Mplus estimation of indirect effects with delta method standard errors (Muthén & Muthén, 1998–2012).

Third, a set of multi-group SEM models was tested to investigate whether the associations of family income, parental perceived barriers, expectation, and involvement varied by parents' levels of education. Chi-square difference test ( $\Delta\chi^2$ ) using the Sattora-Bentler scaled chi-square (Satorra, 2000) was used to compare nested models. We first fit the model without any equality constraint and then fit the model that was fully constrained. If the fully constrained model was significantly different from the baseline model without equality constraints, as indicated by a significant  $\Delta\chi^2$  value, we would then go to the next step, which was to test the equity constraint for each single path. If by adding the equity constraint for one path significantly worsens the model fit as compared to the base model, the equity constraint for that path would be removed. Otherwise, that equality constraint would be kept to test the equity constraint for another path. Above steps were repeated to test each path of interest until a final model with close approximation fit was identified.

## Results

### *Preliminary analyses*

Descriptive statistics and bivariate correlations for study variables were presented in Table 1. The measurement model, examining the validity of two latent variables – parental involvement and perceived barriers, fit the data well: CFI = .99, RMSEA = .02,  $\chi^2(4) = 30.96$ ,  $p < .001$ . The two indicators of parental involvement – home-based ( $\beta = .76$ ,  $p < .001$ ) and school-based involvement ( $\beta = .50$ ,  $p < .001$ ) – were both significantly loaded on it. Parental perceived barriers consisted of three indicators that were all significantly loaded on it, including communication problems ( $\beta = .53$ ,  $p < .001$ ), limited knowledge ( $\beta = .47$ ,  $p < .001$ ), and limited time and resource ( $\beta = .59$ ,  $p < .001$ ).

### *The mediating role of parental expectation and perceived barriers*

The first SEM model examined whether the association between family economic status and parents' educational involvement was mediated by their perceived barriers and expectation for children's ultimate academic attainment (Hypotheses 1 & 2). We controlled for children's grade and gender in the model. The model fit the data well: CFI = .96, RMSEA = .04,  $\chi^2(17) = 196.08$ ,  $p < .001$ .

**Table 1.** Means, standard deviations, and inter-correlations among major study variables.

| Variables                   | 1        | 2        | 3        | 4        | 5        | 6      | 7      | 8     |
|-----------------------------|----------|----------|----------|----------|----------|--------|--------|-------|
| 1. Family economic status   | —        |          |          |          |          |        |        |       |
| 2. Mothers' education       | .51***   | —        |          |          |          |        |        |       |
| 3. Parental expectation     | .20***   | .28***   | —        |          |          |        |        |       |
| <i>Parental involvement</i> |          |          |          |          |          |        |        |       |
| 4. Home-based               | .17***   | .31***   | .24***   | —        |          |        |        |       |
| 5. School-based             | .13***   | .17***   | .12***   | .38***   | —        |        |        |       |
| <i>Perceived barriers</i>   |          |          |          |          |          |        |        |       |
| 6. Limited time & resource  | −0.22*** | −0.24*** | −0.09*** | −0.29*** | −0.18*** | —      |        |       |
| 7. Limited knowledge        | −0.17*** | −0.30*** | −0.08*** | −0.20*** | −0.14*** | .29*** | —      |       |
| 8. Communication problems   | −0.10*** | −0.15*** | −0.11*** | −0.25*** | −0.17*** | .29*** | .26*** | —     |
| N                           | 11166    | 11311    | 11239    | 10867    | 10875    | 10229  | 10981  | 10257 |
| M                           | 3.32     | 10.05    | 4.35     | 4.13     | 1.80     | .35    | .69    | .39   |
| SD                          | 2.02     | 3.30     | .87      | .96      | .51      | .37    | .46    | .41   |

Note: \*\*\* $p < 0.001$ .

The standardized coefficients and  $R$ -square values were displayed in Figure 1. Significant indirect effect from family economic status to parents' involvement emerged ( $\beta = .21$ ,  $p < .001$ ). Both parents' expectation for children's highest degree ( $\beta_{\text{ind}} = .04$ ,  $p < .001$ ) and perceived barriers ( $\beta_{\text{ind}} = .17$ ,  $p < .001$ ) mediated the relationship between family economic status and parents' involvement.

### *Variation by parents' education*

Another set of SEM models examined whether the relationship under study varied by parents' education (Hypothesis 3). Mothers' education was first dichotomized by median split to create high versus low groups. This dichotomous variable of education was then entered as a moderator in multi-group comparisons to examine whether the observed associations may differ by mothers' education. The baseline model that allowed all parameters to be estimated freely across two groups (high versus low maternal education) was significantly different from a fully constrained model that constrained all paths of interest to be estimated equally across two groups ( $\Delta\chi^2(5) = 30.81$ ,  $p < .001$ ). We then constrained all paths of interest to be equal across two groups, one at a time. Standardized coefficients for both groups were presented in Figure 2. Two groups significantly differed on one path. Family economic status was negatively associated with parents' perceived barriers among mothers who had relatively high education ( $\Delta\chi^2(1) = 18.09$ ,  $p < .001$ ). But this association was not significant among mothers who had relatively low education.

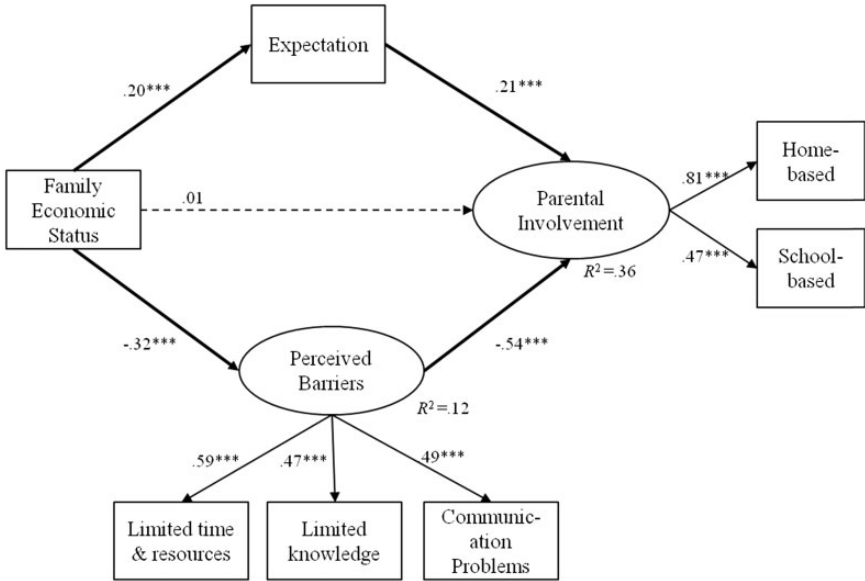


**Figure 1.** Estimated standardized coefficients of the SEM model testing the mediation of parents' expectation and perceived barriers in the association of family economic status and parents' involvement in children's education. Bold lines denote significant indirect paths from family economic status to parental involvement. The dash line denotes a nonsignificant path. Comparative fit index = .95, root-mean-square error of approximation = .04,  $\chi^2(17) = 196.08$ ,  $p < .001$ ; \*\*\* $p < .001$ .

We also compared whether the mediation of parental expectation and perceived barriers in the association of family economic status and parental involvement may vary by mothers' education. The indirect effect from family economic status to parental involvement was significant for the highly-educated group ( $\beta = .19$ ,  $p < .001$ ), whereas it was only marginally significant for the low-educated group ( $\beta = .04$ ,  $p = .06$ ). Two groups also differed on mediating mechanisms that may account for the relationship between family economic status and parental involvement. While the mediation of parental expectation emerged for both groups (highly-educated group:  $\beta_{(ind)} = .04$ ,  $p < .001$ ; low-educated group:  $\beta_{(ind)} = .02$ ,  $p < .001$ ), the mediation of perceived barriers emerged only for the highly-educated group ( $\beta_{(ind)} = .15$ ,  $p < .001$ ).

*Testing an alternative model*

Although our proposed model was informed by the theory and the extant research, the possibility of alternative models exists due to the cross-sectional nature of our data. For example, it may be that rather than mediating the link between family economic status and parental involvement, parents' low expectation and high



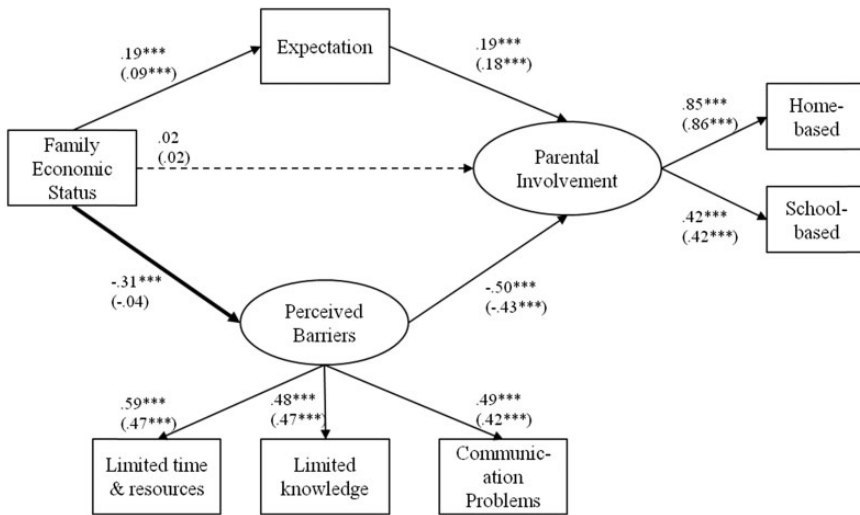


**Figure 2.** Multi group SEM model testing whether relationships of interest varied by mothers' education. Estimated standardized coefficients were reported. Coefficients for the group of low maternal education were in parentheses. The bold line denotes the path that was significantly different across two groups. The dash line denotes a nonsignificant path for both groups. Comparative fit index = .95, root-mean-square error of approximation = .04,  $\chi^2(41) = 214.18$ ,  $p < .001$ ; \*\*\* $p < .001$ .

perceived barriers are actually byproducts of this relationship. In this alternative model, family economic status would be directly linked to parental involvement, expectation, and perceived barriers. Our test of this alternative model revealed a poorer model fit (CFI = .94, RMSEA = .06,  $\chi^2(16) = 159.89$ ,  $p < .001$ ). An examination of both Akaike's Information Criterion (AIC; alternative model = 55203.76 versus proposed model = 53238.59) and Bayes Information Criterion (BIC; alternative model = 55397.95 versus proposed model = 53426.69) provided similar evidence that our proposed mediational model fit the data better.

## Discussion

Children from low-income families are at particular risk for socioemotional and educational adjustment difficulties. This risk is thought to reflect, in part, the low involvement of their parents as associated with disadvantaged economic status. Yet, little is known on mechanisms by which family economic hardship undermines parental involvement. Using a large disadvantaged sample from China, this study explored the mediating role of proximal processes in parents – expectation and perceived barriers – in linking family economic status and parents' involvement in adolescent children's education. Moreover, unlike previous work (Murdock, 2000), we differentiated the effect of family economic status from that of education

because parental education is thought to have independent effects above and beyond economic status (Murdock, 2000). This differentiation enabled us to disentangle the unique effects of family economic status and parents' level of education in influencing proximal processes in parents and accordingly, their involvement in children's education. Understanding these processes has the potential to inform the design and implementation of intervention that aims to foster low-income children's school adjustment.

While the association of parental characteristics (i.e. SES, self-efficacy, and education) and involvement in their children's education has been established in a prior study (Waanders et al., 2007), the current study extends this initial effort by elucidating differentiated effects of these multiple levels of determinants of parental involvement, by examining underlying processes that contribute to those relations, and by applying those relations to understanding the adverse impact of family economic disadvantage on parental involvement. To our knowledge, this study was among the first to demonstrate that the impact of family economic status on parental involvement was indirect through influencing proximal processes in parents. Among economically disadvantaged Chinese families, parents tend to develop low expectations for their children's ultimate educational achievement and to experience difficulty in getting involved in their children's education as manifested by constrained time and resources, limited knowledge, and communication problems with their children. These processes internal to parents then predicted low involvement in their children's education, both at home and at school.

We suspect that the impact of these two proximal factors in parents – expectation and perceived barriers – on their involvement may be due to different processes. The association between parental expectation and their involvement may in part reflect two processes. First, parents' high expectation may foster their motivation to get involved (Yamamoto & Holloway, 2010). When parents expect high educational outcomes for their children, they may be highly motivated to get involved in their children's education, to provide learning opportunities to enhance children's performance, and to maintain positive communication with the school. In contrast, when parents hold relatively low educational aspiration for their children, they may be less motivated to expend time and energy engaging in activities targeted at improving children's academic performance. Second, parents' high expectations may promote ambitious goals for their involvement in children's education. These preset goals, in turn, may serve as a self-regulating mechanism that promote goal-consistent behaviors (Albert & Luzzo, 1999). Therefore, parents with high expectations for children's educational outcomes may be more likely to set consistent goals and to actively get involved in children's education to meet those goals.

The association between parental perceived barriers and their involvement may in part reflect two different processes. First, high perceived barriers may undermine parents' sense of efficacy to be a positive influence of children's education (Bandura, 1997). High perceived barriers may instill in parents a sense of incapability, which may further impede them from getting involved. Second, high perceived barriers may elicit parenting stress that in turn may interfere with their

ability to get involved with children's schooling (Solem, Christophersen, & Martinussen, 2011), particularly among those who have low efficacy to support children's education (Semke, Garbacz, Kwon, Sheridan, & Woods, 2010).

Findings partially supported the hypothesis that the relation of interest may vary across parents' education groups. But it was unexpected to find that relations among family economic status, parents' perceptions, and educational involvement were more prominent among highly educated rather than low educated mothers. While the mediation of parental expectations was supported in both groups, the mediation of parental perceived barriers was supported only in the highly educated group. Only among highly educated mothers, household economic status predicted perceived barriers, which then predicted parents' low involvement in children's schooling. We suspect that this discrepancy may reflect a more realistic view of economic hardship among highly educated mothers. The overly optimistic view of low educated mothers may be a psychological coping mechanism that functions to attenuate the adverse impact of economic pressure. This speculation is in line with prior studies showing that parents of high educational background tend to form more realistic views compared to parents of low education (Alexander et al., 1994).

## **Limitations and future directions**

Although this study contributes to our understandings of the underlying mechanisms in the relation of family economic status and parental involvement among economically disadvantaged Chinese families, some limitations should be noted. First, the data are cross-sectional in nature, and therefore we cannot draw causal conclusions. It is possible that a third variable that is beyond the scope of the current study may account for observed relations as well, such as parenting efficacy (Bandura, 1997). Our unique contribution lies in pointing out indirect pathways by which family economic status influenced parents' involvement in children's schooling and in differentiating the main and interactive effects of economic status and parents' education in predicting parental involvement. **Future studies that measure proximal factors and parental educational involvement** across time are needed to replicate our findings. Second, this study used a large low-income sample from China. Thus, it is not possible to generalize the findings to other populations with varying economic status. However, findings may extend our understandings of parental educational involvement beyond Western populations. Third, this study heavily relied on survey data reported by parents. **Although we were able to measure parental educational involvement with survey data, future studies may consider multiple informants and methods to collect data, such as conducting observations at home and using adolescent report.**

## **Conclusion**

The current study examined mechanisms that link family economic status and parents' involvement and how this relation of interest varies by mothers' level of

education. Among low-income Chinese families, distal contextual stressors, such as economic hardship, may translate into proximal processes, such as parents' beliefs and perceptions, which in turn affect their involvement in children's educational activities. This relationship, while prominent among highly educated parents, was partially supported among low educated parents. This pattern demonstrates the necessity of differentiating the effects of key demographic variables – household economic status and parents' level of education – in exploring the factors that promote the involvement of parents as related to youth's schooling. Understanding these relations has a potential to inform educators and intervention programs that target low-income youth. Efforts to foster the involvement of their parents may be focused on enhancing parents' expectations to youth's ultimate educational attainment and alleviating their perceptions of barriers that impede them from getting involved in their children's education.

### Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The authors acknowledge the support of grants from Peak Discipline Construction of Education at East China Normal University to Yiji Wang, from National Natural Science Foundation of China to Yiji Wang (31600900), and from China Postdoctoral Science Foundation to Yiji Wang (2016M590330).

### Notes

The authors would like to thank all study participants and our research teams for collecting the data. We are also grateful to Dr. Yi Hu for his helpful comments.

### References

- Albert, K. A., & Luzzo, D. A. (1999). The role of perceived barriers in career development: A social cognitive perspective. *Journal of Counseling and Development*, 77(4), 431–436. doi:10.1002/j.1556-6676.1999.tb02470.x.
- Alexander, K. L., Entwisle, D. R., & Bedinger, S. D. (1994). When expectations work: Race and socioeconomic differences in school performance. *Social Psychology Quarterly*, 57(4), 283–299. doi:10.2307/2787156.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Freeman and Company.
- Bandura, A., Barbaranelli, C., Caprara, G. V., & Pastorelli, C. (1996). Multifaceted impact of self-efficacy beliefs on academic functioning. *Child Development*, 67(3), 1206–1222. doi:10.2307/1131888.
- Benner, A. D., Boyle, A. E., & Sadler, S. (2016). Parental involvement and adolescents' educational success: The roles of prior achievement and socioeconomic status. *Journal of Youth and Adolescence*, 45(6), 1053–1064. doi:10.1007/s10964-016-0431-4.

- Benner, A. D., & Mistry, R. S. (2007). Congruence of mother and teacher educational expectations and low-income youth's academic competence. *Journal of Educational Psychology, 99*(1), 140–153. doi:10.1037/0022-0663.99.1.140.
- Bronfenbrenner, U. (1994). Ecological models of human development. In T. Husen, & T. N. Postlethwaite (Eds.), *The international encyclopedia of education* (2nd ed. pp. 1643–1647). New York, NY: Elsevier Sciences.
- Bronfenbrenner, U., & Morris, P. (1998). The ecology of developmental processes. In W. Damon, & R. M. Lerner (Eds.), *Handbook of child psychology* (pp. 993–1028). New York, NY: Wiley.
- Camacho-Thompson, D. E., Gillen-O'Neel, C., Gonzales, N. A., & Fuligni, A. J. (2016). Financial strain, major family life events, and parental academic involvement during adolescence. *Journal of Youth and Adolescence, 45*(6), 1065–1074. doi:10.1007/s10964-016-0443-0.
- Cheung, C. S., & Pomerantz, E. M. (2015). Value development underlies the benefits of parents' involvement in children's learning: A longitudinal investigation in the United States and China. *Journal of Educational Psychology, 107*(1), 309–320. doi:10.1037/a0037458.
- Comer, J. P. (1995). *School power: Implications of an intervention project*. New York, NY: Free Press.
- Conger, R. D., Ge, X., Elder, G. H., Lorenz, F. O., & Simons, R. L. (1994). Economic stress, coercive family process, and developmental problems of adolescents. *Child Development, 65*, 541–561. doi:10.2307/1131401.
- Cook, T. D., Herman, M. R., Phillips, M., & Settersen, R. A. (2002). Some ways in which neighborhoods, nuclear families, friendship groups, and schools jointly affect changes in early adolescent development. *Child Development, 73*, 1283–1309. doi:10.1111/1467-8624.00472.
- Crosnoe, R., Mistry, R. S., & Elder, G. J. (2002). Economic disadvantage, family dynamics, and adolescent enrollment in higher education. *Journal of Marriage and Family, 64*(3), 690–702. doi:10.1111/j.1741-3737.2002.00690.x.
- Crozier, G. (1999). Is it a case of 'We know when we're not wanted'? The parents' perspective on parent-teacher roles and relationships. *Educational Research, 41*(3), 315–328. doi:10.1080/0013188990410306.
- Davis-Kean, P. E. (2005). The influence of parent education and family income on child achievement: The indirect role of parental expectations and the home environment. *Journal of Family Psychology, 19*(2), 294–304. doi:10.1037/0893-3200.19.2.294.
- Dearing, E., Kreider, H., Simpkins, S., & Weiss, H. B. (2006). Family involvement in school and low-income children's literacy: Longitudinal associations between and within families. *Journal of Educational Psychology, 98*(4), 653–664. doi:10.1037/0022-0663.98.4.653.
- Eccles, J. S., & Harold, R. D. (1996). Family involvement in children's and adolescents' schooling. In A. Booth, & J. F. Dunn (Eds.), *Family school links: How do they affect educational outcomes?* (pp 3–34). Mahwah, NJ: Lawrence Erlbaum Associates.
- Englund, M. M., Luckner, A. E., Whaley, G. L., & Egeland, B. (2004). Children's achievement in early elementary school: Longitudinal effects of parental involvement, expectations, and quality of assistance. *Journal of Educational Psychology, 96*(4), 723–730. doi:10.1037/0022-0663.96.4.723.
- Enders, C. K. (2001). The impact of nonnormality on full information maximum-likelihood estimation for structural equation models with missing data. *Psychological Methods, 6*(4), 352–370. doi:10.1037/1082-989X.6.4.352.

- Epstein, J. L. (1987). Toward a theory of family-school connections: Teacher practices and parent involvement. In K. Hurrelman, F. X. Kaufmann, & F. L. Sel (Eds.), *Social intervention: Potential and constraints* (pp. 121–136). Berlin: Walter de Gruyter.
- Epstein, J. L., & Sanders, M. G. (2002). Family, school, and community partnerships. In M. H. Bornstein (Ed.), *Handbook of parenting: Vol. 5. Practical issues in parenting* (pp. 407–437). Mahwah, NJ: Erlbaum.
- Gonzalez-DeHass, A. R., Willems, P. P., & Doan Holbein, M. F. (2005). Examining the relationship between parental involvement and student motivation. *Educational Psychology Review*, 17(2), 99–123. doi:10.1007/s10648-005-3949-7.
- Grolnick, W. S., Friendly, R. W., & Bellas, V. M. (2009). Parenting and children's motivation at school. In K. R. Wenzel, & A. Wigfield (Eds.), *Handbook of motivation at school* (pp. 279–300). New York, NY: Routledge/Taylor & Francis.
- Halle, T. G., Kurtz-Costes, B., & Mahoney, J. L. (1997). Family influences on school achievement in low-income, African American children. *Journal of Educational Psychology*, 89(3), 527–537. doi:10.1037/0022-0663.89.3.527.
- Hill, N. E., Castellino, D. R., Lansford, J. E., Nowlin, P., Dodge, K. A., Bates, J. E., & Pettit, G. S. (2004). Parent academic involvement as related to school behavior, achievement, and aspirations: Demographic variations across adolescence. *Child Development*, 75(5), 1491–1509. doi:10.1111/j.1467-8624.2004.00753.x.
- Hill, N. E., & Tyson, D. F. (2009). Parental involvement in middle school: A meta-analytic assessment of the strategies that promote achievement. *Developmental Psychology*, 45(3), 740–763. doi:10.1037/a0015362.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), 1–55. doi:10.1080/10705519909540118.
- Jeynes, W. H. (2007). The relationship between parental involvement and urban secondary school student academic achievement: A meta-analysis. *Urban Education*, 42(1), 82–110. doi:10.1177/0042085906293818.
- Kohl, G. O., Lengua, L. J., & McMahon, R. J. (2000). Parent involvement in school: Conceptualizing multiple dimensions and their relations with family and demographic risk factors. *Journal of School Psychology*, 38(6), 501–523. doi:10.1016/S0022-4405(00)00050-9.
- Lau, E. H., Li, H., & Rao, N. (2011). Parental involvement and children's readiness for school in China. *Educational Research*, 53(1), 95–113. doi:10.1080/00131881.2011.552243.
- MacKinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., & Sheets, V. (2002). A comparison of methods to test mediation and other intervening variable effects. *Psychological Methods*, 7, 83–104. doi:10.1037/1082-989X.7.1.83.
- Mendez, J. L., & Fogle, L. M. (2002). Parental reports of preschool children's social behavior: Relations among peer play, language competence, and problem behavior. *Journal of Psychoeducational Assessment*, 20(4), 370–385. doi:10.1177/073428290202000405.
- Murdock, T. B. (2000). Incorporating economic context into educational psychology: Methodological and conceptual challenges. *Educational Psychologist*, 35(2), 113–124. doi:10.1207/S15326985EP3502\_5.
- Muthén, L. K., & Muthén, B. O. (1998–2012). *Mplus user's guide* 7th ed. Los Angeles, CA: Muthén & Muthén.
- National Bureau of Statistics of China (2015). *Annual statistics of household income in rural and urban families*. <http://data.stats.gov.cn/easyquery.htm?cn=C01>. Accessed 27 October 2015.
- Ng, S. W. (1999). Home-school relations in Hong Kong: Separation or partnership. *School Effectiveness and School Improvement*, 10, 551–560. doi: 10.1076/sesi.10.4.551.3488.



- Parkes, A., Sweeting, H., & Wight, D. (2015). Parenting stress and parent support among mothers with high and low education. *Journal of Family Psychology*, 29(6), 907–918. doi:10.1037/fam0000129.
- Pomerantz, E. M., Kim, E. M., & Cheung, C. S. (2012). Parents' involvement in children's learning. In K. R. Harris, S. Graham, T. Urdan, S. Graham, J. M. Royer & M. Zeidner, et al. (Eds), *APA educational psychology handbook, Vol 2: Individual differences and cultural and contextual factors* (pp. 417–440). Washington, DC: American Psychological Association.
- Pomerantz, E. M., Ng, F. F., Cheung, C. S., & Qu, Y. (2014). Raising happy children who succeed in school: Lessons from China and the United States. *Child Development Perspectives*, 8(2), 71–76. doi:10.1111/cdep.12063.
- Reynolds, A. J. (1992). Comparing measures of parental involvement and their effects on academic achievement. *Early Childhood Research Quarterly*, 7(3), 441–462. doi:10.1016/0885-2006(92)90031-S.
- Satorra, A. (2000). Scaled and adjusted restricted tests in multi-sample analysis of moment structures. In R. D. H. Heijmans, D. S. G. Pollock, & A. Satorra (Eds.), *Innovations in multivariate statistical analysis* (pp. 233–247). London: Kluwer Academic Publishers.
- Seginer, R. (2006). Parents' educational involvement: A developmental ecology perspective. *Parenting: Science and Practice*, 6(1), 1–48. doi:10.1207/s15327922par0601\_1.
- Semke, C. A., Garbacz, S. A., Kwon, K., Sheridan, S. M., & Woods, K. E. (2010). Family involvement for children with disruptive behaviors: The role of parenting stress and motivational beliefs. *Journal of School Psychology*, 48(4), 293–312. doi:10.1016/j.jsp.2010.04.001.
- Shumow, L., Vandell, D. L., & Posner, J. (1999). Risk and resilience in the urban neighborhood: Predictors of academic performance among low-income elementary school children. *Merrill-Palmer Quarterly*, 45(2), 309–331.
- Solem, M., Christophersen, K., & Martinussen, M. (2011). Predicting parenting stress: Children's behavioural problems and parents' coping. *Infant and Child Development*, 20(2), 162–180. doi:10.1002/icd.681.
- Van Voorhis, F. L., Maier, M. F., Epstein, J. L., & Lloyd, C. M. (2013). *The impact of family involvement on the education of children ages 3 to 10: A focus on literacy and math achievement outcomes and social-emotional outcomes*. MDRC.
- Waanders, C., Mendez, J. L., & Downer, J. T. (2007). Parent characteristics, economic stress and neighborhood context as predictors of parent involvement in preschool children's education. *Journal of School Psychology*, 45(6), 619–636. doi:10.1016/j.jsp.2007.07.003.
- Yamamoto, Y., & Holloway, S. D. (2010). Parental expectations and children's academic performance in sociocultural context. *Educational Psychology Review*, 22(3), 189–214. doi:10.1007/s10648-010-9121-z.

## Author biographies

**Yiji Wang**, PhD, is an Assistant Professor at the School of Psychology and Cognitive Sciences at East China Normal University. She earned her PhD degree in child development from University of Texas at Austin. Before that, she also earned a MS degree in human development from University of Rochester and a EdM degree in human development and psychology from Harvard University.

**Ciping Deng**, PhD, is a Professor at the School of Psychology and Cognitive Sciences at East China University. He is the Chair of the Institute of Developmental and Educational Psychology at East China Normal University.

**Xiangdong Yang**, PhD, is a Professor at the School of Education at East China Normal University. He is the Deputy Director of the Institute of Curriculum and Instruction at East China Normal University.



## Reframing Parent Involvement: What Should Urban School Leaders Do Differently?

Terri Nicol Watson & Ira Bogotch

To cite this article: Terri Nicol Watson & Ira Bogotch (2015) Reframing Parent Involvement: What Should Urban School Leaders Do Differently?, *Leadership and Policy in Schools*, 14:3, 257-278, DOI: [10.1080/15700763.2015.1024327](https://doi.org/10.1080/15700763.2015.1024327)

To link to this article: <https://doi.org/10.1080/15700763.2015.1024327>



Published online: 12 Aug 2015.



[Submit your article to this journal](#)



Article views: 2253



[View Crossmark data](#)



Citing articles: 8 [View citing articles](#)

## **Reframing Parent Involvement: What Should Urban School Leaders Do Differently?**

TERRI NICOL WATSON

*The City College of New York, New York, New York, USA*

IRA BOGOTCH

*Florida Atlantic University, Boca Raton, Florida, USA*

*In this article we critically examine how teachers and administrators in an urban high school identify and consider the challenges to parent involvement without either engaging in or disrupting normative constructions of the term parent involvement. It is in this unintentional misconstruction of the notion of parent involvement that school leaders most often perceive Black and Hispanic parents in urban schools. Our aim is to trouble this hegemonic view and to offer alternative ways of knowing and practice in order to increase parent involvement and student achievement.*

After 60 years of initiatives sponsored by the federal government and aimed to increase equity, access, and student achievement (see Brown v. Board of Education of Topeka, Kansas, 1954; Elementary and Secondary Education Act of 1965; No Child Left Behind Act, 2001) America's public schools continue to fail our children (Orfield, 2013; Reardon, 2011). A recent examination of reform efforts in key U.S. cities, namely Washington, DC, New York City, and Chicago, revealed little if any student learning gains (Weis & Long, 2013). School closures, city-wide magnet schools, and the chartering of public schools were proven to be ineffective remedies for “complex, poverty-related problems” (p.70) that thwart the success of primarily Black,<sup>1</sup> Hispanic, and poor students. In fact, Diane Ravitch (2013) explained in detail how many of these reform efforts have served to further distance schools from parents and communities of color. Despite these lackluster results, research continues to hold out promise for urban schools—26,000 U.S. schools are so

---

Address correspondence to Terri Nicol Watson, The City College of New York, Educational Leadership, 160 Convent Avenue, School of Education, New York, NY 10031, USA. E-mail: [TWatson@ccny.cuny.edu](mailto:TWatson@ccny.cuny.edu)

classified—that (a) provide a rich curriculum, (b) use student data streams, and (c) actively engage parents in their children’s success (Bryk, Sebring, Allensworth, Luppescu, & Easton, 2010).

Historically, parent involvement was a vital component in public education (Jeynes, 2014). Its function was proven to increase student learning (Jeynes, 2005, 2007) and it is included as an essential module in teacher and administrator preparation programs (Epstein, 2011). Despite these findings, many educational leaders, from policymakers to superintendents and principals, have ignored best practices that reframe the concept of parent involvement (see Jeynes, 2012). In other words, even with widespread consensus that parent involvement is an essential tool for student success and “a key mechanism for educational change and improvement, particularly in schools that enroll a large percentage of children of color” (López, 2003, p. 72), critical research that does not align to the dominant discourse has been overlooked. Ladson-Billings (2006) detailed how such hegemonic acts have caused an “education debt” that has fueled the achievement gap. Moreover, she reminded us how these practices have not served anyone well, as they have led to the creation of a “bifurcated society that leaves more than its children behind” (p. 10).

In this article, we critically examine how teachers and administrators in an urban high school identify and consider the challenges to parent involvement without either engaging in or disrupting normative constructions of the term *parent involvement*. It is in this unintentional misconstruction of the notion of parent involvement that school leaders most often perceive Black and Hispanic parents. Our aim is to trouble this hegemonic view and to offer alternative ways of knowing and practice in order to increase parent involvement and student achievement in urban schools.

## THEORETICAL FRAMEWORK

We utilize the lens of Critical Race Theory (CRT) to undergird this study. CRT is founded in the scholarship of Derrick Bell (1980) and proposes race-based perspectives to challenge traditional modes of research and to promote social justice (Crenshaw, Gotanda, Peller, & Thomas, 1995). Gloria Ladson-Billings and William Tate (1995) formally introduced CRT to the field of public education. They provided a fundamental and primary understanding of how racial discrimination permeates and impairs the school-based experiences of children of color. CRT presupposes educational policies and practices as inequitable and unjust in regards to students of color as political, social, and historical realities posit the normalization of inequitable, unjust, and race-based practices (Crenshaw et al., 1995; Ladson-Billings & Tate, 1995).

## Community Cultural Wealth

In alignment with CRT and in an effort to remedy the deficit perspective through which many educators view non-majority populaces, Yosso (2005) adapted the tenets espoused in Oliver and Shapiro's (1995) groundbreaking text, *Black Wealth/White Wealth: A New Perspective on Racial Inequality*, to create the alternative lens of Community Cultural Wealth (CCW). Yosso constructed CCW to challenge scholars who labeled students of color as culturally deficient and found them to inherently lack the prerequisite social capital (race and class) to be successful in schools. CCW is intended to forge genuine partnerships between non-majority parents and educators. With respect to Black and Hispanic children and their families, schools will continue to fail students of color if school leaders continue to discount their cultures and lived experiences and if they do not establish genuine relationships with their parents, families, and communities. The purpose of CCW is to build these bridges and it is the lens through which we analyzed this study's empirical findings.

Yosso (2005) offered six types of cultural wealth (i.e., assets) to exemplify the human capital students of color were perceived to lack, specifically: aspirational; linguistic; familial; social; navigational, and resistant capital. Aspirational capital refers to the ability of historically marginalized people to continue to "hope and dream" in the face of their harsh realities. Linguistic capital refers to the inherent value bilingual and multilingual people possess. Familial capital encompasses the extended family ties present in many communities of color amongst people who are related not by kin but by kind. Social capital accounts for resources available to many people of color based on informal relationships. Navigational capital is the code-switching ability many non-majority people use to survive in racially tense environments. Last, resistant capital is a resource that marginalized people use to maintain their sense of worth in contexts where their very existence is compromised.

We applied CCW as tool in this study to deconstruct and reframe perceived challenges to parent involvement to untapped advantages. In the next section we focus on families of color to provide a historical account of parent involvement, an overview of the current policy context of parent-teacher relations, and consider the perspectives of urban school leaders in regards to parent involvement.

## REVIEW OF LITERATURE

### Parent Involvement and Public Education: A Brief Look Back

Beginning in 1897 with the formation of The National Congress of Mothers, which has evolved to the current parent-teacher associations, parents have sought input into their children's school lives (Schlossman, 1976). In the early nineteenth century, parents were at the helm of their local public schools.



They participated in developing curricula, the hiring and firing of teachers, and insuring that the school produced citizens capable of functioning in the context of their environment (Prentice & Houston, 1975). In the 1930s a shift occurred and public schools became insular spaces and parent involvement became more akin to parent education (Berger, 1991; Epstein, 2001; Gordon, 1977). Public schools were viewed as the primary means to assimilate immigrant families into the dominant culture (Gordon, 1977) and to inform parents of the normative ways (i.e., White middle class) to raise children (Berger, 1991). Parents were now expected to take a secondary role in their children's formal education as opposed to being in control of their learning as they had been at the turn of the twentieth century (Epstein, 2001).

The above dynamics varied by immigrant racial and ethnic groups (Perlmann, 1988). Because our focus is on families of color in relation to parent involvement, Perlmann's findings as they relate to the schooling patterns of Black children based on data from 1880, 1900, and 1925 are noteworthy. To explain, after the great migration nearly 40 percent of northern Black households were headed by single mothers. Perlmann believed these working mothers were not able to support their children's academic efforts as they were found to have "less time to concern themselves with their children's schooling than do mothers who are at home" (p. 187). Perlmann went on to note how limited labor opportunities were available to Black children, who therefore attended and remained in schools at higher rates than their White counterparts—a fact that did *not* translate into higher academic achievement. He further correlated higher levels of illiteracy and lower level occupations to the "harsh social realities" (p. 181) faced by Black children and their parents in society at large.

During the mid-twentieth century, the passage of federal legislation, namely The Elementary and Secondary Education Act of 1965 (the Act), changed the face and overall agenda of public education. As part of President Lyndon B. Johnson's War on Poverty, the Act provided additional funding for the nation's historically marginalized students. Under the premise that supplementary educational services and programs (including preschool and special education) were required by poor children and their families' schools with low-income students received federal funds to defeat what was thought to be their greatest challenge—poverty. Ironically, less than a year later *The Coleman Report* was released. The latter was a study commissioned by the U.S. Department of Education in compliance with The Civil Rights Act of 1964. James Coleman, a sociologist, found family environment (not poverty) to be a determining factor in the academic success of historically marginalized students.

A great deal of school effectiveness research emerged in reaction to Coleman's (1966) study that highlighted family variables as more significant than within school variables. But even as school effectiveness researchers sought correlations between school and familial variables (see Mosteller &

Moynihan, 1972), what never changed in the educational literature was the finding that a stable and loving home had a strong correlation to student achievement (Jeynes, 2014). It must be noted that Black and Hispanic parents have always played important roles in the educational and moral development of their children (Delpit, 1988; Villenas, 2002). Unfortunately, based on a two-year ethnographic study, Villenas (2002) found educational agencies to collide both culturally and ideologically with Spanish-speaking children and their families. Similarly, Delpit (1988) described how schools and society as a whole create a “culture of power” that excludes Black and poor students.

### The Policy Context of Teacher and Parent Relations

The role of teachers and their relationships with parents changed at the end of the twentieth century. A wall formed and parent–teacher partnerships shifted from complementary relationships to autarchic paradigms. In addition, a statistically significant increase in the divorce rate followed by a surge in working mothers further strained parent–teacher relationships (Jeynes, 2014). Teachers and school administrators became specialists as to what was best for children inside of the schoolhouse and perceived themselves as experts as opposed to collaborators with parents (Gordon, 1977).

Despite the aforementioned findings, the federal government believed that the active participation of parents in schools was crucial to student achievement. As such, while the term “*parent involvement*” was first included in the Act five years after it was authorized, prescriptive measures were found in the 1988 and 1994 reauthorizations (Johnson, 1997). For instance, in 1988 the federal mandate required districts to create parent-involvement policies; explain Title I programs (supplementary programs funded by the Act) to parents; provide parents with timely progress reports, and, if requested, schedule regular meetings with parents to insure student progress and achievement. The 1994 edition of the Act strengthened the previous reauthorization as it was now directed at school leaders. Specifically, it required leaders of schools that received Title I funding to engage parent advisors to facilitate parent involvement and to create a shared-responsibility compact with parents to mobilize parent involvement (Johnson, 1997). Unfortunately, as a result these new requirements and processes, many Black and Hispanic parents were depicted as uninvolved at best (Boutte & Johnson, 2014) and inept at worst (López, 2003).

To date, a vast amount of scholarship exists which exemplifies parent involvement as an effective means to increase student learning (LaRocque, Kleiman, & Darling, 2011). Most notably, the work of Joyce Epstein (2011) illuminates an often-cited model of parent involvement. This framework, like the majority of the research on parent involvement, continues to focus on traditional activities such as parent–teacher meetings, parent–teacher association membership, and parent participation and attendance

at school fundraisers (e.g., bake sales, book sales, school dances, and school fairs). This discourse, unfortunately, privileges school-centered practices and “positions marginalized parents as deficient and/or incapable of positively influencing the educational lives of their children” (López, 2003, p. 73). Omitted from these traditional definitions of parent involvement are what Jeynes (2012) referred to as “subtle indicators.” These realities include parents maintaining high academic expectations, open lines of communication, and structured home lives for their children. These practices are often disregarded by school leaders who have little to no awareness of these powerful yet seemingly minuscule parent-centered influences.

### Urban School Leaders and Parent Involvement

In Jackson and Remillard’s (2005) study on parent involvement, while only 3 of the 10 African-American families interviewed were able to attend school-centered functions on a regular basis, all of the parents surveyed were found to monitor their children’s progress in school. Additionally, all of the parents found ways to supplement their respective child’s learning experiences outside of the context of school. This finding debunks the perceptions by some urban school leaders who believe Black, Hispanic, and poor families do not value education (Horsford & Holmes-Sutton, 2012). In fact, many of the “subtle” (Jeynes, 2012) practices of urban parents are not readily visible to school leaders who often classify them as minimally, if at all, involved in their children’s educational lives (LaRocque et al., 2011). What these leaders fail to see is the limited roles they have constructed and defined as *parent involvement* and how this distinction often conflicts with parents’ work and child-care services (LaRocque et al., 2011). Despite these challenges, when parents perceive that their child(ren) and/or their child’s school leaders want them involved, their participation is guaranteed (Anderson & Minke, 2007).

While parent involvement was found to increase student achievement regardless of the child’s race, grade level, and socioeconomic class, poor parents of color were found to be less likely to participate in school-centered activities based on perceived social and cultural deficits (Mapp, 2004; Mitchell, 2008). Interestingly, urban school leaders were found to lack knowledge and respect of the ethnicities and cultures of the children charged to their care (McDermott & Rothenberg, 2000). This leaves us, as researchers, to question who truly possesses the deficit. In sum, the underlying finding from critical researchers on parent involvement is that teachers alone cannot close the achievement gap (Delpit, 1988; Ladson-Billings, 2006; LaRocque et al., 2011). This perspective counters the deficit assessment many school leaders use to denigrate parents of color (Ladson-Billings, 2006) and the framework they operate within (Delpit, 1988). Unfortunately, it is within the dominant perspective that many Black and Hispanic children and their parents currently find themselves pigeonholed in urban schools.

## METHODOLOGY

Kincheloe and McLaren (2002) explained that one of the fundamental components of critical research was to identify and explain the role of the researcher. This facet underpins the ways she or he makes sense of a phenomenon. As critical researchers committed to social justice, we wanted to counteract the perspectives of parent involvement gathered during our ongoing study of school leadership (Day, 2010) at King's Academy<sup>2</sup>. More importantly, we wanted to challenge the deficit thinking found in many of our schools and communities that hinders the educational outcomes of our most vulnerable populace, poor children of color (Darling-Hammond, 2006). To accomplish this task we employed the notion of a dialogue with empirical evidence (see Mirón, Bogotch, & Biesta, 2001) originally developed by Michael Smith (1983). We do so to challenge the fixed and socially constructed "realities" created by dominant discourses. Thus, our dialogue with evidence includes the following:

Empirical data as starting points for actively and continuously "beginning again" (Foucault, 1992) rather than a search for externally derived criteria, (b) equitable intersubjectivities rather than subject–other binary relationships, and (c) a normative (political) commitment to actively challenge dominant and privileged voices rather than providing a purely descriptive social analysis. (Mirón et. al., pp.7–8)

After listening to the school's leaders, we concluded that their perceptions were neither empirical answers nor solutions. They were merely reflections of abiding mental models passed on uncritically from a successive stream of teachers and administrators. Accordingly, we reframed their identified challenges as spaces for beginning a new and different dialogue in an effort to increase parent involvement and student success.

Our objective was to reconstruct an alternative interpretation of the material facts, if not also the harsh realities of parents (e.g., immigrants working multiple jobs who speak English as a second or third language). We accepted the empirical statements of the school's leaders without drawing moral judgments so that we could revisit them as starting points for dialogues with new meanings and possibilities. The descriptive data are neither empowering nor interactive, and more than likely renders parents "invisible" (Laing, 1967, p. 19).

## King's Academy

The high school was named in honor of the iconic civil rights leader and occupies most of a city block in a historic section of town. It opened its doors in 1979 and, like its surrounding community, was once predominately

**TABLE 1** Demographic Characteristics of the Students at King’s Academy.

|                                              |       |
|----------------------------------------------|-------|
| American Indian or Alaskan Native            | 2     |
| Asian or Pacific Islander                    | 62    |
| Black                                        | 420   |
| Hispanic                                     | 808   |
| Multiracial                                  | 2     |
| Native Hawaiian or Other Pacific Islander    | 2     |
| Other                                        | 12    |
| White                                        | 15    |
| Students on register                         | 1,324 |
| Students eligible for free/reduced lunch     | 1,002 |
| Students in assisted housing                 | 710   |
| Students with individualized education plans | 3.4%  |
| English-language learners                    | 8.4%  |
| Overage students                             | 3.8%  |

**TABLE 2** Demographic Characteristics of the Participants in Study (*N* = 8).

|                  |                                                |
|------------------|------------------------------------------------|
| Gender           | 5 females, 3 males                             |
| Primary language | 6 English, 1 Spanish, 1 Arabic                 |
| Race/ethnicity   | 3 White, 1 Black, 3 Hispanic, 1 Middle Eastern |

Black. To date, like many urban neighborhoods (and some schools) in the northeast, King’s Academy has shifted demographically to an overwhelmingly Hispanic populace. This trend is evident in the school’s demographics (see [Table 1](#)). While 93% of the student body is either Hispanic or Black (respectively) there is a small but growing White populace—perhaps as a result of gentrification. Moreover, of the 1,324 students, 1 out of 8 is classified as an English-language learner. It must be noted that while a majority of the students at King’s Academy were born in the U.S., many of them do not speak English as their first language. [Table 1](#) details the demographic characteristics of the school’s student body; [Table 2](#) features the study’s participants.

Data Analysis

Data were collected by several means. A semi-structured questionnaire (Drever, 1985) was adapted from the International Successful School Principals’ Project (Day, 2010). Each interview lasted between one and two hours. All interviews were recorded and professionally transcribed. Along with interview data, descriptive field notes (Bogdan & Bilken, 1982) were also included as part of the qualitative data for this study. The notes were gathered at monthly meetings held by the school leadership team and the parent teacher organization. These meetings lasted between two and three hours and were held after school in the principal’s conference room and in the school’s auditorium, respectively. In addition, quantitative data were

obtained from the U.S. Census Bureau to contextualize this study's qualitative findings within larger social conditions experienced by students and their families.

Based on our independent reading of the transcripts and subsequent conversations, four descriptive themes, which were previously confirmed in the literature on parent involvement, emerged. These themes serve to outline our findings and characterize the "challenges" school leaders identified as impediments to parent involvement. In the following section, we provide an explication of the confirmed themes.

### Confirming Themes

All of the participants in this study identified the following themes: (1) culture and language; (2) poverty; (3) overemployment, and (4) access and literacy with respect to technology as "challenges" to parent involvement. Because these themes are already well-grounded in the literature on parent involvement, our emphasis will be on the reconstruction of these themes.

#### CULTURE AND LANGUAGE

Culture may be defined as a way of life. Language may be deemed an attribute that is heavily influenced by one's cultural context and is often based on locale. As mentioned, King's Academy has a primarily Hispanic populace. These students speak Spanish as their native language and represent the many territories that are Latin America. Also, many of the students who are identified as Black for federal reporting purposes (see the No Child Left Behind Act of 2001) are oftentimes of African or Haitian descent. More often than not the parents of these students were born in either Africa or Haiti and if they speak English, it is probably their second or third language. Due to the diversity of the student body and the multitude of languages and dialects spoken at home, all of the school leaders interviewed for this study cited the parent's native culture and tongue as "challenges" to parent involvement.

Further, when asked the question, "What kinds of resources would it take for your students to be successful?" One leader replied, "Having parents learn English. I think they need some classes for parents to learn how to communicate with the teachers and staff." Also, many of the school leaders interviewed assumed that foreign-born parents had little knowledge of the U.S. educational system and of U.S. cultural norms. As a remedy, one leader stated that parents should be mandated to attend workshops that would inform them of the resources available to them at the school, district, and state levels. She suggested an "education" of sorts for these parents and offered the following rationale:



It's a cultural thing that they need to be made aware of what's going on here. Why did they come to this country? If you want opportunities here are the opportunities and why they're important. I think there should be a lot of that kind of education for parents.

On the other hand, a few of the school's leaders were sympathetic to parents who struggled in the U.S. school system. One leader described her role as a "resource" for Spanish-speaking parents and families. In this capacity she explained how she often calls students' homes, relaying messages in Spanish on behalf of the respective child's teachers.

#### POVERTY

Of the student body at King's Academy, 75.7% qualify for free lunch. Students who qualify for free lunch barely exist at or below the Federal Poverty Level (FPL).<sup>3</sup> Based on the most recent data obtained from the U.S. Census Bureau, city-wide, nearly 300,000 people (including 124,000 children) were found to live in extremely impoverished neighborhoods. These communities are defined as localities where more than 40% of people live below the FPL. In this context, King's Academy is an extremely impoverished neighborhood based on its student data.

As such, almost all of the school leaders interviewed for this study noted dismal financial resources as a major deterrent to parent involvement. One detailed her students' limited monetary means and explained how many families are struggling to make ends meet. Another relayed an incident that occurred last year wherein the principal paid the senior dues for a student whose parents were unable to do so. Still another school leader spoke of the survival mode many parents find themselves in which impedes their ability to advocate on behalf of their children in comparison to their suburban counterparts. To explain the last statement, the following rationale was given:

In a big city, families don't know enough about the school system and how it runs and how much their voice can impact education. They lose their voice because they're not proactive. If we were in the suburbs somewhere in upstate [name of state] this would be a whole different scenario because the parents would be lobbying and asking for extra funding. Many times the parent association might have a team of parents that are already professionals that are taking some of their personal time to maybe write a grant for the school and help us out in one way or another instead of us organizing the uniforms and money for the uniforms. They become a more active voice. Whereas, in a big city like ours, sometimes parents are just struggling to survive and working and they're so exhausted and so overwhelmed with so many things.

## OVEREMPLOYMENT

A majority of the student body at King's Academy receive some form of federal assistance and more than half reside in government-subsidized housing. Despite this reality, all of the school leaders included in this study mentioned the fact that parents worked multiple jobs at varying shifts, making parent involvement nearly impossible. One noted many of the extra roles (i.e., "challenges") she and her colleagues had to assume that would normally be the work of engaged parents. She explained:

Many of the administrators in the building along with teachers do a lot of the work that in other schools parents can take on. Last year, we had several meetings where Ms. XXX was ordering the food and providing all the stuff. Even with the dance with last year, I basically took care of the catering and the press services. We're doing all of that stuff for them. Where normally, the parent association would come in and order that stuff.

Another school leader noted how the school serves a diverse, hard-working populace, which often hampers student success. He found parents, because of their work schedules, to undermine their children's academic achievement by requiring them to perform tasks (i.e., babysitting and cooking the family's meals) that should be done by the respective parent. He exemplified this perspective in the following statement:

We have a lot of hard-working parents, a lot of parents that work several jobs; it's very difficult for them to sometimes be very proactive in their child's life. They put a lot of responsibility on their children. We have a lot of kids that have to grow up fast. Yeah, sometimes they're very successful and mature very quickly and sometimes they don't know how to handle it and they struggle. The struggle is sometimes very apparent.

## TECHNOLOGY—LITERACY AND ACCESS

In the fall, 2013, King's Academy adopted an online database. This system gives parents access to their child's school records in real time. Through this medium parents can also contact their child's teachers, guidance counselors, and other school officials. School leaders viewed this tool in distinct ways. Some thought this system was a great resource for parents. In contrast, many believed it would further delimit parent involvement as parents would no longer have to meet with teachers and administrators to inquire about their child's performance or lack thereof. One leader felt that this resource was useless for scores of parents as many of them either do not have access to a computer or are illiterate in regard to technology.

In light of the new database and in response to the question, “What kind of support do you think they [parents] need to be successful?” One administrator stated:

I think they need to be more involved, like for instance this Skedula stuff, this technology. We’re trying to create a way to create transparency for the parents and what their kids are doing so they can see the lateness, the absences, and all of these things. But if they don’t sign on and then they wait until we call them. They are like, “Why didn’t you tell me before?” The parents have to take responsibility for that; they have to take ownership of those things. We’re not their babysitter, we’re trying to teach them and they’re acting this way. You have to be part of that discussion and some of them are not. Some parents outright lie and say they don’t speak English. They just don’t want to be involved.

Clearly, the school leaders’ perceptions of parent involvement in regard to technology (literacy and access) are varied. But as with all of the descriptive themes, parents are perceived as having deficits rather than capital. The objective of the next section, our discussion, is two-fold. First, we share critical perspectives to trouble the prevailing definition of *parent involvement*. Second, we apply the lens of CCW (Yosso, 2005) to the abovementioned themes to help readers and school leaders reframe perceived challenges to parent involvement. In all, our aim is to re-create, through dialogues, a different paradigm of parent involvement and to encourage school–community relationships.

## DISCUSSION

As mentioned previously, one of the most widespread models of parent–teacher relationships is based on Epstein’s work (2011). This exemplar affords multiple facets of school, family, and community partnerships known as “spheres of influence.” Epstein’s framework for parent involvement was adopted by the nation’s largest parent–teacher organization (National Parent Teacher Association) and it is widely accepted in the academy and school-houses nationwide (see the Center on School, Family, and Community Partnerships’ website).

### Critical Perspectives

Urban realities present different considerations for both researchers and school leaders outside of normative paradigms of parent involvement. For instance, one critique of Epstein’s model noted how her theoretical lens lacks depth. Specifically, Price-Mitchell (2009) found the paradigm to fall short

as it “does not consider the multidimensional or tacit aspects of learning between parents, educators, students and community” (p. 13). Critical scholars such as Price-Mitchell (2009) and Jeynes (2012) question the imbalanced positionality of Epstein’ framework of parent involvement among schools, families, and students who exist outside the dominant societal culture and norms.

The notion of what makes a “good” parent—checking homework, attending school-sponsored events, and putting children to bed in a timely manner—are actions school leaders perceive as supportive of student success. When parents are seen “failing” at these tasks, they are not only viewed as unsupportive by teachers and administrators, but are also seen as not providing loving and nurturing home environments. In effect, blaming the parent for their perceived lack of involvement situates school leaders as the only “caring” adults in a child’s life. School leaders, in this respect, view themselves as benevolent and compassionate caregivers who attempt to involve parents in their children’s school lives only to be met by uncaring adults who aren’t supportive of the overall educational agenda (Jackson & Remillard, 2005; Villenas, 2002). However, there is a dangerous and unexamined slippage between not getting a response from a parent and a parent not loving their child (de Carvahlo, 2001). This “slippage” certainly needs to be critically examined and unpacked, as it reproduces problematic stereotypes in terms of who is being “disadvantaged” (López & Vazquez, 2006).

Boutte and Johnson (2014) call on school leaders to re-envision “the involvement of parents, families, and communities from the current dominant deficit narrative to one of collaboration, promise and hope” (p. 167). In practical terms, it means that parent–school relationships should begin with teachers and administrators consulting parents. It is inclusive of the “subtle” yet meaningful impact of parents on student success (Jeynes, 2012) and challenges the notion that the terms “urban” and “deficit” are synonymous (Delpit, 1988; Ladson-Billings, 2006). The key for these researchers is for school leaders to identify parents’ strengths before enacting school-centered programs and activities. In doing so, school leaders are no longer positioned a priori as experts and having the correct concept of *parent involvement*.

Similarly, Griffiths (2013) found school leaders to be mistaken if they believe that they can determine a parent’s interest in their child’s education based on the normative ideals found in schools and classrooms. He wrote,

We cannot evaluate a parent’s commitment to the school or determine how he or she values education based on how many times the agendas we send home are signed, how many phone calls are returned, how often the parent/guardian attends school meetings, events, or interviews. (p. 81)

Again, based on this critical reading of the literature, it is up to school leaders to initiate communication in an inclusive and respectful manner in order to *learn* rather than *tell* how to best foster and increase parent involvement. Ironically, it is the teachers and administrators who are at a disadvantage—not the parents.

### Community Cultural Wealth

CCW is an aspect of critical race theory in that it challenges dominant paradigms and hegemonic practices. It is intended to celebrate the inherent capital within communities of color that often go unnoticed in schools and classrooms. While the focus of this study is on the “subtle” advantages of Black and Hispanic parents, families, and communities, we are not romanticizing the material disadvantages of living in poverty, lacking technological skills, or working full-time at jobs that do not pay living wages. CCW tenets rightly recognize aspirational, linguistic, familial, social, navigational, and resistant capital. This approach aims to help school leaders reframe their mindsets and practices and to encourage student success (Yosso, 2005).

### ASPIRATIONAL CAPITAL

For many disregarded populaces, education is the only viable means to long-term stability and economic prosperity. As such, schools are vehicles that can raise the collective aspirations of students and parents to foster social, economic, and political change. However, when the school and home-community are separated, the role of the school leader falls far short of representing and/or replacing parents. Accordingly, while our findings revealed teachers and administrators oftentimes stand in for parents at school-sanctioned events, these actions promote a school-centered agenda and serve to further disconnect the school from the home-community.

Another aspect of aspirational capital emerges from the fact that many of the teachers and administrators at King’s Academy are themselves of color. Therefore, we hope that they share their personal stories and life lessons with the children charged to their care. This will provide a roadmap of sorts for students who may be in similar predicaments. This will also create meaningful relationships that are at the core of all successful learning communities. But even when school leaders are reluctant to share their stories, they could reframe parents’ stories of hard work and sacrifice. Meaning, when teachers and administrators are faced with the fact that a parent works more than one job in order to provide sustenance for the family, the storyline ought to read that hard work, personal responsibility, and love are central to the lives of their students. Undoubtedly, school leaders, too, work

hard. However, the reality of “overemployment” as a component of parent involvement was absent in the findings. Instead, teachers and administrators highlighted the parents’ lack of attendance at school-centered events and faulted their poor knowledge of the English language and of U.S. culture and customs.

#### LINGUISTIC CAPITAL

Many students at King’s Academy were noted to be “first generation.” To explain, while the students were probably born in the U.S., their parents were born abroad. And, if their parents do speak English, it is as a second or sometimes third language. As such, all of the school leaders interviewed for this study perceived the parent’s native tongue as a deficit and problematic to parent involvement. They failed to consider their students’ knowledge of a second (or third) language as an asset to their academic identities, sense of self-worth, or even for their future possibilities of success in a globalized economy. Therefore, it is logical to disagree with the narrow perceptions of today’s U.S. public school educators, as they reflect a worldview very different from most observers’ (e.g., Thomas Friedman). Moreover, language is an important part of one’s culture and affords an insider perspective as well as a sense of community. Individuals possessing linguistic capital in multiple cultures will be at a great advantage over monolingual and monocultural individuals. This form of capital is crucial to disenfranchised people who are often excluded from the dominant discourse and traditional pathways to success *today*, but who possess cultural understandings needed for *tomorrow*. Furthermore, critical scholars have found that students who serve as “cultural brokers” for their parents and community are empowered in that they are able to transcend cultures and communities (Delgado-Gaitan, 2001; Rodriguez & Shefelbine, 2010).

On many school faculties there are often bridge communicators who speak and write in non-majority tongues. Usually there are just one or two per school–community. This is not realistic in a large urban high school where multiple languages and dialects are spoken. Therefore, teachers and administrators who work in such communities need to make language acquisition part of their professional development—or else their “disadvantage” serves to disadvantage students and parents too. School systems, consequently, need to (1) upgrade the language skills of its school leaders, (2) consider hiring community-based staff to act as “cultural brokers,” and (3) follow the lead of multinational corporations and other international agencies that recognize the need for language development, making it a requirement for administrators, teachers, and staff.

### FAMILIAL CAPITAL

Among the “subtle” measures of parent involvement identified in critical literature are the love and warmth inside the home (Boutte & Johnson, 2014; Jeynes, 2012) and the moral teachings at home and in places of worship (Villenas, 2002). These attributes are very different when compared to school-centered norms that classify parental involvement as signing report cards and returning teachers’ telephone calls. In this light, school leaders should begin to appreciate parents for what they are doing for their children and invite students to celebrate their culture and customs. This affirms one’s identity and notions of care and love. Further, these acts create ties, not of kin but of community, which is an essential aspect of learning.

### SOCIAL CAPITAL

In many urban environments, access to health and human services are limited. Families have themselves and extended family members and friends to rely upon. However, if these individuals lack education and job security, then those resources are also limited. Thus, responsibility for building social capital must be shared amongst students, families, community members, and school leaders. Moreover, in many instances, teachers and administrators live outside of their surrounding school community. Hence, maximizing social capital requires school leaders to become cognizant of local community agencies, churches, and non-profit organizations that may provide students and families with direct support.

### NAVIGATIONAL CAPITAL

The more adept a person is at code-switching (the ability to move between two or more languages and cultures) the wider she/he can travel across racial and ethnic groups and social classes. While some of this knowledge may be referred to as “street smarts” or “uncommon sense,” it behooves school leaders to (1) teach code-switching, (2) help students to appreciate diverse contexts, and (3) encourage culturally responsive and relevant curricula to equip students to travel amongst different worlds.

### RESISTANT CAPITAL

While the interviews did not provide empirical evidence of resistant capital, the very fact that most of the students at King’s Academy come to school regularly demonstrates that parents are doing whatever it takes to get their sons and daughters to school. There are many obstacles in life on the streets and life within schools that require students to resist, when it is



necessary, to maintain self-esteem. Resistance, in the context of schools, is often misinterpreted as acting out and an unwillingness to follow directions. To avoid such instances school leaders should forge meaningful relationships with students and their parents wherein they deconstruct normative constructs in order to understand why, in some instances, resistance is the most logical and efficacious option for students.

## CONCLUDING THOUGHTS AND RECOMMENDATIONS

Critical leadership researchers must look beyond data for spaces to create new narratives in order to trouble normative perceptions, attitudes, and behaviors that hinder student success. To this end, we wrote about parents who do not participate in school-centered activities, parents who speak English as their second or third language, and parents who sometimes work unusual hours, often at more than one job, to sustain their families. Urban school leaders have categorized all the above characteristics as disadvantages and many of these conditions *are* empirically disadvantages. However, many such characteristics are also hidden strengths that require teachers and administrators to reframe their concept of parent involvement.

Table 3 proffers alternative ways of knowing and practice and responds to the question asked in the title of this article—Reframing Parent Involvement: What Should Urban School Leaders Do Differently? To do so we juxtaposed themes noted first in the literature and in our conversations with many of the school leaders at Kings Academy alongside tenets Yosso (2005) suggested to counter the deficit lens through which many educators were found to view non-majority populaces. The matrix is not a prescription, but rather a framework for dialogue and best practices in order for school leaders to increase parent involvement and to encourage student achievement in urban schools.

The school leaders at King's Academy would be open to this study's recommendations based on how they have expressed their own concerns regarding student success. We recognize, however, that systemic changes in public education require policies above the school level and that one school's programmatic approach cannot meet the diverse needs of the multiple cultures across a school community. The vulnerabilities of students, teachers, parents, and administrators create possibilities for shared efforts, advocacy, and activism, which are missing in current reform efforts. Teachers and administrators work very hard. Indeed, parents too work very hard. And when the shared meanings of hard work become evident, shared values are created that illustrate how school leaders and parents can work collectively to encourage student success and reframe parent involvement.

**TABLE 3** Reframing Parent Involvement: What Should Urban School Leaders Do Differently?

| Capital      | Culture and Language                                                                  | Poverty                                                                     | Overemployment                                                      | Technology—Literacy and Access                                               |
|--------------|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------|------------------------------------------------------------------------------|
| Aspirational | Encourage, celebrate, and respect diversity                                           | Create green spaces and gardens in the school and surrounding community     | Encourage community meals and job-sharing                           | Host technology workshops on the weekends                                    |
| Linguistic   | Offer professional development in cultural relevant pedagogy                          | Promote small businesses and garage sales                                   | Encourage code switching                                            | Create on-line curriculum guides in non-English languages                    |
| Familial     | Build and extend community resources (i.e., food banks and farmers markets)           | Extend community resources through apprenticeship programs                  | Host job fairs and job training opportunities                       | Foster on-line opportunities between colleges and the school community       |
| Social       | Encourage parents and students to serve as tutors and interns in the school–community | Provide a medium to advertise employment opportunities and community events | Hold school-based functions on the weekends and in community spaces | Encourage parents to serve as mentors for other parents                      |
| Navigational | Encourage students to volunteer in community-based organizations                      | Direct parents and families to social service agencies and programs         | Provide interviewing and skill building workshops                   | Partner with community based organizations to introduce and teach technology |
| Resistance   | Host advocacy workshops and well-being seminars                                       | Encourage visits to museums, libraries, and cultural events                 | Host college fairs for students and parents                         | Host technology workshops in multiple languages in community spaces          |

## NOTES

1. The terms “Black” and “African American” are used interchangeably and refer to those of African ancestry and roots in the United States.
2. Pseudonyms have been used to protect the identity of the school and its employees.
3. The FPL as defined by the U.S. Census Bureau in 2010 for a family of four was \$22,314.

## REFERENCES

- Anderson, K. J., & Minke, K. M. (2007). Parent involvement in education: Toward an understanding of parents’ decision making. *Journal of Educational Research, 100*, 311–323.
- Bell, D. A. (1980). Brown v. Board of Education and the interest-convergence dilemma. *Harvard Law Review, 33*, 1–34.
- Berger, E. H. (1991). Parent involvement: Yesterday and today. *The Elementary School Journal, 91*(3), 209–219.
- Bogdan, R. C., & Biklen, S. K. (1992). *Qualitative research for education: An introduction to theory and methods* (2nd ed.). Boston, MA: Allyn and Bacon.
- Boutte, G. S., & Johnson, G. L., Jr. (2014). Community and family involvement in urban schools. In H. R. Milner, IV, & K. Lomotey (Eds.). *Handbook of urban education* (chapter 9, pp. 167–187. New York, NY: Routledge.
- Brown v. Board of Education of Topeka, Shawnee County, Kansas.* 347 U. S. 483, 74 S. Ct. 686 (1954).
- Bryk, A. S., Sebring, P. B., Allensworth, E., Luppescu, S., & Easton, J. Q. (2010). *Organizing schools for improvement: Lessons from Chicago*. Consortium on Chicago School Research at the University of Chicago Urban Education Institute. Chicago, IL: University of Chicago Press.
- Coleman, J. S. (1966). *Equality of Educational Opportunity* (Coleman) Study (EEOS) ICPSR06389-v3. Ann Arbor, MI: Inter-University Consortium for Political and Social Research [distributor], April 27, 2007. doi:[10.3886/ICPSR06389.v3](https://doi.org/10.3886/ICPSR06389.v3)
- Crenshaw, K. W., Gotanda, N., Peller, G., & Thomas, K. (Eds.). (1995). *Critical race theory: The key writings that formed the movement*. New York, NY: The New Press.
- Darling-Hammond, L. (2006). No Child Left Behind and high school reform. *Harvard Education Review, 76*(4), 642–647.
- Day, C. (2010). *Conducting research on successful school principals: Associate member’s guide*. Nottingham, UK: University of Nottingham.
- De Carvalho, M. E. P. (2001). *Rethinking family–school relations: A critique of parent involvement in schooling*. Mahwah, NJ: Erlbaum.
- Delgado-Gaitan, C. (2001). *The power of community: Mobilizing for family and schooling*. Boulder, CO: Rowman & Littlefield.
- Delpit, L. (1988). The silenced dialogue: Power and pedagogy in educating other people’s children. *Harvard Educational Review, 58*(3), 280–299.
- Drever, E. (1995). *Using semi-structured interviews in small-scale research. A teacher’s guide*. Edinburgh, UK: Scottish Council for Research in Education.
- Elementary and Secondary Education Act, 20 U.S.C. §§ 6301–8962 (1965).

- Epstein, J. L. (2011). *School, family, and community partnerships: Preparing educators and improving schools* (2nd ed.). Boulder, CO: Westview Press.
- Foucault, M. (1992). What is enlightenment? In P. Waugh (Ed.), *Postmodernism: A reader* (pp. 96–107). London, UK: Edward Arnold.
- Gordon, I. R. (1977). Parent education and parent involvement: Retrospect and prospect. *Childhood Education*, 54, 71–79.
- Greer, C. (1972). *The great school legend: A revisionist interpretation of American public education*. New York, NY: Basic Books.
- Griffiths, D. (2013). *Principals of inclusion: Practical strategies to grow inclusion in urban schools*. Burlington, Canada: Word & Deed Publishing.
- Horsford, S. D., & Holmes-Sutton, T. (2012, August). *Parent and family engagement: The missing piece in urban education reform*. The Lincy Institute Policy Brief Education Series no. 2. Las Vegas: University of Nevada, Las Vegas.
- Jackson, K., & Remillard, J. T. (2005). Rethinking parent involvement: African American mothers construct their roles in the mathematics education of their children. *The School Community Journal*, 15(1), 51–73.
- Jeynes, W. H. (2005). A meta-analysis of the relation of parental involvement to urban elementary school student academic achievement. *Urban Education*, 40(3), 237–269.
- Jeynes, W. H. (2007). The relationship between parental involvement and urban secondary school student academic achievement: A meta-analysis. *Urban Education*, 42(1), 82–110.
- Jeynes, W. H. (2012). A meta-analysis of the efficacy of different types of parental involvement programs for urban students. *Urban Education*, 47(4), 706–742.
- Jeynes, W. H. (2014). Parent involvement for urban students and youth of color. In H. R. Milner, IV, & K. Lomotey (Eds.), *Handbook of urban education* (pp. 149–166). New York, NY: Routledge.
- Johnson, D. (1997). Putting the cart before the horse: Parent involvement in the Improving America's Schools Act, 85 Cal. L. Rev. 1757.
- Kincheloe, J. L., & McLaren, P. (2002). Rethinking critical theory and qualitative research. In Y. Zou & E. T. Trueba (Eds.), *Ethnography and schools: Qualitative approaches to the study of education* (pp. 87–138). Lanham, MD: Rowman & Littlefield.
- Ladson-Billings, G. (2006). From the achievement gap to the education debt: Understanding achievement. *Educational Researcher*, 35(7), 3–12.
- Ladson-Billings, G., & Tate, W. (1995). Toward a critical race theory in education. *Teachers College Record*, 97(1), 47–68.
- Laing, R. D. (1967). *The politics of experience*. New York, NY: Pantheon Books.
- LaRocque, M., Kleiman, I., & Darling, S. M., (2011). Parental involvement: The missing link in student achievement. *Preventing School Failure*, 55(3), 115–122.
- López, G. R. (2003). Racialized performance. In G. R. Lopez & L. Parker (Eds.), *Interrogating racism in qualitative research methodology* (pp. 71–95). New York, NY: Peter Lang.
- López, G. R., & Vazquez, V. A. (2006) Parental involvement in Latino/Latina-impacted schools in the Midwest: Recognizing the role and function of home-based knowledge and practices. *Journal of School Public Relations*, 27, 365–396.

- Mapp, K. (2004). Family engagement. In F. P. Schargel & J. Smink (Eds.), *Helping students graduate: A strategic approach to dropout prevention* (pp. 99–113). Larchmont, NY: Eye on Education.
- McDermott, P., & Rothenberg, J. (2000, October). Why urban parents resist involvement in their children's elementary education. *The Qualitative Report*, 5(3/4). Retrieved from <http://www.nova.edu/ssss/QR/QR5-3/mcdermott.html>
- Mirón, L. F., Bogotch, I., & Biesta, G. J. J. (2001). In pursuit of the good life. *Cultural Studies Critical Methodologies*, 1(4), 490–516.
- Mitchell, C. (2008, May). Parent involvement in public education: A literature review. Research for Action. Retrieved from <http://www.researchforaction.org/>
- Mosteller, F., & Moynihan, D. P. (1972). *On equality of educational opportunity*. New York, NY: Random House.
- No Child Left Behind Act of 2001. (2002). Vol. Public Law Print of PL 107–110.
- Oliver, M. L., & Shapiro, T. M. (2006). *Black wealth, White wealth: A new perspective on racial inequality*. New York, NY: Routledge.
- Orfield, G. (2013). A new civil rights agenda for American education [Lecture notes]. Retrieved from <http://www.aera.net/EventsMeetings/AnnualBrownLectureinEducationResearch>
- Parker, L., & Lynn, M. (2002). What's race got to do with it? Critical race theory's conflicts with and connections to qualitative research methodology and epistemology. *Qualitative Inquiry*, 8(1), 7–22.
- Perlmann, J. (1988). *Ethnic differences: Schooling and social structure among the Irish, Italians, Jews, and Blacks in an American city, 1880–1935*. Cambridge, UK: Cambridge University Press
- Prentice, A. R., & Houston, S. E. (Eds.). (1975). *Family, school, and society*. Toronto, Canada: Oxford University Press.
- Price-Mitchell, M. (2009). Boundary dynamics: Implications for building parent-school partnerships. *The School Community Journal*, 19(2), 9–26.
- Ravitch, D. (2013). *Reign of error: The hoax of the privatization movement and the danger to America's public schools*. New York, NY: Alfred A. Knopf.
- Reardon, S. F. (2011). The widening academic achievement gap between the rich and the poor: New evidence and possible explanations. In R. Murnane & G. Duncan (Eds.), *Whither opportunity? Rising inequality and the uncertain life chances of low-income children* (pp. 91–116). New York, NY: Russell Sage Foundation Press.
- Rodriguez, J. A., & Shefelbine, J. R. (2010). Border students as culture brokers: District leadership supporting a value-added language program. *Border-lines: Journal of the Latino Research Center*, 4, 139–148.
- Schlossman, S. L. (1976) Before home start: Notes toward a history of parent education in America, 1897–1929. *Harvard Educational Review*, 46, 436–467.
- Smith, M. P. (1983). Introduction: Structuralist urban theory and the dialectics of power. *Comparative Urban Research*, 4(2), 5–12.
- United States Census Bureau. (2010). *State & county quickfacts*. Retrieved from <http://quickfacts.census.gov/qfd/#>
- Villenas, S. A. (2002). Reinventing education in new Latino communities: Pedagogies of change and continuity in North Carolina. In S. Wortham, E., Morillo, Jr., & E.

- Hamann (Eds.), *Education in the new Latino Diaspora: Policy and the politics of identity* (pp. 17–35). Westport, CT: Ablex Publishing.
- Weiss, E., & Long, D. (2013). Market-oriented education reformers' rhetoric trumps reality: The impacts of test-based teacher evaluations, school closures, and increased charter school access on student outcomes in Chicago, New York City, and Washington, D.C. Retrieved from <http://www.epi.org/files/2013/bba-rhetoric-trumps-reality.pdf>
- Yosso, T. (2005). Whose culture has capital? A critical race theory discussion of community cultural wealth. *Race Ethnicity and Education*, 8(1) 69–91.

# The Effects of Teacher Home Visits on Student Behavior, Student Academic Achievement, and Parent Involvement

*Kim B. Wright, Samantha M. Shields, Katie Black,  
and Hersh C. Waxman*

## Abstract

This study's purpose was to determine if a teacher home visit program implemented by a Texas-based charter school system resulted in differences in K–12 students' classroom behavior, academic achievement, and parent involvement in school. Study findings indicate positive behavioral, academic, and parent involvement outcomes for students who received a home visit ( $n = 3,681$ ), compared to a similar group of students who did not receive a home visit ( $n = 3,681$ ). One-way MANOVAs revealed statistically significant differences between the two groups. Follow-up independent samples  $t$ -tests showed that the teacher home visit group had statistically significantly higher levels of academic achievement in mathematics and English/language arts courses, higher levels of positive classroom behavior, and higher levels of parent involvement.

Key Words: teacher home visits, student academic achievement, student behavior, student attitude, student motivation, parent involvement

## Introduction

The benefits of parent involvement in a child's education at all levels are well-documented (Castro et al., 2015; Jeynes, 2012; Sheldon & Jung, 2015; Shumow & Schmidt, 2014). Teacher home visit programs are used by many



school systems as a way to build relationships with parents to increase in-school parent involvement and, in turn, increase student achievement. Current research findings support the continued use of teacher home visit programs as a tool to encourage students' academic success and parent involvement in the classroom, with many studies also noting teacher home visit programs' improvement of students' classroom behavior (Lin & Bates, 2010; Meyer & Mann, 2006; Meyer, Mann, & Becker, 2011; Simington, 2003; Stetson, Stetson, Sinclair, & Nix, 2012). Many research studies have reported benefits for both students and parents when teacher home visit programs have been implemented, but fewer studies have specifically examined the impact that teacher home visit programs have on students' classroom behavior, academic achievement, and parent involvement. In addition, much of the current research on teacher home visit programs has been qualitative, utilizing small sample sizes or focusing primarily on teachers' perceptions gathered through interviews and surveys. The following sections summarize some of the existing research on the effects of teacher home visits on (a) students' achievement, (b) student behavior, and (c) parent involvement.

### **Student Achievement**

Studies have shown a positive relationship between teacher home visit programs and students' academic achievement. Teachers, students, and parents perceived teacher home visit programs as a key factor for student academic success in the classroom (Meyer & Mann, 2006; Simington, 2003). In a study involving 26 elementary teachers, 73% of the teachers surveyed felt their students were better prepared for class after the utilization of teacher home visits. Teachers surveyed attributed increased student success, in part, to a home visit conducted by their classroom teacher (Meyer & Mann, 2006). Furthermore, Stetson et al. (2012) found that 78% of the teachers surveyed for their study said that teacher home visits had an extremely positive effect on students' work. A 2015 study of the St. Louis program Home Works! found that home visits also have an effect on student state standardized test scores, with students who received one home visit scoring 5% higher and students who received two home visits scoring 7% higher than students not receiving a home visit (Sheldon & Jung, 2015). Across these studies, the majority of teachers, students, and parents studied agreed that teacher home visit programs contributed to students' academic success (Meyer & Mann, 2006; Stetson et al., 2012).

### **Student Behavior**

With the implementation of teacher home visit programs, schools are choosing to invest time and resources into their students and their students' families,

which in turn positively impacts students' behavior in the classroom. Flannery (2014) explained the unique perspective home visits provide for a classroom teacher. By visiting a student's home, teachers develop a stronger understanding of the factors contributing to a student's behavior in the classroom, as well as overall school performance. This appreciation of a student's background and influences on behavior allows a teacher to modify his or her approach to working with the student, thus allowing for a more meaningful relationship between teacher and student. Not only does this increased understanding of a student impact the teacher's view of the student, but it has been shown to have a positive impact on the student's classroom behavior as well. Stetson et al. (2012) found that 75% of the teachers studied linked home visits to improved student classroom behavior. The reported behavior change also resulted in improved work habits, which then positively impacted the student's academic achievement. This finding supports a Sacramento school district's experience with its teacher home visit program where participating principals reported that student behavior improved due to the home visits (Sandham, 1999).

### **Parent Involvement**

As Sawchuk (2011) explains, "Teacher home visits are based on a common-sense idea: Parents are more likely to be engaged in their son's or daughter's progress through school if they feel that they have a real partner" (p. 1). Several recent studies focused on teachers' perceptions of a strong connection between teacher home visit programs and increased parent involvement. Meyer and Mann (2006) found that 42% of the teachers surveyed reported that teacher home visits increased the rate of parent attendance at conferences, while 38.5% of teachers agreed parental communication had increased. Another recent study noted that of the 60 teachers who completed a survey after conducting teacher home visits, 35 teachers reported that the experience had an extremely positive impact on their relationships with the parents of the students in their classroom (Stetson et al., 2012). In a follow-up study, Meyer et al. (2011) found that 100% of the teachers they surveyed reported that parents' attitudes toward school had improved, as well as their attitude toward the teacher, after participation in a teacher home visit. In addition to increased parental attendance at conferences and increased levels of parental communication, studies have reported that after teacher home visits, parents were more likely to volunteer to help and be more involved at the school (Faber, 2015; Meyer et al., 2011; Stetson et al., 2012). Not only is the impact of increased parent involvement noticed by the teacher, students have also noticed the impact of teacher home visits. In a study of 28 high school students enrolled in an accounting course, Simington (2003) found that students who had participated in a teacher home

visit program shared the same opinions as those noted above by the teachers, with 100% of the students surveyed indicating that parent involvement was important to them and that teacher home visits served as a tool for increasing such involvement.

In addition to overall increased parent involvement, teacher home visit programs have also been found to improve ties between schools and culturally diverse families. Teacher home visits give families an opportunity to share their culture and background with teachers. When teachers understand the culture and expertise of parents and extend the opportunities for parents to get involved, levels of parent involvement have been shown to increase (Baeder, 2010). Peralta-Nash (2003) conducted a study of 20 elementary preservice teachers, each of whom completed a teacher home visit for a child in his or her classroom. Each of the families visited spoke English as a second language. Preservice teachers discussed the importance of allowing the parents to have a voice in their child's education. One preservice teacher commented, "In order for teachers to develop curriculum that honors and respects knowledge, interests, and experiences that students bring into the classroom, parents, students, and teachers need to be engaged in a dialogue" (Peralta-Nash, 2003, p. 116).

### **Student Attitude and Motivation**

Teacher home visits have been shown to positively impact student attitude (Meyer et al., 2011; Simington, 2003; Stetson et al., 2012). Using teacher reflections, interviews, and student self-reported data, the completion of teacher home visits by a teacher seems to have an influence on students' attitudes toward school and the classes they are taking (Meyer et al., 2011; Simington, 2003; Stetson et al., 2012). Stetson et al. (2012) found that 88% of teachers surveyed agreed that they felt teacher home visits had a positive effect on students' attitudes towards class and helped to form a better student-teacher relationship. Teachers surveyed in a 2006 study by Meyer and Mann felt students' attitude toward school and class were much improved after completing teacher home visits. Additionally, 89% of teachers surveyed in a follow-up study completed five years later reported that they felt students' attitudes had improved (Meyer et al., 2011). Along with improved attitude, the same teachers also reported improvements in attendance, with 61% noting improvement.

### **Purpose of Study**

Multiple qualitative research and small-scale experimental studies have described the positive effects teacher home visit programs have on students' classroom behavior, academic achievement, and parent involvement. However,

missing from the research literature are large-scale studies that simultaneously examine the effects of teacher home visits on all three factors. Furthermore, most of these research studies have used weak designs (primarily pretest–posttest designs) that have not included comparison groups. In addition, the findings from previous research are limited in their scope and generalizability due to small samples and lack of quantitative measures. The present study uses a mixed-method approach to provide a more comprehensive understanding of teacher home visit programs and their effects on students, classrooms, and parents. Due to its larger sample size comprised of districtwide teacher, student, and parent data and its quasi-experimental research design with a comparison group, the current study will provide a more comprehensive picture of the effects that teacher home visit programs have on students' classroom behavior, academic achievement, parent involvement, and student attitude and motivation.

## **Study Context**

### **School Context**

The study used data from a Texas-based public charter school system, mostly centered in major metropolitan and the surrounding areas, serving students in grades K–12. The school system has an explicit focus on science, technology, engineering, and mathematics (STEM) areas, reaching out to underserved communities across the state. Many of the system's schools have received national recognition for being academically competitive. Currently, 25 schools within the system are designated T-STEM Academies by the Texas Education Agency. T-STEM Academies serve as lab and demonstration sites with the goals of increasing STEM-related postsecondary readiness, teacher preparation and retention in STEM subjects, and alignment between educational and economic development in STEM fields.

The school system operates 46 schools across seven independent school districts in 17 cities across Texas. The charter system serves almost 28,318 students, the majority of whom are economically disadvantaged (59.4%) and identify with an ethnic minority group. Table 1 provides overall demographic information for the school system's student composition.

Table 1. Overall Student Demographics

|                        | Overall<br>( <i>n</i> = 28,318) |       |
|------------------------|---------------------------------|-------|
|                        | <i>n</i>                        | %     |
| Ethnic Distribution    |                                 |       |
| African American       | 5,376                           | 18.98 |
| Hispanic               | 13,698                          | 48.37 |
| White                  | 4,633                           | 16.36 |
| American Indian        | 80                              | 0.28  |
| Asian                  | 3,934                           | 13.89 |
| Pacific Islander       | 21                              | 0.07  |
| 2 or more races        | 576                             | 2.03  |
| Socioeconomic Status   |                                 |       |
| Econ Disadvantaged     | 16, 821                         | 59.40 |
| Non-Econ Disadvantaged | 11,497                          | 40.60 |

*Source.* Texas Academic Performance Reports (TAPR), 2014–15, TEA Snapshot 2014 Summary Tables.

### Teacher Home Visit Program

The school system first implemented its teacher home visit program during the 2001–02 academic year at one of its campuses. The foundation of the teacher home visit program rests on the school system’s desire to increase student academic achievement, increase parent involvement, and motivate students to demonstrate more positive behavior in the classroom. Although there is quite a bit of time and effort involved in conducting teacher home visits, the school system felt that building parent engagement in this manner was key to the continued success of their students. In fact, building relationships between the school and the home is the driving force behind the program, furthering the system’s school–home engagement and support system.

The school system’s teachers are asked to conduct home visits with all students; however, they schedule visits on their own and choose which students they visit. Teachers visit students’ homes in pairs. Just over 10% of the school system’s students receive a home visit each year, with the majority of visits concentrated in Grades K–8. While conducting a teacher home visit, the school system’s staff focuses on a student’s interests, his/her hopes and dreams, as well as academic and social progress and needs. Also during the visit, parents are informed of the child’s progress, showing them where the child is currently functioning both academically and socially, as well as where the child should be academically and socially (Z. Yaman, personal communication, June 21, 2016).

To help ensure the program's success, the school system conducts teacher home visit trainings at the beginning of the year during each school's in-service programs for all participating teachers. Also, individual schools within the school system host teacher home visit kickoff events to launch the start of a new teacher home visit season. General items covered in the teacher home visit trainings include the benefits of teacher home visits to students, parents, and the school; how to schedule a teacher home visit; and what to talk about with parents. While conducting a teacher home visit, the school system's teachers provide parents with a folder that contains such documents as the student's academic and behavior record, a calendar with school academic and social events held during the year, a list of school extracurricular activities, the school's college readiness program, and other school-specific items to help guide the visit's discussion. In order to promote parent involvement and home-school communication, the school staff also provide parents with an introduction to the school system's parent portal software system, which is used as a primary measure of overall parent involvement. The parent portal serves as the primary point of contact between teachers and parents, allowing parents access to students' academic and behavioral performance in real time. The portal's behavioral component tracks students' positive and negative behaviors using a point system derived from each school's discipline management plan. The portal is utilized by all school personnel who interact with students. While visiting, the teachers pay close attention to any parent feedback given and share this information with school administration as deemed appropriate (Z. Yaman, personal communication, June 21, 2016).

## Methods

The purpose of this quasi-experimental explanatory mixed methods research study was to determine if the school system's teacher home visit program resulted in differences in classroom behavior and academic achievement of students who received teacher home visit(s) compared to students who did not receive teacher home visit(s). In addition, we examined whether there were differences in the level of parent involvement in school between the two groups of students. Due to the large sample size ( $n = 7,362$ ), a  $p$ -value of .001 was used to determine significance for all tests of statistical inference. A final research question focused on teacher perceptions of the effects of teacher home visits on student attitude and motivation. For the first three research questions, qualitative data were used to expand upon the results of the quantitative data (Merriam & Tisdell, 2016). The fourth research question was based entirely on qualitative data related to teacher perceptions.

### **Research Questions**

1. Are there significant ( $p < .001$ ) differences in the classroom behavior of school system students who received a teacher home visit compared to similar students who did not receive a teacher home visit?
2. Are there significant ( $p < .001$ ) differences in the academic achievement of school system students who received a teacher home visit compared to similar students who did not receive a teacher home visit?
3. Are there significant ( $p < .001$ ) differences in the level of parent involvement of school system students who received a teacher home visit compared to similar students who did not receive a teacher home visit?
4. What are teachers' perceptions of the impact of teacher home visits on student attitude and motivation?

### **Data Sources and Collection**

Quantitative and qualitative data were provided from preexisting school system 2015–16 program records for secondary analysis. All data sources were de-identified. The two data sources included: (a) student records from the 2015–16 school year, and (b) teacher responses to questions regarding student behavior and parent involvement following teacher home visits.

#### ***Quantitative Data***

In the spring of 2016, the school system provided de-identified student data including the academic, behavioral, teacher home visit, and parent involvement records for over 20,000 ( $n = 21,003$ ) school system students in grades 3–12. Academic variables included student core course grades in mathematics, science, social studies, and English/language arts for the first two grading periods of the 2015–16 school year. Behavioral variables included the school system's Positive Reward System (PRS) points and Discipline Point System (DPS) for the fall semester of 2015. PRS points are awarded in an online system by each classroom teacher for positive in-school behaviors, such as academic improvement and helping fellow students without being asked. Conversely, teachers log DPS points in the online system for negative student in-school behaviors, including running in the hallway or sleeping in class. The PRS and DPS categories included points assigned to a student by all of his or her teachers for the Fall 2015 semester. Teacher home visit variables included dates and number of school system teachers participating in teacher home visits. Parent involvement data included the total number of times a student's parent logged in to the school system's online parent portal, as well as a breakdown of log-ins inside of the school and outside of the school. We separated parents' log-in data by inside school and outside school to examine whether digital divide issues such as



parent access to technology use at home influenced the log-in data. All school personnel who interact with students can access and utilize the parent portal.

For determination of the final sample, students who received a teacher home visit(s) ( $n = 3,681$ ) were matched with a comparison group of students ( $n = 3,681$ ) randomly drawn from the students who did not receive a teacher home visit. The demographic characteristics were examined, and there were no significant differences between the treatment group, comparison group, and the overall population by race or socioeconomic status (as measured by the number of students who received free or reduced lunch). The demographic characteristics of the comparison group sample were determined to be a close approximation ( $\pm 5\%$ ) to that of the teacher home visit sample. Table 2 provides demographic information for both groups.

Table 2. Teacher Home Visit and Comparison Group (No Teacher Home Visit) Student Demographics

|                               | Home Visit Sample<br>( $n = 3,681$ ) |      | Comparison Group<br>( $n = 3,681$ ) |      |
|-------------------------------|--------------------------------------|------|-------------------------------------|------|
|                               | $n$                                  | %    | $n$                                 | %    |
| Ethnic distribution           |                                      |      |                                     |      |
| African American              | 555                                  | 15.1 | 753                                 | 20.5 |
| Hispanic                      | 1,925                                | 52.3 | 1,764                               | 47.9 |
| White                         | 697                                  | 18.9 | 669                                 | 18.2 |
| American Indian               | 9                                    | 0.2  | 14                                  | 0.4  |
| Asian                         | 555                                  | 15.1 | 481                                 | 13.1 |
| Socioeconomic status          |                                      |      |                                     |      |
| Economically disadvantaged    | 1,893                                | 51.4 | 1,905                               | 51.8 |
| Noneconomically disadvantaged | 1,788                                | 48.6 | 1,776                               | 48.2 |

Source. School System Program Records.

### ***Qualitative Data***

In addition to student data, the school system provided de-identified teacher responses ( $n = 223$ ) to four open-ended survey questions asking teachers who had completed teacher home visits during the 2015–16 school year to discuss their perceptions of the effects of teacher home visits on student behavior, academic achievement, parent involvement, and attitude and motivation. The survey link was sent to 1,400 teachers, resulting in a response rate of 15.9%.

A total of three responses were removed from the sample prior to analysis, two of which appeared to be respondents answering from a parent perspective and one of which simply provided a web link rather than an answer to a question. This resulted in a final sample of 220 total responses. The open-ended questions provided a rich source of information on the impact of teacher home visits, focusing on noticeable changes in student classroom behavior, academic performance, parent involvement, and changes in students' attitudes and levels of motivation.

### **Data Analysis**

Data analyses for this report were conducted in the summer of 2016. Quantitative analyses of student data were followed by qualitative analyses of teachers' perceptions of the impacts of teacher home visits.

#### ***Quantitative Analyses***

Student data from the school system's program records were primarily analyzed using Multivariate Analysis of Variance (MANOVA) to investigate whether there were significant ( $p < .001$ ) differences in students' behavioral and academic achievement data, as well as levels of parent involvement, between the teacher home visit and non-teacher home visit group. All analyses were conducted using a sub-sample of 5,814 students for whom all dependent variables were present in the data. In cases where MANOVAs revealed statistically significant differences, independent samples *t*-tests were used to identify statistically significant differences between the two groups.

#### ***Qualitative Analysis***

The research team used constant comparative analysis of teachers' responses to determine emergent themes (Glaser & Strauss, 1967) from the four open-ended questions. A 10% random sample of cases ( $n = 22$ ) were then re-coded by researchers in order to determine inter-coder reliability, yielding an initial inter-rater reliability of 85%. After coders discussed differences in coding, 100% inter-rater reliability was reached. Due to the large number of responses, each of the responses was quantified by theme in order to provide a frequency count of the number of responses mirroring each of the emergent themes (Tashakkori & Teddlie, 1998). In addition, quotes or phrases illustrative of each theme are provided as a means of expanding the description of each theme.

### **Results**

The results of the school system's teacher home visit program are discussed separately for students' classroom behavior, academic achievement, and parent

involvement. For each research question, one-way multivariate analysis of variance (MANOVA) results are reported, followed by independent  $t$ -test results, and ending with a qualitative analysis of the open-ended teacher survey responses. Due to the open-ended nature of the survey questions, some responses included multiple themes and were coded accordingly, resulting in an  $n$  greater than 220 in some cases. In addition, due to a lack of quantitative data focusing on student attitude and motivation, research question four only contains an analysis of the open-ended survey data.

**Research Question 1: Are there significant ( $p < .001$ ) differences in the classroom behavior of the school system's students who received a teacher home visit compared to similar students who did not receive a teacher home visit?**

The research team conducted a one-way multivariate analysis of variance (MANOVA) by teacher home visit group (visit or no visit) on the student classroom behavior dependent variable measures (PRS and DPS scores) to determine if there were any differences by group. The results of the MANOVA revealed a significant difference between the two groups ( $Wilks' \lambda = .996$ ,  $F(1, 5813) = 7.86$ ,  $p < .000$ ).

Independent samples  $t$ -tests were conducted by teacher home visit group (visit or no visit) on both the cumulative PRS and DPS scores to determine if statistically significant differences ( $p < .001$ ) existed in the classroom behavior of school system students who received a teacher home visit during the first half of the 2015–16 school year, compared to a comparison group who did not receive a teacher home visit. The independent samples  $t$ -tests were conducted separately for each behavioral measure (PRS and DPS). Students who received a teacher home visit had significantly higher PRS, or positive reward system, scores than students who did not receive a teacher home visit ( $p < .001$ ). Teacher home visits showed a small positive effect for positive classroom behaviors, as measured by PRS scores (Cohen's  $d = 0.13$ ). However, there were no statistically significant differences between the DPS scores of students who received a teacher home visit compared to students who did not receive a teacher home visit. Because there is no limit to the number of PRS and DPS points a student may earn, there were large standard deviations for both measures. Table 3 provides the results of the independent  $t$ -tests by teacher home visit for student classroom behavior.

Table 3. Independent *t*-test Results for Student Classroom Behavior

| Behavior Tracking Points | Home Visit<br>( <i>n</i> = 2,974) |           | No Home Visit<br>( <i>n</i> = 2,840) |           | <i>t</i> |          |
|--------------------------|-----------------------------------|-----------|--------------------------------------|-----------|----------|----------|
|                          | <i>M</i>                          | <i>SD</i> | <i>M</i>                             | <i>SD</i> | <i>t</i> | <i>p</i> |
| DPS                      | 15.71                             | 20.14     | 15.56                                | 19.65     | -0.24    | .808     |
| PRS                      | 20.00                             | 20.97     | 17.51                                | 18.24     | 4.81     | .000*    |

Source. School System Program Records.

Note. \**p* < .001

Qualitative data were also examined in regard to this question. The four themes that emerged from teacher responses regarding differences in student classroom behavior following teacher home visits were positive behavioral impact, positive affective impact, slight or temporary positive impact, and no change or not helpful in impacting classroom behavior. Of the 269 coded responses, 70.26% of survey respondents reported that teacher home visits had a positive effect on students' classroom behavior, either behaviorally (40.15%) or affectively (30.11%), while an additional 7.06% reported a slight or temporary increase in students' classroom behavior. About one-fifth (21.19%) of respondents reported no change, and 1.49% of those surveyed did not provide a response.

With regard to teacher home visits having a positive behavioral impact on students' classroom behavior, one teacher explained,

Big! I've had students change tremendously. One student wasn't turning in work; well at her home visit I mentioned how great she was, but I would like to get more work from her to be more successful. What do you know, I got more work from her!

As for teacher home visits having a positive affective impact on students' classroom behavior, another respondent shared,

One impact of the home visit on student behavior was a noted awareness of the teacher and parents' involvement in the student's life. The established communication between the teacher and the student's home helped to foster a respect transcending the classroom environment. The human connection made was a caring bond of respect and interest in the student's success both in and out of school.

Regarding slight or temporary changes in students' classroom behavior after teacher home visits, several teachers commented on how a student would show a positive change in behavior directly after the teacher home visit, but many times this change faded with time. For example, one teacher noted, "It is a temporary solution but tends to not have long lasting effects." Another respondent

pointed out the importance of the existing teacher–student relationship for a teacher home visit to have an impact on a student’s classroom behavior, stating that, “I think it is mostly beneficial. However, it does depend on the relationship between the teacher and student beforehand.”

About one-fifth of the responses suggested that teacher home visits had no impact on the students’ classroom behavior. One teacher’s response seemed to encapsulate the thoughts of several surveyed, “It helps, but one visit does not make a big difference.” Many teachers openly expressed that they saw “negligible to no impact” on students’ classroom behavior due to the fact that “the parents who most need the visits will not allow them.” Many expressed a frustration that the students who were behaving well in the classroom had parents who were open to teacher home visits, while those students who were struggling behaviorally in the classroom had parents who were the most reluctant to allow a teacher home visit, if they responded at all to the teacher home visit invitation. Table 4 provides the frequency and percent of each theme that emerged in question one.

Table 4. Themes from Open-Ended Survey Question #1 - Student Classroom Behavior

|                                | Question #1<br>( <i>n</i> = 269*) |       |
|--------------------------------|-----------------------------------|-------|
|                                | <i>n</i>                          | %     |
| Positive Behavioral Impact     | 108                               | 40.15 |
| Positive Affective Impact      | 81                                | 30.11 |
| Slight/Little/Temporary Impact | 19                                | 7.06  |
| No Change/Not Helpful          | 57                                | 21.19 |
| No Data Recorded               | 4                                 | 1.49  |

Source: School System Program Records.

\*Note. Responses containing evidence of more than one theme were dual-coded resulting in an *n* that is greater than the number survey respondents.

Both quantitative and qualitative data appear to indicate that teacher home visits result in higher levels of positive student classroom behavior, but do not have a statistically significant impact on negative student classroom behavior. In addition, of the 269 survey responses, about 70% of the responses indicated the perception that teacher home visits positively impacted students’ classroom behavior either behaviorally or affectively, while almost 30% responded slight, temporary, or no student classroom behavior impact.

**Research Question 2: Are there significant ( $p < .001$ ) differences in the academic achievement of the school system’s students who received a teacher home visit compared to similar students who did not receive a teacher home visit?**

The research team conducted a one-way multivariate analysis of variance (MANOVA) by teacher home visit group (visit or no visit) on the student academic achievement dependent variable measures (second quarter course grades in mathematics, science, English/language arts, and social studies) to determine if there were any differences by group. The results of the MANOVA revealed a significant difference between the two groups ( $Wilks' \lambda = .994$ ,  $F(1, 5813) = 9.68$ ,  $p < .000$ ).

Next, an independent samples  $t$ -test was conducted by teacher home visit group (visit or no visit) on students’ second quarter course grades in mathematics, science, English/language arts, and social studies to determine if there were statistically significant differences ( $p < .001$ ) in the academic achievement of the school system’s students who received a teacher home visit during the first half of the 2015–16 school year compared to a comparison group who did not receive a teacher home visit. The independent samples  $t$ -tests were conducted separately for each academic measure. Students who received a home visit had statistically significantly higher mathematics and English/language arts second quarter grades than students who did not receive a teacher home visit. Additionally, teacher home visits showed a small positive effect for both subjects (mathematics, Cohen’s  $d = 0.13$ , English/language arts, Cohen’s  $d = 0.12$ ). These results are consistent with effect sizes reported in previous studies measuring the effect sizes of non-standardized measures of student achievement, such as course grades (Castro et al., 2015; Jeynes, 2012). Table 5 provides the results of the independent  $t$ -tests by teacher home visit for student academic achievement.

Table 5. Independent  $t$ -test Results and Effect Sizes (Cohen’s  $d$ ) for Student Academic Achievement

| Second Quarter Grades | Home Visit<br>( $n = 2,974$ ) |       | No Home Visit<br>( $n = 2,840$ ) |      |       |       | $d$  |
|-----------------------|-------------------------------|-------|----------------------------------|------|-------|-------|------|
|                       | $M$                           | $SD$  | $M$                              | $SD$ | $t$   | $p$   |      |
| Math                  | 84.53                         | 10.14 | 83.18                            | 9.97 | 5.617 | .000* | 0.13 |
| Science               | 85.38                         | 9.53  | 84.79                            | 9.65 | 2.570 | .010  | 0.06 |
| English               | 84.53                         | 10.14 | 83.18                            | 9.97 | 5.143 | .000* | 0.12 |
| Social Studies        | 86.76                         | 9.16  | 86.20                            | 9.03 | 2.524 | .012  | 0.06 |

Source. School System Program Records.

Note. \* $p < .001$

The four themes that emerged from analysis of teacher responses regarding academic achievement were: positive academic impact, positive affective impact, slight or temporary positive impact, and no change or not helpful in impacting academic achievement. Around one-third (34.14%) of the teachers reported that teacher home visits had a positive academic impact on students due to behaviors shown in class, such as increased focus or motivation. Around 20% (20.88%) of the teachers surveyed reported that they noticed a positive affective impact on student academic achievement after completing teacher home visits, which many respondents attributed to the cultivation of important relationships with both students and their parents. Slightly over 4% (4.42%) of teachers responded that there was a slight or temporary positive impact on student achievement after teacher home visits but did not see the changes as significant or long lasting. Over one-fourth (28.11%) of teachers reported no change in student academic achievement after students had received a teacher home visit. Finally, 12.45% of teachers surveyed did not provide a response. Table 6 provides the frequency and percent of each theme that emerged in question two.

Table 6. Themes from Open-Ended Survey Question #2 - Student Academic Achievement

|                                | Question #2<br>( <i>n</i> = 249*) |       |
|--------------------------------|-----------------------------------|-------|
|                                | <i>n</i>                          | %     |
| Positive Academic Impact       | 85                                | 34.14 |
| Positive Affective Impact      | 52                                | 20.88 |
| Slight/Little/Temporary Impact | 11                                | 4.42  |
| No Change/Not Helpful          | 70                                | 28.11 |
| Theme 5 – No Data Recorded     | 31                                | 12.45 |

Source: School System Program Records

\*Note. Responses containing evidence of more than one theme were dual-coded resulting in an *n* that is greater than the number survey respondents.

A total of 249 responses were coded regarding the impact teacher home visits had on students' academic achievement. Of the 249 coded responses, 85 (34.14%) noted that teacher home visits had a positive impact in student academic achievement based on the students' behaviors in the classroom. Comments such as, "Students pay attention to class more than they did before the home visits," as well as responses noting that, "Students took my course more seriously and were motivated to increase grades" after teacher home visits help to illustrate the perceived impact of the home visits on students'



academic achievement based on students' classroom behaviors. In addition to an impact on student achievement based on student classroom behaviors, 52 teachers (20.88%) reported increases in academic achievement due to better relationships and/or better communication created by teacher home visits. Teachers provided comments such as, "the students felt more comfortable with the teacher–student relationship once the home visit was conducted," and, "I was able to witness an increase in classroom participation, as the student had more confidence to participate once they knew their teacher personally." One respondent noted, "Our relationship was different in that they [the student] felt special and knew I cared about them." Of the 220 teachers surveyed, 70 (28.11%) noted that they saw no change in student academic achievement after teacher home visits, with several teachers noting, "I did my home visits early in the school year, so I could not compare before and after in terms of student academic performance."

The statistically significant differences in academic achievement in mathematics and English language arts for students who received a teacher home visit compared to students who did not receive a home visit were mirrored by the school system's teachers surveyed, with 34.14% noting an impact on student achievement through classroom behavior and 20.88% reporting an impact on student achievement through affective factors, such as strengthened relationships and better communication. In addition to these findings, the survey results may help explain why some teachers reported no change in academic achievement, with several reporting that teacher home visits were conducted early in the school year with no baseline on which to gauge improvement.

**Research Question 3: Are there significant ( $p < .001$ ) differences in the level of parent involvement of the school system's students who received a teacher home visit compared to similar students who did not receive a teacher home visit?**

The research team conducted a one-way multivariate analysis of variance (MANOVA) by teacher home visit group (visit or no visit) on the parent involvement dependent variable measures (total, inside, and outside of school parent portal log-ins) to determine if there were any differences by group. The results of the MANOVA revealed a significant difference between the two groups (*Wilks' lambda* = .984,  $F(1, 5813) = 61.49$ ,  $p < .000$ ).

An independent samples *t*-test was conducted by teacher home visit group (visit or no visit) on the cumulative number of parent portal log-ins for each student to determine if statistically significant differences ( $p < .001$ ) existed in the level of parent involvement of the school system's students who received a teacher home visit during the first half of the 2015–16 school year compared

to a comparison group who did not receive a home visit. Parent involvement data included the total number of log-ins logged for each student, the number of within-school log-ins logged for each student, and the number of outside of school log-ins logged for each student by the school system's parent portal.

Three independent samples *t*-tests were conducted separately for each of the parent portal log-in types: total parent log-ins, within-school log-ins, and outside of school log-ins. Students who received a teacher home visit had a significantly higher number of parent portal log-ins across the three types than students who did not receive a teacher home visit ( $p < .001$ ). Teacher home visits showed a small positive effect for total parent log-ins, within-school log-ins, and outside of school log-ins (total, Cohen's  $d = 0.18$ , within-school, Cohen's  $d = 0.23$ , outside of school, Cohen's  $d = 0.16$ ). Because there was not a limit to the number of times a parent can log into the parent portal, there were large standard deviations for all three measures. Table 7 provides the results of the independent *t*-tests by teacher home visit for level of parent involvement.

Table 7. Independent *t*-test Results for Level of Parent Involvement

| Parent Log-Ins | Home Visit<br>( $n = 2,974$ ) |           | No Home Visit<br>( $n = 2,840$ ) |           |          |          |          |
|----------------|-------------------------------|-----------|----------------------------------|-----------|----------|----------|----------|
|                | <i>M</i>                      | <i>SD</i> | <i>M</i>                         | <i>SD</i> | <i>t</i> | <i>p</i> | <i>d</i> |
| Total          | 218.28                        | 267.94    | 169.85                           | 283.71    | 7.53     | .000*    | 0.18     |
| Within-School  | 15.78                         | 27.97     | 10.07                            | 22.47     | 9.66     | .000*    | 0.23     |
| Outside School | 202.50                        | 263.59    | 159.78                           | 278.61    | 6.76     | .000*    | 0.16     |

Source. School System Program Records.

Note. \* $p < .001$

The four themes that emerged from teacher responses regarding changes in parent involvement following teacher home visits were increases in involvement, slight or temporary increases in involvement, decreases in involvement, and no change in involvement. Over half of the 220 respondents felt that parent involvement increased following teacher home visits (51.36%), while an additional 3.64% reported a slight or temporary increase in parent involvement. A small percentage of the teachers reported a decrease in parent involvement (1%), with 28.64% reporting the visits caused no change in parent involvement. Just over 15% of the teachers surveyed did not provide a response (15.45%).

With regard to increases in parent involvement following teacher home visits, one teacher noted that, "After you made a home visit, you saw that most of the parents who get involved, you made [a] home visit to them." Another respondent said, "Parents felt comfortable in talking with me and were thankful

for the personal approach to their child’s education.” Regarding slight or temporary changes in parent involvement, several teachers noted that some parents either were not sure how to support their child at school or were limited due to circumstances. For example, one teacher stated, “Parents seemed more aware but still not knowing how to support child at home due to lack of resources,” while another pointed out limited involvement due to family circumstances, noting that, “[one] student’s father worked long hours, and the student’s mother was busy caring for the student’s brother, who has a disability.”

The limitation of involvement due to home or work circumstances was a common response among teachers who suggested their home visits resulted in slight or temporary changes. The potential causes of limited parent involvement expressed by many of the teachers surveyed in our study mirrors the findings of a recent study (Baker, Wise, Kelley, & Skiba, 2016) that utilized both parent and teacher focus groups to investigate barriers to greater parent involvement. Similar to the present study, researchers found that many parents expressed limited involvement simply due to the fact that events were often held during the school day or did not take family weeknight schedules into account.

Over one-fourth (28.64%) of the responses suggested that teacher home visits did not cause a change in parent involvement. Several teachers suggested that perhaps the reason for no change was that parents were already involved. One teacher said, “Parents that want a home visit are usually already involved with their child’s education.” Several respondents noted that the nature of arranging a teacher home visit, which, at least at some campuses, requires that a parent request a teacher home visit, was a limiting factor in increasing parent involvement. One teacher commented thus, “Parents who were already involved in school were open to visits, but those less involved did not accept invitations,” while another noted similarly that, “The parents that wanted home visits were the ones always involved.” Table 8 provides the frequency and percent of each theme that emerged in question three.

Table 8. Themes from Open-Ended Survey Question #3 – Level of Parent Involvement

|                                     | Question #3<br>( <i>n</i> = 220*) |       |
|-------------------------------------|-----------------------------------|-------|
|                                     | <i>n</i>                          | %     |
| Parent Involvement Increase         | 113                               | 51.36 |
| Slight or Temporary Positive Impact | 8                                 | 3.64  |
| Parent Involvement Decrease         | 2                                 | 1.00  |
| No Change/Not Helpful               | 63                                | 28.64 |
| No Data Recorded                    | 34                                | 15.45 |

Source: School System Program Records.

\*Note. Responses containing evidence of more than one theme were dual-coded resulting in an *n* that is greater than the number survey respondents.

Both quantitative and qualitative data appear to indicate that teacher home visits increased parent involvement in the school system's schools. Independent samples *t*-tests revealed statistically significantly greater numbers of parental log-ins to the school system's parent portal overall, as well as from within and outside of the system's schools. In addition, of the 220 teachers surveyed, over half (51.36%) of the responses indicated the perception that teacher home visits positively impact levels of parent involvement.

**Research Question 4: What are teachers' perceptions of the impact of teacher home visits on students' attitudes and motivation?**

A final question asked the system's teachers about their perceptions of the impact of teacher home visits on students' attitudes and motivation. The four themes that emerged from teacher responses regarding the impact of teacher home visits on students' attitudes and motivation were positive behavioral impact, positive affective impact, slight or temporary positive impact, and no change or not helpful in impacting students' attitudes and motivation. Slightly less than half (42.69%) of the respondents reported that teacher home visits had a positive impact on students' motivation by impacting their behavior in the classroom. Just over 15% (15.38%) reported that they noticed a positive affective impact on students' attitudes and motivation through the relationships and connections they had formed with the students and families during the teacher home visit. Less than 10% (7.7%) of the teachers reported they noticed a slight or temporary positive impact on students' attitudes and motivation after completing a teacher home visit, but these changes were minimal and not permanent. Almost one-fifth (20.77%) of the teachers surveyed said they noticed no change in students' attitudes and motivation after the student received a teacher home visit, and 13.48% of the respondents did not provide an answer. Table 9 provides the frequency and percent of each theme that emerged in question #4.

Table 9. Themes from Open-Ended Survey Question #4 – Students' Attitudes and Motivation

|                                     | Question #4<br>( <i>n</i> = 260) |       |
|-------------------------------------|----------------------------------|-------|
|                                     | <i>n</i>                         | %     |
| Positive Behavioral Impact          | 111                              | 42.69 |
| Positive Affective Impact           | 40                               | 15.38 |
| Slight or Temporary Positive Impact | 20                               | 7.70  |
| No Change/Not Helpful               | 54                               | 20.77 |
| No Data Recorded                    | 35                               | 13.46 |

Source: School System Program Records.

Note. Responses containing evidence of more than one theme were dual-coded resulting in an *n* that is greater than the number survey respondents.

Of the 260 coded responses, 111 (42.69%) noticed a positive behavioral impact on students' attitudes and motivation after these students received a teacher home visit. One teacher mentioned that, "The majority of the students seem to have a more positive attitude and increased motivation in their daily classwork performance." Additional remarks by another teacher helped to illustrate the impact of teacher home visits on students' attitudes and motivation, suggesting that students show "more focus on work and assignments." With regard to teacher home visits having a positive affective impact on students' attitudes and motivation, one teacher noted, "Motivation is increased because they are more aware of communication between parent and teacher," as well as, "they [students] feel that home-school connection and trust that [the school system] is a safe and nurturing environment for them." One teacher noted that after teacher home visits, "Students were dedicated and worked toward their goals more. The students knew that communication was necessary through home visits, conferences, email, phone, and more. The home visit created an excellent parent-teacher relationship."

## Discussion

This evaluation of the school system's teacher home visit program examined both quantitative and qualitative data to determine if there were significant differences in classroom behavior, academic achievement, level of parent involvement, and attitudes and motivation of the school system's students who received a teacher home visit compared to similar students who did not receive a teacher home visit. With regard to the effects of teacher home visits on student classroom behavior, students who received a teacher home visit had significantly higher PRS, or positive reward system, scores than students who did not receive a teacher home visit ( $p < .001$ ), with an effect size of 0.13. However, there were no statistically significant differences between the DPS scores of students who received a teacher home visit compared to students who did not receive a teacher home visit. Of the 269 responses recorded from the teacher survey, 70.25% reported that teacher home visits had a positive effect on students' classroom behavior, either behaviorally (40.15%) or affectively (30.11%), while an additional 7.06% reported a slight or temporary increase in students' positive classroom behavior.

In addition to increases in positive behavior, the school system's teacher home visit program showed significant differences in student academic achievement when compared to students who did not receive a teacher home visit. Both mathematics and English language arts second quarter grades showed a small positive effect (mathematics, Cohen's  $d = 0.13$ , English language arts, Cohen's

$d = 0.12$ ) for students who received a home visit. These results were then reinforced through the responses of the teachers in the open-ended survey, where more than half (55.02%) noted an increase in academic achievement of the students who participated in the teacher home visit program. Regarding the effects of teacher home visits on parent involvement, students who received a teacher home visit had a significantly higher number of parent portal log-ins across all three types (total log-ins, within-school log-ins, outside of school log-ins) than students who did not receive a teacher home visit ( $p < .001$ ), with small, positive effects for each type of log-in. Finally, over half (51.36%) of the school system's teachers surveyed felt that teacher home visits increased parent involvement, with many noting that teacher home visits increased parents' level of comfort with their child's teacher. The results of the open-ended survey given to the school system's teachers suggested that the majority (58.07%) of teachers saw an increase in student motivation and improvement in students' attitudes for those that participated in the teacher home visit program.

The results of this study suggest that the school system's teacher home visit program positively impacts students' academic and behavioral functioning in school. Students who have received a teacher home visit through the school system's program had significantly higher academic achievement, as well as motivation, when compared to similar school system students who did not receive a teacher home visit. Additionally, parents whose child received a home visit were found to be more involved in their children's schooling than parents who had not received a teacher home visit. Our study findings are consistent with previous research findings and help to reinforce the positive impact home visits have been shown to have on students, parents, and schools (Meyer & Mann, 2006; Sandham, 1999; Sheldon & Jung, 2015; Stetson et al., 2012). Specifically, the study's findings contribute to and help to corroborate other research findings showing the positive impact home visits have on students' academic achievement, increased positive student behaviors, and increased parent involvement (Lin & Bates, 2010; Meyer & Mann, 2006; Meyer et al., 2011).

Stetson et al. (2012) reported results indicating home visits had been perceived by the majority of the teachers studied (75%) to impact students' classroom behavior in a positive way. The results of the current study further demonstrate this, as the majority (70.26%) of the teachers studied indicated that home visits had positively impacted students' classroom behavior. When focusing on the impact home visits had on students' academic achievement, the results of this study showed a small positive effect for mathematics and English language arts, which was echoed in the responses given by teachers indicating a positive impact on academics. These study results mirror similar results reported in previous research showing an agreement between teachers,

students, and test scores on the positive impact of home visits (Meyer & Mann, 2006; Simington, 2003). Finally, previously reported research indicated home visits positively impacted students' attitudes as indicated by teacher reflections or responses (Simington, 2003; Stetson et al., 2012), as did this current study, with over half (58.07%) of the surveyed teachers' responses indicating they saw improvement in students' attitudes after a home visit. The results from this research also showed home visits having a positive effect on parent involvement as measured by recorded log-ins to the parent portal. These results were consistent with previous research where positive impacts to parent involvement were also noted, though measured by teacher perceptions of parent impact (Meyer & Mann, 2006; Sawchuk, 2011).

These findings, however, need to be viewed with caution, as the magnitude of the differences between the two groups was not large and effect sizes cannot be soundly attributed to home visits given the inability of *t*-tests to control for demographic information. In addition, because the school system did not provide us with any prior data on dependent measures such as student achievement, behavior, or parent involvement upon which to match students, it cannot be determined whether preexisting differences between students contributed to reasons for home visit selection and/or post-visit differences in the dependent measures. Also, the general nature of the quantitative measure of parent involvement (number of log-ins to parent portal) made it impossible to distinguish parents' reasons for logging into the portal and may have provided an inflated sense of involvement in some cases. Additionally, differences in families and students due to teachers' choice of which students to visit likely resulted in group differences not detected by our measures.

Finally, the teachers that participated in the open-ended survey also reported positive benefits of the teacher home visit program. However, a low response rate among the teachers surveyed also points to interpreting teacher perceptions of home visits cautiously, as less than 20% of the teachers who completed home visits responded to the survey. In addition, due to the quasi-experimental study design and lack of data on teacher motivation, we could not determine what factored into teachers' choice of which students to visit. However, the results of this study should still be seen as encouraging for school systems interested in beginning or expanding teacher home visit programs.

Based on the findings of this study, future studies should consider other dependent measures of the impact of home visits, such as student attendance. Additionally, designing the study to allow for random assignment for which students receive a home visit could allow further insight into the potential impact these visits have on students and parents. Finally, as this study focused on a large charter school system, expanding this study to focus on schools



outside of this system, and across the United States, could allow a deeper understanding of the potential impacts of teacher home visits on students and their parents. Other expansions on this work could focus on teacher perceptions about changes in their own attitudes and beliefs regarding students and parents as a result of conducting home visits, as well as consideration of what types of incentives would encourage more parents to participate in home visits.

## References

- Baeder, A. (2010). Stepping into students' worlds. *Educational Leadership*, 67(5), 56–60. Retrieved from <http://www.ascd.org/publications/educational-leadership/feb10/vol67/num05/Stepping-into-Students'-Worlds.aspx>
- Baker, T. L., Wise, J., Kelley, G., & Skiba, R. J. (2016). Identifying barriers: Creating solutions to improve family engagement. *School Community Journal*, 26(2), 161–184. Retrieved from <http://www.schoolcommunitynetwork.org/SCJ.aspx>
- Castro, M., Expósito-Casas, E., López-Martín, E., Lizasoain, L., Navarro-Asencio, E., & Gáviria, J. L. (2015). Parental involvement on student academic achievement: A meta-analysis. *Educational Research Review*, 14, 33–46.
- Flannery, M. E. (2014, October 28). *All in the family: How teacher home visits can lead to school transformation*. Retrieved from <http://neatoday.org/2014/10/28/all-in-the-family-how-teacher-home-visits-can-lead-to-school-transformation/>
- Faber, N. (2015). Connecting with students and families through home visits. *American Educator*, 39(3), 24–27.
- Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. New York, NY: Aldine De Gruyter.
- Jeynes, W. (2012). A meta-analysis of the efficacy of different types of parental involvement programs with urban students. *Urban Education*, 47(4), 706–742.
- Lin, M., & Bates, A. B. (2010). Home visits: How do they affect teachers' beliefs about teaching and diversity? *Early Childhood Education Journal*, 38(3), 179–185.
- Merriam, S. B., & Tisdell, E. J. (2016). *Qualitative research: A guide to design and implementation* (4th ed.). San Francisco, CA: Wiley.
- Meyer, J. A., & Mann, M. B. (2006). Teachers' perceptions of the benefits of home visits for early elementary children. *Early Childhood Education Journal*, 34(1), 93–97.
- Meyer, J., Mann, M., & Becker, J. (2011). A five-year follow-up: Teachers' perceptions of the benefits of home visits for early elementary children. *Early Childhood Education Journal*, 39(3), 191–196.
- Peralta-Nash, C. (2003). The impact of home visit in students' perception of teaching. *Teacher Education Quarterly*, 30(4), 111–125.
- Sandham, J. L. (1999, December 1). Home visits lead to stronger ties, altered perceptions. *Education Week*. Retrieved from <http://www.edweek.org/ew/articles/1999/12/01/14home.h19.html?tkn=YLVFmNLOcrHKytyvn2zmmcGTt6KqNRxnKqvc&print=1>
- Sawchuk, S. (2011, December 13). More districts sending teachers into students' homes. *Education Week*. Retrieved from <http://www.edweek.org/ew/articles/2011/12/14/14visit.ep.h31.html>
- Sheldon, S. B., & Jung, S. B. (2015, September). *The family engagement partnership student outcome evaluation*. Baltimore, MD: Johns Hopkins University School of Education Center

- on School, Family, and Community Partnerships. Retrieved from [http://www.pthvp.org/wp-content/uploads/2016/09/JHU-STUDY\\_FINAL-REPORT.pdf](http://www.pthvp.org/wp-content/uploads/2016/09/JHU-STUDY_FINAL-REPORT.pdf)
- Shumow, L., & Schmidt, J. A. (2014). Parent engagement in science with ninth graders and with students in higher grades. *School Community Journal*, 24(1), 17–36. Retrieved from <http://www.schoolcommunitynetwork.org/SCJ.aspx>
- Simington, L. R. (2003). A study of the effects of teacher visits to high school accounting students' homes on their attitudes and achievement in accounting class. *ERS Spectrum*, 21(3), 39–46.
- Stetson, R., Stetson, E., Sinclair, B., & Nix, K. (2012). Home visits: Teacher reflections about relationships, student behavior, and achievement. *Issues in Teacher Education*, 21(1), 21–37.
- Tashakkori, A., & Teddlie, C. (2003). *Handbook of mixed methods in social and behavioral research*. Thousand Oaks, CA: Sage.

Kim B. Wright is a research associate in the Education Research Center in the College of Education and Human Development at Texas A&M University in College Station, Texas. Wright is also a second-year Ph.D. student in the Department of Teaching, Learning, and Culture at Texas A&M University. Wright's research interests include the development of teachers' data literacy, the impacts of teacher evaluation policy on teaching practice, and preservice STEM teacher preparation. Correspondence concerning this article may be addressed to Ms. Wright at 4232 TAMU, College Station, Texas 77843-4232 or email [kbwright@tamu.edu](mailto:kbwright@tamu.edu)

Samantha M. Shields is a graduate assistant for curriculum development in the Center for Teaching Excellence at Texas A&M University in College Station, Texas. Shields is also a second-year Ph.D. student in the Department of Teaching, Learning, and Culture at Texas A&M University. Shields' research interests include the recruitment and retention of STEM students, as well as STEM faculty development.

Katie Black is an instructor in the Department of Child Development at Blinn College in Bryan, Texas. Black is also a second-year Ph.D. in the Department of Teaching, Learning, and Culture at Texas A&M University. Black's research interests include preservice teachers who begin their education at the community college level, the impact and designs of teacher education at the community college level, and the community college–university transfer process for students who wish to complete a 4-year degree in education.

Hersh C. Waxman is a professor in the Department of Teaching, Learning, and Culture (TLAC), director of the Texas A&M University Education Research Center, and co-director of the Center of Mathematics and Science Education. Waxman's research interests include teacher and school effects, classroom learning environments, and students at risk of failure.

Copyright of School Community Journal is the property of Academic Development Institute and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.



# Factors that Promote High School Graduation: a Review of the Literature

Jonathan F. Zaff<sup>1</sup> · Alice Donlan<sup>1</sup> · Aaron Gunning<sup>2</sup> ·  
Sara E. Anderson<sup>3</sup> · Elana McDermott<sup>2</sup> ·  
Michelle Sedaca<sup>2</sup>

Published online: 18 March 2016

© Springer Science+Business Media New York 2016

**Abstract** A high school education prepares young people to participate positively in the economy and in civic life, among other positive life outcomes. However, nearly one in five American high school students does not graduate from high school on time, if ever. Progress has been made on understanding why students fail to complete high school and on raising graduation rates. Previous reviews and syntheses of this literature have focused on identifying factors that put students at risk for dropping out of school. Less is understood regarding what assets can promote high school graduation. Therefore, we reviewed research from the past 25 years on high school graduation, focusing on longitudinal, US-based studies of malleable factors that predict graduation. Through this systematic search, we identified 12 assets in individual, family, school, peer, and community contexts, which predict high school graduation, as well as identified assets for which more research is needed. Implications for policy and practice and directions for future research are discussed.

**Keywords** Dropout · Graduation · Peers · Family · Schools · Community · Individuals

High school graduation can be a doorway to higher education, economic self-sufficiency, and civic engagement (Belfield and Levin 2007). Nonetheless, nearly one in five American young people do not graduate on time, if ever (DiPaoli et al. 2015). Without a high school diploma, young people are much less likely to vote or volunteer in their communities (Nover et al. 2010), or be employed, and much more likely to be arrested and earn a low income (Sum et al. 2009). Furthermore, each person that drops out costs the USA an estimated \$292,000 more

---

✉ Jonathan F. Zaff  
jonz@americaspromise.org

<sup>1</sup> Boston University, Boston, MA, USA

<sup>2</sup> Tufts University, Medford, MA, USA

<sup>3</sup> Georgetown University, Washington, DC, USA

than the average high school graduate over his or her lifetime because of lower taxable income and a higher average reliance on social welfare programs (Sum et al. 2009).

The costs associated with high school dropout may be even more detrimental among populations where non-completion rates are higher than the national average, such as young people who grow up in low-income families and neighborhoods. Whereas 87 % of medium- to high-income students graduate high school on time, only 72 % of low-income students do so. Furthermore, African-American (70.7 %) and Hispanic (75.2 %) students have significantly lower on-time graduation rates than the national average (80 %; DiPaoli et al. 2015). The implications of these low rates of completion are magnified when considering that the children of non-completers are likely to have poorer health, economic, and educational outcomes than children of parents who have graduated from high school (Hernandez and Napierala 2014), feeding an intergenerational cycle of poverty.

Prior syntheses of research have focused on reducing dropout rates and increasing graduation rates by identifying risk behaviors (e.g., Balfanz et al. 2007; Rumberger and Lim 2008). However, no synthesis has used a positive youth development (PYD) framework to understand what is needed to directly promote graduation and continued enrollment. In this review, we focus on the role that individual and contextual assets play in promoting high school graduation and/or continued school enrollment. Such insights could guide the development of public policies and refine on-the-ground practices to promote graduation.

First, we draw on Ecological Systems Theories (Bronfenbrenner and Morris 2006; Spencer 2006) to provide a theoretical framework for our search criteria, examining factors across multiple contexts and levels of a young person's ecology. Next, we review the extant literature on predictors within these contexts that have direct effects on graduation and continued enrollment in high school.

## **A Framework for Studying Predictors of High School Graduation/Continuing Enrollment**

This review is framed by Ecological Systems Theories (Bronfenbrenner and Morris 2006; Spencer 2006). The pathway to graduation is a function of the dynamic, mutually influential relationships between an individual and the context around her (Bryk and Driscoll 1988; Jimerson et al. 2002). Furthermore, proximal and distal influences within a young person's ecology shape the individual's development (Bronfenbrenner and Morris 2006) and include the actions and characteristics of youth themselves (Lerner 2012). Importantly, youth react and engage with their ecology based on their prior and current experiences, as well as their future expectations (Spencer 2006). Thus, in order to accurately understand the relevance of a developmental asset, one must understand how different youth relate to that asset; for example, a young person from a historically disenfranchised group may experience structures within their communities differently than a young person from a historically privileged group.

A PYD perspective builds upon these tenets by emphasizing that alignment between the strengths and needs of a young person and the supportive features of her surrounding ecology produce adaptive developmental outcomes (Benson et al. 2006; Lerner et al. 2009). PYD constructs include a set of individual strengths, such as sense of self and motivation, and features of programs and interpersonal relationships that can help to build these strengths, such as positive social norms, caring and supportive relationships, and salient educational and skill-building opportunities (Durlak et al. 2010; Eccles and Gootman 2002; Greenberg et al. 2003;

Zaff et al. 2016), leading to positive academic, social, emotional, and vocational well-being (Lerner et al. 2009; Zaff and Smerdon 2009). Therefore, the task for policymakers and practitioners is to promote this alignment across multiple contexts, which can result in young people adapting positively within adverse environments (i.e., resilience; Ungar 2011).

Once risk, protective, and promotive factors are identified for high school graduation, interventions can be designed to manipulate “upstream” factors that impact “downstream” outcomes (e.g., Hawkins 2006). For example, interventions have focused on youth mobility as an “upstream” factor that predicts “downstream” outcomes, including high school dropout, substance use, teenage pregnancy, violence, and other delinquent behaviors (e.g., Hawkins et al. 2012). Thus, the current study not only identifies malleable assets (theoretically sensitive to intervention), which may promote high school graduation, but focuses on systematic, longitudinal research on such assets to identify potential “upstream” levers for interventions.

## Longitudinally Assessing Strengths and Contextual Assets

Although no studies have synthesized the empirical research on assets that promote graduation and continued enrollment, literature reviews have explored risk factors for dropping out. Three systematic reviews show the importance of the individual, family, school, and communities (Hammond et al. 2007; Rumberger and Lim 2008; Tyler and Lofstrom 2009). The studies contained in these reviews included nationally representative and community-based longitudinal studies and cross-sectional studies. On the individual level, risk factors such as poor school performance, negative attitudes about academics, and non-academic problem behaviors (e.g., teen pregnancy, drug and alcohol use) have been implicated in young people dropping out of school. In addition, school-level risk factors (e.g., teacher quality), family risk factors (e.g., living in a single parent household, low parent educational attainment), and community risk factors (e.g., high crime rate) have all been shown to predict young people leaving school before graduating (see Hammond et al. 2007; Rumberger and Lim 2008; Tyler and Lofstrom 2009). Importantly, cumulative risk is a stronger predictor of dropout than any single factor (Hammond et al. 2007).

It is important to note that when youth avoid a negative outcome, it does not necessarily mean that he or she is thriving. In other words, the absence of risk factors does not mean that an individual’s development is being optimized (Pittman et al. 2005). For example, avoiding peers engaged in delinquent behaviors or not having low-quality teachers does not mean that young people have peer relationships that encourage academic excellence and teachers who are nurturing and exceptionally competent instructors. In this review, we build upon PYD and bioecological approaches to examine the existing evidence on factors that promote educational attainment, not just avoiding dropout. Since the developmental process of promoting graduation occurs over time, we are limiting the scope of this review to longitudinal studies.

In the current study, we complement previous reviews of high school dropout that have taken a risk and prevention approach by examining the key strengths and contextual assets that a young person needs in order to continue enrollment in school and/or to graduate from high school. We searched for factors that predict graduation or continued enrollment on five aspects of the ecology that are the most salient and proximal in the lives of young people: individual, family, peer, school, and community.

## Method

The literature review process included three stages. We began by identifying factors that consistently predict dropout, such as mobility, employment, substance use, and parental disengagement from school, as well as low-quality school climate, teacher relationships, peer relationships, and neighborhoods (e.g., Rumberger and Lim 2008). Although the lack of a risk factor does not equal a promotive factor, we used this prior research to generate ideas of potential positive factors to explore in our search.

In the second phase, we generated a list of search terms of the related research and ecological levels (i.e., individual, family, peers, school, and community). A full list of search terms can be found in Table 1. These terms and their derivatives were entered into the online scholarly databases Proquest, PsycInfo, JSTOR, Project Muse, Academic OneFile, PubMed, Web of Science, and Google Scholar. Additionally, citations were culled from peer-reviewed article bibliographies which included reports from educational research centers and doctoral dissertations. This phase yielded 250 journal articles and reports.

In our third phase, we refined our search results through the following criteria:

1. Direct predictors. The factor must directly predict graduation or continued enrollment (or the inverse, dropout) as the outcome variable.
2. Longitudinal. To account for issues of temporality (though not causality), the study must occur over at least 2 years and during adolescence.
3. Domestic. The focus of this paper is on educational attainment in the USA. Therefore, because of the substantial contextual differences across countries (Miller and Warren 2011), international studies were excluded.
4. Recent. Articles were limited to publication dates between 1993 and 2014 in order to ensure applicability of the findings to modern contexts.

**Table 1** Search terms used to find initial pool of 180 articles

| Level      | Search terms                                                                                                                                                                                                                                                                        | Outcome terms                                            |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| Individual | Engagement, “school engagement,” motivation, “intrinsic motivation,” “extrinsic motivation,” optimism, “locus of control,” expectation*, aspiration*, persistence, “self perception*”                                                                                               | Graduation, dropout, enrollment, “education* attainment” |
| Parents    | Family, Parent*, monitor*, communication, involvement, support, expectation*, connect*, “academic support,” “social support,” “parent-school involvement”                                                                                                                           |                                                          |
| Peers      | Peer*, achievement, norms, aspirations, expectations, support, connection                                                                                                                                                                                                           |                                                          |
| School     | School, teacher*, climate, expectation*, curriculum, “student-teacher relation*,” “teacher-student relation*,” mentor*, “vocational education,” “career and technical education,” belonging, bonding, “extracurricular,” athletic*, sport*, art*, club*, size, improvement, policy* |                                                          |
| Community  | Community, neighborhood, “collective efficacy,” “social cohesion,” “out-of-school time,” OST, mobility, “housing voucher,” “school voucher,” “social capital”                                                                                                                       |                                                          |



Based on these criteria, we retained 180 studies out of the 250. We developed a list of factors that these studies assessed as direct predictors of high school graduation and continued enrollment and further refined our inclusion list for a factor based on:

1. Evidence of effectiveness. Each factor has at least three different studies that provide empirical support for its effectiveness in predicting graduation or continued enrollment in high school. The studies providing support drew from at least two data sources. For example, we did not accept a factor supported by three studies which all used data from National Educational Longitudinal Study of 1988 (NELS:88) as an effective predictor.
2. Malleability. We are interested in determining potential points of intervention. We therefore limited our factors to those that are possible for practitioners and policy makers to impact. For example, we excluded demographic factors (e.g., race, gender, socioeconomic status) that predict graduation but are not points of intervention.

Based on these criteria, we generated a list of 10 evidence-based factors from 41 articles (see Table 2).

### A Note on Effect Sizes

A majority of the effect sizes reported in this review are presented as Beta weights, Cohen's *h*, and odds ratios; the last of which is convertible into a Cohen's *d* (Borenstein et al. 2009). We use Cohen's (1988) criteria for interpreting effect sizes as small, moderate, and large. Cohen's criteria represent a useful heuristic but are not definitive in expressing the impact of one factor on another across all fields of study (Ellis 2010). Therefore, we also consider the practical significance of the findings. For instance, a young person having higher expectations is related to an increased likelihood of high school graduation, with an odds ratio of 1.2. This ratio is considered to be a small effect according to Cohen's (1988) criteria, but a 20 % increase in the odds of graduation for a population exposed to multiple risk factors could be considered a huge success from a practical standpoint.

## Results

### Individual-Level Factors Promoting High School Graduation

A growing body of research shows that individual-level developmental assets of youth are related to differences in academic achievement, higher probabilities of academic attainment, and positive developmental outcomes (e.g., Benson et al. 2011). Based on our review criteria, we found four individual-level factors that predict graduation or continued enrollment: motivation, engagement, youth expectations for attainment, and locus of control (see Table 2). Although we have delineated these concepts here for clarity, many of the articles we reviewed emphasize the ways in which these concepts are interrelated.

**Intrinsic Motivation** Researchers studying motivation examine the beliefs, needs, and thoughts that promote individuals working toward specific tasks or activities (Pintrich 2003). Motivation promotes student educational attainment, and students who are more motivated are more likely to achieve positive educational outcomes than students who are less motivated (see

**Table 2** Citations with construct, sample composition, and effect size for individual-level studies

| Individual                         |              |                                                                                         |                                                                                     |                                               |
|------------------------------------|--------------|-----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------|
| Citation                           | Construct(s) | Sample composition                                                                      | Relation                                                                            | Effect size                                   |
| Abar et al. (2012)                 | Motivation   | $n = 15,362$ . Nationally representative                                                | Motivation $\rightarrow$ CE                                                         | Ranged from $\beta = .23$ to $\beta = 1.07^a$ |
| Connell et al. (1995)              | SE           | $n = 443$ . 100 % African American. All from 1 public school district in New York State | SE $\rightarrow$ CE (males)                                                         | $\beta = .22^a$                               |
| Driscoll (1999)                    | EA           | $n = 1781$ . 100 % Hispanic                                                             | EA $\rightarrow$ CE                                                                 | OR = 1.39                                     |
| Fall and Roberts (2012)            | SE, LC       | $N = 14,781$ . Nationally representative                                                | SE <sub>Behavioral</sub> $\rightarrow$ CE, SE <sub>Academic</sub> $\rightarrow$ CE  | $\beta = .30$ , $\beta = .27$                 |
| Finn and Rock (1997)               | SE, LC       | $n = 1803$ . African-American and Hispanic student sub-sample from NELS:88              | SE $\rightarrow$ CE (race), LC $\rightarrow$ CE                                     | $d = .68$ to $.76^a$ , $d = .30$ to $.69^a$   |
| Ou and Reynolds (2008)             | EA           | $n = 1286$ . 94 % African American, 83 % low income. All in Chicago, IL                 | EA $\rightarrow$ G                                                                  | $\beta = .52$                                 |
| Rumberger (1995)                   | SE, EA, LC   | $n = 17,424$ . Nationally representative                                                | SE $\rightarrow$ CE, EA $\rightarrow$ CE, LC $\rightarrow$ CE                       | $\beta = .67$ , $\beta = .79$ , $\beta = .57$ |
| Stearns et al. (2007)              | SE, EA       | $n = 13,356$ . Nationally representative                                                | SE $\rightarrow$ CE, EA $\rightarrow$ CE                                            | $d = -.21$ to $.72^a$                         |
| Suh et al. (2007)                  | EA           | $n = 4327$ . Nationally representative                                                  | EA $\rightarrow$ CE                                                                 | OR = 1.21                                     |
| Tenenbaum et al. (2007)            | Motivation   | $n = 44$ . 76 % White, 25 % low income. All in Boston, MA                               | Motivation $\rightarrow$ CE                                                         | $r = -.09$                                    |
| Wang and Fredericks (2014)         | SE           | $n = 1272$ . 58 % African American, 36 % White. 1 school district in northeast USA      | SE <sub>behavioral</sub> $\rightarrow$ CE, SE <sub>emotional</sub> $\rightarrow$ CE | $\beta = .16$ $\beta = .13$                   |
| Zimmerman and Schmeelk-Cone (2003) | Motivation   | $n = 681$ . 100 % African American in 1 Midwestern city                                 | Motivation $\rightarrow$ G                                                          | $\beta = .16$                                 |

SE school engagement, EA expectations for academic attainment, LC locus of control, CE continued enrollment, G graduation

<sup>a</sup> The effect size applies to a specific subgroup. All arrows indicate a positive relationship

Covington 2000; Pintrich 2003 for reviews). Motivational processes draw from what the student feels capable of achieving, his or her goals and aspirations, and whether the environment is supportive of those beliefs and goals (Covington 2000). Motivational processes can be *intrinsic*, wherein a person finds a task inherently interesting or enjoyable, or *extrinsic*, indicating that a person performs the task because it leads to another desired outcome (Ryan and Deci 2000). Intrinsic motivation has been found to promote educational outcomes (Cerasoli et al. 2014; Covington 2000; Eccles and Wigfield 2002).

We found three studies that specifically examine intrinsic motivation as a predictor of graduation or continued enrollment. One study of a small sample of 7th graders in Boston

revealed a positive correlation between intrinsic motivation and high school graduation (Tenenbaum et al. 2007). In a nationally representative study, Abar et al. (2012) used data from the Educational Longitudinal Study of 2002 (ELS:2002) to model five unique profiles for students' self-reported reasons for attending school in the 10th grade. This research showed that intrinsic motivation was beneficial to educational attainment, and that youth whose primary motivations were extrinsic displayed a dropout rate more than 50 % above the sample average (Abar et al. 2012).

Finally, Zimmerman and Schmeelk-Cone (2003) showed a direct relation between an individual's intrinsic academic motivation and his or her graduation status. Youths' prior school motivation positively and significantly predicted later youth motivation in school and likelihood of graduating. This relation was only significant for students who had not engaged in substance use prior to 9th grade (Zimmerman and Schmeelk-Cone 2003).

**School Engagement** Whereas motivation relates to underlying psychological processes, engagement describes an individual's commitment to and participation in a given context or activity (Appleton et al. 2008). School engagement can be behavioral (e.g., attending class, completing assignments), emotional (e.g., identification with school, liking school), and/or cognitive (e.g., taking a strategic approach to learning, intellectual curiosity; Wang and Holcombe 2010). Furthermore, researchers believe that behavioral, emotional, and cognitive components of engagement are interrelated (Appleton et al. 2008; Wang and Holcombe 2010). For instance, youth who are more emotionally engaged show increased behavioral engagement, whereas lower behavioral engagement undermines positive emotions, feeding into boredom, anxiety, and frustration (Skinner et al. 2008). Youth who exhibit high levels of all three types of school engagement are significantly less likely to drop out of school early and more likely to succeed academically (Stearns et al. 2007; Wang and Eccles 2012).

Research on the relation between engagement and high school graduation has focused primarily on aspects of behavioral engagement. We identified six studies finding that youth behavioral engagement promotes graduation and/or continued enrollment after controlling for the effects of individual characteristics such as race/ethnicity, SES, and gender (e.g., Stearns et al. 2007; Wang and Fredericks 2014). Behavioral engagement, including attendance and completing academic tasks, is a key variable for predicting high school dropout (Fall and Roberts 2012; Rumberger 1995). Research has shown that youth who were more behaviorally engaged were less likely to drop out (Fall and Roberts 2012) and that behavioral engagement predicts continued enrollment (Rumberger 1995). For instance, among a sample of African-American and Hispanic youth, Finn and Rock (1997) found significant differences in behavioral engagement, as indicated by attendance, between students who continued their enrollment compared with youth who dropped out. In addition, using data from NELS:88, Stearns et al. (2007) found that students who were engaged with social or academic aspects of school were more likely to stay in school. This finding was affirmed using NELS:88 data in which arts and athletic participation were both related to continued enrollment into 12th grade (Ream and Rumberger 2008); with athletic participation being significant for White and Latino students, but arts participation only being significant for White students. Finally, Connell et al. (1995) found that among African-American students in an urban New York school district, greater school engagement directly increased the probability of male students staying enrolled in school but only indirectly for female students (through reduced risk behaviors).

**Youth Expectations for Academic Attainment** We found five studies that students' academic expectations for themselves are an important predictor of graduation and continued enrollment (e.g., Driscoll 1999). These expectations may shape students' engagement in school and may help students to interpret and understand their experiences in high school (Stein and Hussong 2007). This may be because youth attend to information and experiences, which are consistent with their expectations (Olson et al. 1996). Accordingly, these expectations may shape different aspects of behavior such as effort, persistence, and academic performance (Eccles and Wigfield 2002).

The effects of youth expectations on graduation remain significant after accounting for gender (e.g., Suh et al. 2007) but may vary according to other individual differences such as race or ethnicity (e.g., Rumberger 1995). In a study using a primarily Black and low-income sample, Ou and Reynolds (2008) found that students' expectations to go to college were associated with a twofold increase in the probability of completing high school, beyond the influence of other factors. Consistent with these findings, researchers using data from the NELS:88 found that students were more likely to stay in school if they had higher educational expectations (e.g., obtaining an education beyond high school) and believed they were viewed positively by fellow students (Rumberger 1995). Among Hispanic students, youth who expected to graduate from college were much less likely to drop out than students with lower expectations (Driscoll 1999). Furthermore, related concepts such as optimism, or positive expectations for the future, have been shown to be a significant factor in increasing students' likelihood of staying in school using data from the National Longitudinal Study of Youth 1997 (NLSY:1997) (Suh et al. 2007). Finally, Stearns et al. (2007) found that students with negative views of their academic attainment were less likely to remain in school.

**Locus of Control** Youth who believe they control their academic outcomes (i.e., internal locus of control) tend to do better in school and persist when they encounter difficulties (Wentzel and Wigfield 1998). Internal locus of control may ultimately foster a more positive outlook on school and higher self-esteem, which constitute developmental assets that promote educational attainment (Borman and Overman 2004).

Three studies examined locus of control in relation to high school graduation and continued enrollment, while accounting for differences in individual characteristics (e.g., Finn and Rock 1997). Fall and Roberts (2012) examined the interactive and iterative roles of social context, self-perceptions, school engagement, and academic achievement as antecedents to the decision to drop out of school using data from ELS:2002. The authors found that students' perceived control over their school outcomes positively influenced their academic and behavioral engagement, which in turn, positively predicted their continued enrollment. Similarly, students with a high internal locus of control in 8th grade were more likely to remain in school in 10th grade than students with a more external locus of control in a sample drawn from NELS:88 (Rumberger 1995). Also using data from the NELS:88, Finn and Rock (1997) found that a greater sense of control over one's life was characteristic of low socioeconomic status minority students who stay in school. These final two studies also investigated race and gender as moderators of this relationship but found no significant interactions (Finn and Rock 1997; Rumberger 1995).

**Summary and Limitations** There is strong evidence that youth's motivation, school engagement, expectations for academic attainment, and locus of control influence their educational outcomes. The effect sizes of these factors ranged from small (e.g., Suh et al. 2007;

Tenenbaum et al. 2007) to moderate (e.g., Finn and Rock 1997; Stearns et al. 2007). However, these assets may operate differently based on the demographic characteristics of the youth. For instance, the extent to which intrinsic motivation serves as a promotive factor of continued enrollment may depend on students' age (Abar et al. 2012; Tenenbaum et al. 2007). By comparison, research on school engagement, locus of control, and expectations shows additional differences based on other demographic characteristics. Research also indicates that these individual factors are highly related to each other such that intervening in one area may lead to substantial differences in another.

There are limitations to the extant research. Motivation, engagement, youth expectations, and locus of control were not operationalized and measured consistently across studies. Second, more research exists on shorter-term academic outcomes instead of high school graduation (e.g., Borman and Overman 2004; Strayhorn 2010) or continued enrollment. More research is needed to understand the multitude of individual-level factors that relate to continued enrollment and graduation.

## Parental Factors Promoting Graduation

Families play a critical role in the development of children and adolescents (Bornstein 2002; Steinberg 2001), but only factors related to parenting have been identified as potential assets for promoting graduation in multiple studies (e.g., Englund et al. 2008; Rumberger 1995; Stone 2006). Parents are key socializing agents and provide critical resources, opportunities, and guidance across development (Grusec and Davidov 2007). Parents, as gatekeepers, are critical elements of the bioecological system. They can provide access to other key contexts, including peers and the school, as well as providing a home environment that fosters socioemotional and intellectual development. In turn, these contexts predict educational attainment (Bornstein 2002). We find two aspects of parenting for which there is evidence for a relation to high school graduation or continued enrollment: parental academic involvement and parent-child connection (see Table 3 for a summary of findings) (Englund et al. 2008; Rumberger 1995).

**Parental Academic Involvement** When parents are involved with educational experiences in the home and school, children and adolescents are more likely to graduate and achieve academically (Hill and Tyson 2009). Parents can be academically involved in home-based learning experiences like helping with homework, or with the school through involvement in committees, attending parent/teacher conferences, or communicating regularly with the school (Jeynes 2012).

Multiple studies using NELS:88 have affirmed the role of parental involvement in high school graduation and continued enrollment. Using two waves of NELS:88 data, Rumberger (1995) demonstrated a significant association between parental involvement with school activities in 8th grade and a greater likelihood of continued school enrollment into high school. The magnitude of this association varied by type of parental involvement and students' race. The more involved White parents were with meetings, conferences, and organizations during middle school, the more likely it was that students would remain enrolled during high school. For African-American families, parents setting clear rules about finishing homework and maintaining a good GPA predicted their children's continued enrollment in high school (Rumberger 1995).

**Table 3** Citations with construct, sample composition, and effect size for family-related studies

| Family related               |              |                                                                                                                                                       |                                               |                                              |
|------------------------------|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|----------------------------------------------|
| Citation                     | Construct(s) | Sample composition                                                                                                                                    | Relation                                      | Effect sizes                                 |
| Carpenter and Ramirez (2007) | PAI          | $n = 17,613$ . Nationally representative                                                                                                              | PAI $\rightarrow$ CE                          | OR = 1.75                                    |
| Jimerson et al. (2000)       | PAI          | $n = 177$ . 63 % white, 14 % African-American, 14 % mixed race; traditional students: 68 % white, 8 % African American, 21 % mixed race               | PAI $\rightarrow$ CE                          | Wilks' Lambda = 1.26                         |
| Ou and Reynolds (2008)       | PAI          | $n = 1286$ . 49 % male, 94 % Black, 83 % eligible for free lunch                                                                                      | PAI $\rightarrow$ G                           | No effects                                   |
| Rumberger (1995)             | PAI          | $n = 17,424$ . Nationally representative                                                                                                              | PCC $\rightarrow$ CE,<br>PAI $\rightarrow$ CE | OR = 1.17,<br>OR = 1.25 to 1.35 <sup>a</sup> |
| Stearns et al. (2007)        | PAI and PCC  | $n = 12,343$ – $13,356$ . Nationally representative                                                                                                   | PAI $\rightarrow$ CE,<br>PCC $\rightarrow$ CE | OR = 1.14 (PAI),<br>OR = 1.15 (PCC)          |
| Stone (2006)                 | PAI          | $n = 2174$ . Nationally representative.                                                                                                               | PAI $\rightarrow$ CE                          | OR = 1.06                                    |
| Englund et al. (2008)        | PCC          | $n = 179$ . All mothers were initially of low SES; 67 % are European American, 11 % are African American, 16 % are mixed ethnicity, and 2 % are other | PCC $\rightarrow$ CE,<br>PCC $\rightarrow$ G  | Partial $\eta^2 = .12$                       |
| Fall and Roberts (2012)      | PCC          | $n = 14,781$ . Nationally representative                                                                                                              | PCC $\rightarrow$ CE                          | $r = .29$                                    |
| Hess and Copeland (2001)     | PCC          | $n = 92$ . 54 % Hispanic, 41 % White, 39 % female                                                                                                     | PCC $\rightarrow$ CE,<br>PCC $\rightarrow$ G  | Not listed                                   |
| Teachman et al. (1997)       | PCC          | $n = 10,899$ . Nationally representative                                                                                                              | PCC $\rightarrow$ CE                          | OR = 1.10                                    |
| Tenenbaum et al. (2007)      | PCC          | $n = 44$ . 25 girls and 19 boys, first wave of data collected in 7th grade, 76 % European American, 25 % qualified for free lunch                     | PCC $\rightarrow$ G                           | OR = 1.15.                                   |

All arrows indicate a positive relationship

PAI parent academic involvement, PCC parent child connection, CE continued enrollment, G graduation

Four other studies using NELS:88 examined the role of parental involvement throughout high school. Using three waves of NELS:88, Teachman et al. (1997) found that adolescents whose parents were more involved during 10th grade (i.e., by directly contacting the school or belonging to a school organization) had a higher likelihood of continued enrollment than those whose parents who were less involved. Similar analyses which used the same three waves of NELS:88 data revealed that higher levels of parental involvement were associated with a greater likelihood of continued high school enrollment, notably among White and Black, though not Hispanic, students (Carpenter and Ramirez 2007). Building on Teachman et al.'s (1997) conceptualization of parent involvement, Stearns et al. (2007) found that parental involvement partially mediated the relation between grade retention and continued enrollment, with lower levels of parental involvement leading to a lower likelihood of continued enrollment among retained students. In addition, Stone (2006) also used three

waves of NELS:88 data to demonstrate that an increase in communication between the parent and school (although not direct parent interaction with the school) was associated with a higher probability of continued enrollment.

Jimerson et al. (2000) provide additional evidence for the role of parental involvement in continued enrollment in and graduation from high school. Parental involvement and contact with schools in sixth grade predicted later high school completion among a sample of low-income students followed for 19 years in Minnesota. Across these analyses, we find consistency in the relationship between parental involvement and high school graduation or continued enrollment. This relationship remains after accounting for the effects of family SES (Carpenter and Ramirez 2007; Jimerson et al. 2000; Rumberger 1995; Stone 2006), race/ethnicity, gender (Ou and Reynolds 2008; Rumberger 1995; Stearns et al. 2007), school composition (Carpenter and Ramirez 2007; Rumberger 1995; Stone 2006) and prior achievement (Stearns et al. 2007; Stone 2006).

**Parent-Child Connection** Parent-child connection is typically conceptualized as regular communication between the child and parent (e.g., Teachman et al. 1997) or emotional support (Tenenbaum et al. 2007). Parental support can lead to positive affect, self-confidence, and more cooperative behavior (e.g., Rueger et al. 2010) and predicts academic achievement and high school graduation or continued enrollment (Heckman 2008). Several studies conducted with NELS:88 indicate that parent-child connection predicts continued enrollment in high school, above and beyond the influence of race/ethnicity, gender, family SES, and prior achievement (Fall and Roberts 2012; Teachman et al. 1997; Tenenbaum et al. 2007; Stearns et al. 2007).

For example, Teachman et al.'s (1997) study examined parent-child connection or the extent of regular communication between parents and children and found a significant and positive relationship with high school enrollment such that more regular communication was associated with a greater likelihood of continued enrollment. Using the same conceptualization of parent-child connection, Stearns et al. (2007) found that the likelihood of high school dropout among retained students was attenuated by parent-child connection, indicating that parent-child connection may be a protective factor buffering risk; however, this buffering effect was only significant for early (8th grade) dropout risk.

Three regional studies also demonstrate a role for parental support in continued enrollment. Experiencing emotional support from a parent was positively associated with the odds of staying in school among a sample of low-income participants followed for 23 years in Minnesota (Englund et al. 2008). In two separate regional studies, parental social support as a coping strategy against stress in 9th grade was associated with continued enrollment into 12th grade (Hess and Copeland 2001).

**Summary and Limitations** Based on our review of the longitudinal research, we conclude that parental academic involvement and parent-child connection are significantly and positively associated with students' likelihood of continued enrollment and high school graduation. The children of parents who are involved in school organizations, attend conferences, and communicate with the teachers and staff are more likely to complete high school. In addition, children who have close and sharing relationships with their parents also are more likely to graduate. However, the effect sizes for these associations are small. Furthermore, many of these studies used the same data, NELS:88, possibly biasing our conclusions. In addition, the operationalization of concepts was inconsistent across studies, raising the question of whether certain aspects of parental involvement and connection are more important than others or are implicated only in certain contexts.



## Peer-Related Factors Promoting Graduation

Peers can be defined as same-age youth who adolescents see on a regular basis. When these relationships are positive, peers can serve as an important source of social support that buffers against environmental stressors and promotes thriving and achievement (Wentzel et al. 2004). Furthermore, peers can create positive norms that promote academic engagement, achievement, and attainment (Gest et al. 2008; Wentzel et al. 2012; Ryabov 2011; Ryan 2001). However, we were only able to find one aspect of peer relationships met our criteria for inclusion: peer norms for achievement (see Table 4).

**Positive Peer Norms** Peer norms are the expectations, values, and behaviors that exist within a group of same-aged youth who see each other on a regular basis (Veenstra et al. 2013). Peer norms can include expectations for social acceptance or exclusion, drug use or avoidance, and academic achievement or disengagement (e.g., Poulin et al. 1999; Ryan 2001). Peer groups provide implicit and explicit messages of what is valued and how peers expect each other to behave. Youth are, therefore, motivated to conform to these norms so that they remain connected to their peer group (Ryan and Deci 2000; Veenstra et al. 2013).

Four studies assessed the direct effects of peer norms related to academic achievement on academic attainment (Barile et al. 2012; Pallardy 2013; Ream and Rumberger 2008; Ryabov 2011). In a study using data from The National Longitudinal Study of Adolescent Health (Add Health), higher average GPA of a students' peer network, as a proxy for achievement norms, significantly predicted an increase in the likelihood of graduation (Ryabov 2011). This association remained after accounting for several covariates, including race, gender, immigrant status, and parents' education. Similarly, Pallardy (2013), using NELS data from 10th grade, 12th grade, and 2 years after participants' on-time graduation, examined the relation between academic peer norms and graduation. In another study using NELS data, Ream and Rumberger (2008) found a significant, but modest relation between the value that friends place on education in 10th grade and continuing their education into 12th grade, but only for non-Latino White students. A final study, using ELS:2002 data, found that having close friends with high academic aspirations (i.e., norm around valuing academic achievement) in sophomore year of high school significantly increased the likelihood that youth would still be enrolled in school during their senior year (Barile et al. 2012).

**Summary and Limitations** Overall, these four studies provide evidence that having friends and peers who support academic attainment increases the likelihood of graduation and

**Table 4** Citations with construct, sample composition, and effect size for peer-level studies

| Peer-related         |              |                                          |                                    |               |
|----------------------|--------------|------------------------------------------|------------------------------------|---------------|
| Citation             | Construct(s) | Sample composition                       | Relation                           | Effect size   |
| Barile et al. (2012) | Peer norms   | $n = 7779$ . Nationally representative   | Peer aspirations $\rightarrow$ CE. | $\beta = .09$ |
| Ryabov (2011)        | Peer norms   | $n = 19,117$ . Nationally representative | Peer average GPA $\rightarrow$ G   | $\beta = .78$ |
| Suh et al. (2007)    | Peer norms   | $n = 4327$ . Nationally representative   | Peer aspirations $\rightarrow$ CE  | $d = .10$     |

All arrows indicate a positive relationship

CE continued enrollment, G graduation

continued enrollment. The evidence is from nationally representative, longitudinal datasets. Effect sizes were small, with one exception that was moderately large (Ryabov 2011). However, it is important to note that although there is significant research on the importance of peer relationships in schools (e.g., Wentzel et al. 2004), we were only able to find one factor with significant evidence linking peers to high school graduation and continued enrollment. Furthermore, peer effects were not the primary analyses in these four studies but were included as covariates to support other research questions.

## School-Related Factors Promoting High School Graduation

Factors within schools intuitively should play a direct role in promoting high school graduation (Barile et al. 2012; McNeal 1995). We found longitudinal support for three school-related factors that can promote both of these outcomes: positive student-teacher relationships (Barile et al. 2012; Rumberger 1995), small schools (Barrow et al. 2015; Bloom et al. 2010; Schwartz et al. 2013), and participation in school-based extracurricular activities (Mahoney et al. 2003; McNeal 1995). We briefly define and review each of these characteristics (see Table 5). We note, too, that several other factors, such as teacher quality and positive school climate, did not have sufficient evidence to be included in our findings.

**Positive Student-Teacher Relationships** Positive Student-Teacher Relationships (STR) are commonly conceptualized as students' belief in teachers' competence, teachers' expression of care for and interest in their students, cordial and respectful interactions between the two (Barile et al. 2012; Croninger and Lee 2001; Fall and Roberts 2012; Lee and Burkam 2003), and the ability of students to talk to teachers about academic or personal (Brooks 2010; Croninger and Lee 2001). Furthermore, teachers can also mentor youth, and form a particularly intensive type of positive STR.

STRs are an integral part of the school ecology because they encourage school-based learning. Moreover, the quality of the STR has been shown to predict numerous outcomes such as academic achievement (Wentzel et al. 2004), school engagement (Connell et al. 1995; Wang and Fredericks 2014), and graduation (Barile et al. 2012; Croninger and Lee 2001).

Five longitudinal studies, using data derived from three nationally representative surveys, have found evidence that positive STRs are related to continued enrollment. This relationship remained after accounting for family SES (Barile et al. 2012; Stearns et al. 2007), prior achievement (Croninger and Lee 2001; Lee and Burkam 2003; Rumberger 1995) and school structure/composition (Barile et al. 2012; Lee and Burkam 2003; Pellerin 2005; Rumberger 1995). Eight studies, using data from the NELS:88 (Croninger and Lee 2001; Lee and Burkam 2003; Pellerin 2005; Rumberger 1995; Stearns et al. 2007) and ELS:2002 (Barile et al. 2012; Brooks 2010; Fall and Roberts 2012), point to multiple dimensions of STRs (e.g., teacher caring, students' perceptions of teacher competence, and mutual respect) positively predicting continued enrollment and high school graduation. For example, STRs in 10th grade positively predict enrollment in 12th grade (Barile et al. 2012; Croninger and Lee 2001; Fall and Roberts 2012; Stearns et al. 2007) and eventual graduation from high school (Brooks 2010), though this relationship may vary by race/ethnicity (Stearns et al. 2007). The effect of STRs may also be moderated by level of risk and the component of STR being examined. For instance, Croninger and Lee (2001) found that the influence of having generally supportive and respectful relationships with teachers was greater for low-risk students, whereas the ability

**Table 5** Citations with construct, sample composition, and effect size for school-related studies

| School related               |              |                                                                                                                                                                                                                                                               |                                                        |                                                                                       |
|------------------------------|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------------------------------------------|
| Citation                     | Construct    | Sample composition                                                                                                                                                                                                                                            | Relation                                               | Effect size                                                                           |
| Ahrens et al. (2010)         | STR          | $n = 1714$ . 100 % receiving SPED services                                                                                                                                                                                                                    | $M \rightarrow G$                                      | OR = 2.53                                                                             |
| Barile et al. (2012)         | STR          | $n = 7779$ . Nationally representative                                                                                                                                                                                                                        | $STR \rightarrow CE$                                   | $\beta = .47$                                                                         |
| Croninger and Lee (2001)     | STR          | $n = 10,979$ . Nationally representative                                                                                                                                                                                                                      | $STR \rightarrow CE$                                   | $\beta = .39^a$                                                                       |
| Erickson and Phillips (2012) | STR          | $n = 8379$ . Nationally representative                                                                                                                                                                                                                        | $M \rightarrow G$                                      | OR = 2.21                                                                             |
| Fall and Roberts (2012)      | STR          | $n = 14,781$ . Nationally representative                                                                                                                                                                                                                      | $STR \rightarrow CE$                                   | $R = .22$                                                                             |
| Hayes (1998)                 | STR          | $n = 118$ . 90.5 % White, 15 % low income                                                                                                                                                                                                                     | $M \rightarrow G$                                      | $h = .50$                                                                             |
| Lee and Burkam (2003)        | STR          | $n = 3840$ . Nationally representative                                                                                                                                                                                                                        | $STR \rightarrow CE$                                   | OR = 1.14                                                                             |
| O'Connor (1995)              | STR          | $n = 257$                                                                                                                                                                                                                                                     | $M \rightarrow CE$                                     | $h = .32$                                                                             |
| Pellerin (2005)              | STR          | $n = 4743$ . 50.6 % minority. 100 % urban                                                                                                                                                                                                                     | $STR \rightarrow CE$                                   | $\beta = .18$                                                                         |
| Stearns et al. (2007)        | STR          | $n = 12,343$ . Nationally representative                                                                                                                                                                                                                      | $STR \rightarrow CE$                                   | $\beta = .36$                                                                         |
| Brooks (2010)                | STR and ECA  | $n = 11,360$ . Nationally representative                                                                                                                                                                                                                      | $STR \rightarrow G$ ,<br>$ECA \rightarrow G$           | OR = 1.16 to 1.26 <sup>a</sup> ,<br>OR = 1.11 to 1.57 <sup>a</sup>                    |
| Rumberger (1995)             | STR and ECA  | $n = 17,424$ . Nationally representative                                                                                                                                                                                                                      | $STR \rightarrow CE$ ,<br>$ECA \rightarrow CE$         | OR = 1.21 <sup>a</sup> ,<br>OR = 1.43 <sup>a</sup>                                    |
| Mahoney and Cairns (1997)    | ECA          | $n = 329$ . 25 % Black, Southern USA                                                                                                                                                                                                                          | $ECA \rightarrow CE$ (boys and girls)                  | $h_{\text{boys}} = 1.39^a$ ,<br>$h_{\text{girls}} = .88^a$                            |
| Mahoney (2000)               | ECA          | $n = 695$ . 25 % Black, Southern USA                                                                                                                                                                                                                          | $ECA \rightarrow CE$ (high-risk boys, high-risk girls) | OR = 2.5 <sup>a</sup> , OR = 4.0 <sup>a</sup>                                         |
| Mahoney et al. (2003)        | ECA          | $n = 695$ . 25 % Black, Southern USA                                                                                                                                                                                                                          | $ECA \rightarrow G$                                    | $\beta = .30$                                                                         |
| McNeal (1995)                | ECA          | $n = 14,249$ . Nationally representative                                                                                                                                                                                                                      | $ECA \rightarrow CE$                                   | OR = 1.40 <sup>a</sup>                                                                |
| Randolph et al. (2004)       | ECA          | $n = 692$ . urban, low income, 90 % Black                                                                                                                                                                                                                     | $ECA \rightarrow CE$                                   | OR = 1.80                                                                             |
| Barrow et al. (2015)         | Small school | 5 cohorts of 9th graders from 22 schools from the Chicago Public Schools district (compared with their former 8th-grade peers from 400 middle schools). 48 % female, 79 % Black, and 19 % Hispanic (compared with 48 % female, 64 % Black, and 29 % Hispanic) | $SS \rightarrow CE$ , $SS \rightarrow G$               | $\beta = .19$ for on-time 11th-grade enrollment. $\beta = .18$ for on-time 11th grade |
| Bloom et al. (2010)          | Small school | $n = 30,959$ , 46 % male, 47.3 % Hispanic, 43.6 % Black for small school                                                                                                                                                                                      | $SS \rightarrow G$                                     | 6.8 percentage point difference in graduation rates                                   |

**Table 5** (continued)

| School related             |              |                                                                                                                                                                                                                                                                                      |                      |                                                                                               |
|----------------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------------------|
| Citation                   | Construct    | Sample composition                                                                                                                                                                                                                                                                   | Relation             | Effect size                                                                                   |
| Schwartz et al. (2013)     | Small school | lottery winners in NYC; 45.5 % male, 47.9 % Hispanic, 43.2 % Black for comparison group<br>$n = 76$ , 213 in NYC (15,444 small school students), 56.94 % female, 42.90 % Black, 42.28 Hispanic for small schools; 52.45 % female, 35.82 % Black, 34.98 % Hispanic for large schools) | SS $\rightarrow$ G   | $\beta = .18$ for on-time graduation.                                                         |
| Plank (2001)               | CTE          | $n = 10,408$ nationally representative                                                                                                                                                                                                                                               | CTE $\rightarrow$ CE | $b = -4.57$ (reducing dropout)                                                                |
| Plank et al. (2008)        | CTE          | $n = 846$ from NLSY with full transcript data                                                                                                                                                                                                                                        | CTE $\rightarrow$ CE | $b = .04$ for on-time 9th graders                                                             |
| Rasinski and Pedlow (1994) | CTE          | $n = 14,625$ nationally representative                                                                                                                                                                                                                                               | CTE $\rightarrow$ CE | $b = -2.06$                                                                                   |
| Rivera-Batiz (2003)        | CTE          | $n = 4448$ , nationally representative                                                                                                                                                                                                                                               | CTE $\rightarrow$ CE | MLE = $- .47$                                                                                 |
| Kemple and Snipes (2000)   | CTE          | $n = 1764$ , 44.6 % male, 30.9 % Black, 55.5 % Hispanic for academy sample (429 % male, 29.4 % Black, 50.0 % Hispanic for non-academy sample)                                                                                                                                        | CTE $\rightarrow$ CE | 11 percentage point difference in not leaving school by 12th grade (for high-risk youth only) |

CE continuous enrollment, CTE career and technical education, ECA extracurricular activities, G graduation, M mentoring, SS small school, STR student-teacher relationships

<sup>a</sup> The effect size applies to specific subgroup or sub-construct. All arrows indicate a positive relationship

of students to talk with teachers about personal or academic issues had a greater effect on continued enrollment for high-risk students (see Table 6).

These results were also found using NELS:88 data (Lee and Burkam 2003; Pellerin 2005). School-level STRs at 10th grade positively predicted enrollment at 12th grade (Lee and Burkam 2003). In addition, authoritative schools characterized, in part, by positive STRs had lower dropout rates than authoritarian schools characterized in part by poor STRs (Pellerin 2005), indicating that STRs are important in teacher-student dyadic relationships, as well as at the school level.

Additional evidence for the importance of positive student-teacher relationships can be found in four studies of teacher mentoring and high school graduation. Two studies using data from Add Health found a positive relationship between teacher mentoring, and general (Erickson and Phillips 2012) and special education students' (Ahrens et al. 2010) likelihood of graduating from high school, net family structure, verbal aptitude, and parent/school/peer connection above and beyond the effects of prior achievement, and family/neighborhood SES. Teacher mentoring of students has also been integrated into dropout prevention programs and

**Table 6** Citations with construct, sample composition, and effect size for community-related studies

| Community                |              |                                                                                                                      |                                                                          |                                                                                              |
|--------------------------|--------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| Citation                 | Construct    | Sample Composition                                                                                                   | Relation                                                                 | Effect Sizes                                                                                 |
| Hahn et al. (1994)       | OST programs | $n = 400$ . All low income. 5 sites in Northeast, Midwest and South                                                  | OST programs $\rightarrow$ CE,<br>OST programs $\rightarrow$ G           | $h = .42$ , $h = .57$                                                                        |
| George et al. (2007)     | OST programs | $n = 20,370$ . All Chicago Public Schools students                                                                   | OST programs $\rightarrow$ CE,<br>OST programs $\rightarrow$ G           | OR = 1.60 <sup>a</sup> to 2.72 <sup>a</sup> ,<br>OR = 1.54 <sup>a</sup> to 1.70 <sup>a</sup> |
| Harlow and Baenen (2001) | OST programs | $n = 166$ . 51.2 % Black, 5.8 % Hispanic, 32.6 % White. 34 % low income. All in Wake Co., NC                         | OST programs $\rightarrow$ CE                                            | $h = .54$                                                                                    |
| Schimm et al. (2006)     | OST programs | $n = 1100$ . 26 % Hispanic, 68 % African American.                                                                   | OST programs $\rightarrow$ CE,<br>OST programs $\rightarrow$ G           | No effects                                                                                   |
| Rodriguez-Planas (2012)  | OST programs | 5 sites in Midwest, South, Northeast, and Pacific Northwest                                                          | OST programs $\rightarrow$ G<br>(students under 14)                      | $H = .15$                                                                                    |
| Myers and Schim (1999)   | OST programs | $n = 2800$ . 28 % White, 19 % Hispanic, 43 % Black, 10 % other. 85 % low income. 6 % had parent with college degree. | OST programs $\rightarrow$ CE,<br>OST programs $\rightarrow$ G           | $h = .85^a$ , $h = .44^a$                                                                    |
| Myers et al. (2004)      | OST programs | 67 sites across the USA                                                                                              | OST programs $\rightarrow$ G                                             | No effects                                                                                   |
| Nathan (2013)            | OST programs | 67 sites across the USA                                                                                              | OST programs $\rightarrow$ G                                             | $h = .16$                                                                                    |
| Arcaira et al. (2010)    | OST programs | $n = 896$ . 75 % Black, 21 % Hispanic, 84 % low income. Boston, MA                                                   | OST programs $\rightarrow$ G<br>(students at non-selective high schools) | OR = 1.9 <sup>a</sup>                                                                        |

OST out-of-school time, CE continued enrollment, G graduation

<sup>a</sup> The effect size is applicable to specific subgroup or sub-construct. All arrows indicate a positive relationship

found to be effective at promoting continued enrollment. In two quasi-experimental evaluations of programs that paired students at high risk for dropout with teacher mentors, mentored students had higher graduation rates than peers in comparison groups that were matched on prior achievement, attendance, and attitudes toward school (Hayes 1998; O'Connor 1995).

**School-Sponsored Extracurricular Activities** Extracurricular activities (ECAs) are school-sponsored activities that are optional for students, ungraded, and usually take place outside the normal school day, but inside school facilities. These activities include athletics, academic and special interest clubs, student government, student publications, and performing arts groups (Mahoney and Cairns 1997). ECAs are an integral part of the school ecology because they provide an important way for students to involve themselves in the institutional life of the school (McNeal 1995). ECAs may promote continued enrollment because they connect students to positive peer networks that expose youth to positive academic norms (Mahoney 2000) and foster attachment to school (Mahoney and Cairns 1997). These positive connections also foster students' sense of agency, high aspirations, and high levels of social competence; all of which predict educational attainment (Mahoney et al. 2003).

Several empirical studies support the notion that participation in ECAs during middle and high school, positive connection to peers, school attachment, and continued enrollment are all interrelated (Mahoney et al. 2003; McNeal 1995; Rumberger 1995). In eight longitudinal studies, ECA participation during middle and/or high school positively predicted students' likelihood of high school graduation (Brooks 2010; Mahoney et al. 2003), as well as continued

enrollment in school after accounting for SES, gender, race, immigrant status (Mahoney 2000; Mahoney and Cairns 1997; McNeal 1995; Randolph et al. 2004; Ream and Rumberger 2008), prior achievement, and school composition (Rumberger 1995). In four studies using nationally representative samples from high school and beyond, NELS:88, and ELS:2002, participation in at least one activity during middle or high school was associated with an increased likelihood of being enrolled in school in 10th grade, 12th grade, and ultimately graduating (Brooks 2010; McNeal 1995; Ream and Rumberger 2008; Rumberger 1995). The effects of ECA participation on continued enrollment and high school graduation have been further demonstrated in regional studies involving children of welfare recipients (Randolph et al. 2004) and a diverse sample of youth from Southeastern USA (Mahoney 2000; Mahoney and Cairns 1997; Mahoney et al. 2003).

From a bioecological perspective, the relationship between ECA participation and continued enrollment/graduation may be attenuated by individual characteristics, as well as type of ECA. Specifically, when analyzed by race/ethnicity, findings from NELS:88 only remained significant for White students in one study (Rumberger 1995) but were also found to be significant in a separate study using NELS for Mexican-American students (Ream and Rumberger 2008). Furthermore, in the Mahoney (2000) and Mahoney and Cairns (1997) studies, ECAs were found to have a stronger effect on graduation for youth with low academic competency and highly aggressive behavior. When ECAs were disaggregated by type, participation in athletics or performing arts was associated with a higher likelihood of enrollment (McNeal 1995), while community service participation was associated with an increased probability of graduation (Brooks 2010).

**Small Schools** Small schools are conceived to encourage closer connections between students and teachers, as well as among students, provide students with more individualized attention, and create a more cohesive school culture (Lee and Smith 1997). Correlational studies have found mixed results on school size on academic proficiency and attainment, with some studies showing the benefits of smaller schools and others showing no benefit (see Bloom and Unterman 2014 for a review). More recent experimental and quasi-experimental studies in New York City and Chicago have focused on a new generation of small schools based on proposals developed by educators, independent school operators, and other institutional stakeholders. Inherent in all of the chosen schools is an emphasis on building strong relationships between students and teachers, as well as individual schools having more autonomy for teacher and staff hiring, and for implementing curriculum (e.g., see Bloom et al. 2010). In New York City, Bloom et al. evaluated 123 new small high schools, using a lottery process to estimate the impacts of the schools on long-term educational outcomes. The researchers find that the schools, on average, increase 4-year, on-time graduation rates by 6.8 percentage points. Similar results were found in an evaluation of Chicago's High School ReDesign initiative (Barrow et al. 2015), which created 22 small schools. Using an instrumental variable approach, the researchers found that students attending the small schools were more likely to persist in high school and graduate than those attending other Chicago Public Schools. More specifically, attending one of these small schools increased the likelihood of progressing on time (i.e., continued enrollment) to 10th grade by 13 percentage points and to 11th grade by 18 percentage points. Barrow et al. (2015) note that the 9 percentage point increase in graduation rates from attending a small school is substantive, but, because of large standard errors, not significant. In a third study, Schwartz et al. (2013) were able to leverage the administrative data in New York City to compare newly created small schools to larger

schools, as well as comparing older small schools to larger schools. Their findings confirm that the newer model of small schools is what makes the difference for student outcomes. They find that the newer schools increase the probability of graduating on time by 17.5 %, but that the older small schools had a negative effect; suggesting that the older small schools performed worse than larger schools (Schwartz et al. 2013).

**Career and Technical Education** Career and Technical Education (CTE) courses are aimed at developing skills for life or employment that focus on (1) family/consumer sciences (e.g., nutrition and personal finance) (2) general labor market preparation or (3) career preparation in specific labor market areas such as health care or business (Agodini and Deke 2004; Plank et al. 2008). CTE has become a common component of American high schools—more than 90 % of comprehensive high schools in America offer some CTE courses (Levesque et al. 2008) and nearly 90 % of American high school students taking at least one CTE course (Levesque et al. 2008). CTE models have typically been directed toward youth who do not have college aspirations (Kulik 1998; Plank 2001). In order to be relevant, encourage greater school engagement, and promote continued enrollment (and not to marginalize non-college-going youth), theory and research suggest that CTE courses should be part of an academically rigorous and broad course of study during high school (Elliott et al. 2002; Plank et al. 2008; Plank 2001). Because CTE models have been implemented with a bias toward large, low-income, and majority racial and ethnic minority districts (Kulik 1998; Kemple and Snipes 2000), low-income and minority students are over-represented in studies of CTE (Elliott et al. 2002; Hayward and Tallmadge 1995; Maxwell and Rubin 1997; Kemple and Snipes 2000; Rivera-Batiz 2003).

Four observational studies with nationally representative samples provide empirical support for the notion that CTE course-taking promotes continued enrollment (Plank 2001; Plank et al. 2008; Rasinski and Pedlow 1994; Rivera-Batiz 2003). Two studies using data from the NELS:88 found CTE course-taking to be associated with staying in school (Plank 2001; Rasinski and Pedlow 1998). Specifically, the ratio of three CTE courses to four academic courses was associated with the highest likelihood of persisting in school (Plank 2001).

A third NELS:88 study by Agodini and Deke (2004) found no association between CTE course-taking and continued enrollment, but these divergent results might be explained by the fact that this study was both more inclusive in defining CTE courses and less inclusive in defining students who had left school than the previous two studies. For example, Agodini and Deke (2004) included courses in family and consumer sciences as CTE courses, which were not included in the other two studies (Plank 2001; Rasinski and Pedlow 1998). Furthermore, Agodini and Deke (2004) also excluded students from their study who left school, but gave no reason for leaving school. Such students were included as dropouts in the other two NELS:88-based studies (Plank 2001; Rasinski and Pedlow 1998).

Two additional studies using data from the NLSY:1997 affirm the findings from the NELS:88 studies. Plank's (2001) earlier findings on course-taking were replicated (Plank et al. 2008), while in another study CTE course-taking in conjunction with work-place based learning experiences (e.g., job shadowing) was found to be associated with continued enrollment, but only for a sub-sample of racial and ethnic minority students (Rivera-Batiz 2003).

CTEs can be included in schools as career academies, which are programs within high schools aimed at keeping students in school through a combination of CTE coursework in specific career areas, rigorous academics, work experience, and small student-teacher cohorts (Kemple and Snipes 2000). Two quasi-experimental or experimental studies involving primarily minority, low-income, and urban students evaluated the CTE model of career



academies and found them to positively impact continual enrollment in high school (Elliott et al. 2002; Kemple and Snipes 2000). Kemple and Snipes (2000) found that career academies only had an impact on continued enrollment for students identified as being at a high risk for leaving school. Further, a study of several career academies in New York State found lower continued enrollment among CTE students compared with similar peers in general education programs (Crain et al. 1999). However, much of the added likelihood of leaving school could be explained as a function of push-out at 11th grade due to caps on 11th- and 12th-grade enrollment in those programs (Crain et al. 1999).

**Summary and Limitations** The extant literature indicates that positive STRs, participation in school-based ECAs during middle school and high school, small schools, and CTE models positively predict students' continued enrollment in and graduation from high school. The effects of these factors ranged from small to a few large effects. The effects remained after accounting for individual-, family-, and school-level factors. We note, though, that the majority of studies on STRs and ECAs used continued enrollment (or high school dropout) as the dependent variable. Although a few studies included high school graduation (see Table 6 for a summary of findings), more research is necessary before we can be as confident in the effect of STRs and ECAs on graduation as we are in their effects on continued enrollment. In addition, there is a possibility that other variables not assessed in the studies, such as motivation, could be implicated in a student's decision to participate in school-based ECAs and be the direct reason for the increased likelihood of graduation. For the small schools studies, only New York City and Chicago were included. We do not know if these school models would be effective in other urban, rural, or suburban contexts. Finally, CTE has a robust research base on its impact on continued enrollment and graduation. However, the programs are primarily geared toward students who have been identified as *at risk* for leaving school. The effectiveness of CTEs on a more general student population is not well documented.

### Community-Level Factors Promoting Graduation

Communities provide adolescents with access to critical resources and forms of social control (Leventhal et al. 2009) and are likely to contribute to high school graduation rates. Youth who live in communities characterized by supportive social networks, positive social norms, and high quality institutional resources are more likely to develop skills and competencies important for success in school and in life than youth in low-resource communities (Brooks-Gunn et al. 1993; Leventhal et al. 2009). We searched for studies examining the relationships between many community-level factors such as collective efficacy (i.e., the extent to which community residents can act together on shared values) and graduation but found only one supported by the extant evidence. Community-based out-of-school time (OST) programs have been found to be a community institutional resource that can promote continued enrollment and graduation from high school (see Table 6; George et al. 2007; Nathan 2013; Rodriguez-Planas 2012).

**Participation in Community-Based Out-of-School Time Programs** OST is a label applied to a heterogeneous set of programs that commonly consist of structured adult-led activities such as community service, academic enrichment, or social-emotional learning. These programs are offered outside of the normal school day, and are based in institutions such as universities and community-based organizations (e.g., Payton et al. 2008). Community-based

OST programs share many features with school-based ECAs, but differ in one critical respect and are, therefore, considered separately here. Whereas school-based ECAs are positioned to integrate students into the life of a school (Mahoney and Cairns 1997), community-based OST programs work are accessed through a separate sphere in young people's lives.

Evaluations of five community-based OST programs have found participation to promote continued enrollment and high school graduation (Arcaira et al. 2010; George et al. 2007; Harlow and Baenen 2001; Nathan 2013; Rodriguez-Planas 2012): SummerBridge, Citizen Schools, After-School Matters, The Quantum Opportunities Project (QOP), and Upward Bound. SummerBridge, Citizen Schools, and After-School Matters were evaluated using quasi-experimental designs, which controlled for endogeneity through subject matching (Arcaira et al. 2010; Harlow and Baenen 2001) or by accounting for other factors associated with graduation such as prior achievement, SES, and educational aspirations (George et al. 2007). QOP and Upward Bound were both evaluated using designs that controlled for selection effects through random assignment.

The largest program effects were associated with After-School Matters. Students who participated the most intensively had a much greater likelihood of finishing high school than non-participating peers (George et al. 2007). Other program effects were more modest (Arcaira et al. 2010; Nathan 2013; Rodriguez-Planas 2012). The content of these programs differed in terms of their specific offerings but shared three common elements: (1) adult-led activities focused on academic enrichment and support outside of the normal school day, (2) activities were housed at community-based institutions, and (3) participants comprised mostly or entirely of socioeconomically disadvantaged youth (Arcaira et al. 2010; George et al. 2007; Harlow and Baenen 2001; Nathan 2013; Rodriguez-Planas 2012).

Program effects for QOP and Upward Bound were evaluated for longevity as well as across subgroups (Myers and Schirm 1999; Rodriguez-Planas 2012). The impacts on educational attainment became non-significant when the participants were assessed in their early to mid-20s, because the comparison group participants' attainment caught up to their program group peers (Myers et al. 2004; Schirm et al. 2006). When tested for moderation, Upward Bound effects were significant for White, male and low-SES students, and students with low educational expectations (Myers and Schirm 1999). Further analysis of Upward Bound data with trimmed sample weights, however, revealed that all program participants were more likely to finish high school than similar non-participating peers with larger effects for students at high risk due to poor prior academic performance or involvement with the justice system (Nathan 2013). Further analysis of QOP data also suggested that attainment benefits persisted for participants at only some program sites (Rodriguez-Planas 2012), and that the effects persisted most for those who were 14 years old or younger in 9th grade, suggesting that QOP might not be effective for youth who had been retained prior to 9th grade. Lastly, Arcaira et al. (2010) found that Citizen Schools' effects on the likelihood of graduation extended only to students attending non-selective enrollment schools.

**Summary and Limitations** The extant longitudinal research on community-based OST programs and high school graduation indicates that several programs successfully promoted continued enrollment and graduation from high school among socioeconomically disadvantaged urban students of color. Effects of these programs ranged from small to moderate. Furthermore, given the use of experimental and quasi-experimental designs with systematic matching, we can infer a likely causal link between program participation and graduating from high school in the populations studied.

This body of research is, however, limited in three important respects. First, the studies have focused on specific geographies and types of student. The generalizability of their findings is, therefore, limited. Second, four of the five studies cited in this section evaluated programs across multiple sites, but did not analyze whether the results differed by site (Arcaira et al. 2010; George et al. 2007; Nathan 2013; Rodriguez-Planas 2012). Considering the wide variation in the effects of QOP (Rodriguez-Planas 2012), there is a strong possibility that effects may differ due to program fidelity and differences in local culture, among other reasons. Finally, the intensity (number of hours per week) and duration (total time spent attending a given program) with which youth participate in programs has been found to influence the outcomes of youth (Durlak et al. 2010; Payton et al. 2008), yet only the evaluators of After-School Matters examined program duration and intensity as potential moderators (George et al. 2007). However, we find that community-based OST programs aimed at promoting positive academic outcomes among disadvantaged youth constitute a potential upstream point of intervention for promoting graduation from high school.

## Discussion

Nearly one in five young people do not graduate high school on time, if ever (DiPaoli et al. 2015), resulting in substantial economic, social, and civic costs to the individual and to society (Nover et al. 2010; Sum et al. 2009). Prior syntheses of the research on graduating or leaving high school have focused largely on risk factors (e.g., Hammond et al. 2007; Rumberger and Lim 2008; Tyler and Lofstrom 2009). This article complements and extends those efforts by examining assets across a youth's ecology that directly predict high school graduation or continued school enrollment. Using bioecological (Bronfenbrenner and Morris 2006) and PYD (Benson et al. 2006; Lerner et al. 2009) frameworks as our guide, we found 41 studies that support the existence of 12 assets within the individual, family, peer group, school, and broader community that directly predict high school graduation and continued enrollment. The effect sizes we found were generally small, indicating that the promotive factors across levels of the ecology had significant but modest direct effects on high school graduation and continued enrollment.

By contrast, we also found little research that took into account the dynamics of person-context relations. Especially important, none of the studies systematically examined the contexts through the lens of youth from historically disenfranchised communities, instead using demographic markers as control or moderating variables. Therefore, little is known about for whom the factors are most salient, within which contexts (for exceptions, see Mahoney 2000; Nathan 2013; Rumberger 1995), and why these factors are or are not salient. Even with this limitation in knowing, the findings, taken together, provide valuable insights into ways to promote high school graduation and continued enrollment, as well as potential avenues for future research.

## Findings and Their Implications for Practice

We present implications for the findings of each factor in this review. Although we present each of these factors individually, we recognize that implementing discrete programs may not result in transformational change for young people; especially given the modest effect sizes. Rather, implementing these factors within an overall school strategy (e.g., within a community

schools approach; see Blank et al. 2003) or broader community strategy (e.g., through a comprehensive community initiative; see Zaff et al. 2015) could provide the array of promotive supports to each young person who needs them, and hypothetically create transformational change. Prevention science provides potential avenues for progress, such as conducting community assessments of youth and aligning new and/or strengthened programs with the assessment (Hawkins 2006). More research is necessary, though, to understand the interactive effects of providing these components together.

Importantly, there is inequity in access to programs and practices that encourage the assets. These inequities are biases against African-American and Latino/a youth and their families as well as youth growing up in low-income families and communities (Putnam 2015; Welner and Carter 2013). Structural barriers, such as institutional racism, can further influence how youth of color interact with their proximal and distal ecology (Spencer 2006). Since there are similar biases in communities with the lowest high school graduation rates and highest dropout rates (DiPaoli et al. 2015), a challenge for practitioners and policymakers is to create structures within which these assets can be experienced in communities where these inequities exist.

**Individual Strengths Matter** We found 11 studies showing that intrinsic academic motivation, academic engagement, locus of control, and expectations for academic attainment predict continued enrollment and high school graduation. These relations have also been found with predominantly White and African-American samples, as well as nationally representative samples. Little is known about how these factors function for other racial and ethnic groups, such as Asian American and Latino/a youth (see Finn and Rock 1997 for an exception). Importantly for interventions, these individual factors were correlated with each other, suggesting that intervening with one could lead to improvements in the others and that the cumulative effect of these individual factors could be greater than the research indicates. Finally, the effect sizes of these relations were modest, suggesting that these factors play a potentially important role in putting a young person on a positive educational trajectory but are not the only relations which influence continued enrollment or graduation.

Promising programs have been identified that promote social and emotional well-being that can be implemented in schools (e.g., Collaborative for Academic, Social, and Emotional Learning 2015) and outside of school (Durlak et al. 2010). **Future research might evaluate these programs' effectiveness for under-studied student populations** (i.e., Hispanic and Asian youth).

**Connection to Parents Provides Foundational Monitoring and Guidance** Parents play an important role in the educational outcomes of their children. Our findings show that parents' involvement in their adolescent children's education and the closeness of the relationships between parents and adolescent children predict whether young people stay in or graduate from high school. This conclusion is consistent with previous analyses and syntheses on parental involvement (Jeynes 2012). Furthermore, there is evidence to suggest that if schools and broader communities can effectively engage parents in their children's education (e.g., through parent-teacher conferences, school-wide assemblies, and performances), then they will result in substantive effects on an array of academic outcomes (Jeynes 2012; Nye et al. 2006). Programs, such as the Iowa Strengthening Families Program and Preparing for the Drug Free Years, which train both parents and their children to engage positively with each other and with the world around them, have shown substantive impacts on a range of developmental outcomes (Spoth et al. 2004). Therefore, we suggest that schools should make efforts to involve parents more in the school, through discrete programs, as well as by enabling teachers

and staff to spend time building relationships and strengthening lines of communication with parents, especially those of struggling students (Jeynes 2012).

**Teachers and Peers Make a Difference** The involvement of adults in a young person's life extends beyond the family. We found that social connections in schools and peer groups have the potential to build the individual promotive factors that predict graduation and continued enrollment (e.g., Fall and Roberts 2012; Rumberger 1995). Specifically, the youth-teacher relationship shows consistent, direct predictive effects on graduation and continued enrollment. These relationships could either be more intensive, mentoring-like relationships or more informal but substantive relationships that a teacher nurtures with a student. Moreover, the norms that peers set for each other around educational attainment also influence a young person's chances of staying in and graduating from high school.

Thus, this review supports the ideas behind interventions that focus on training teachers how to support the emotional needs and educational aspirations of young people (e.g., Fall and Roberts 2012; Ross and Broh 2000), as well as those aimed at impacting the ways in which peers interact with one another (e.g., Feinberg et al. 2007; Hawkins et al. 2012). We therefore recommend that school and community leaders can learn from programs such as The Incredible Years (Carlson et al. 2011), My Teaching Partner (Allen et al. (2011), and Building Assets, Reducing Risks (Corsello and Sharma 2015) that provide evidence for improving teacher-student interactions and promoting academic achievement and attainment.

**Institutions Provide Opportunities for Connection** As we found, school-based and non-school-based extracurricular activity participation can affect graduation and continued enrollment rates. Studies of community and school-based extracurricular activities suggest that high quality programs provide supportive adult and peer relationships, meaningful skill-building opportunities, appropriate structure for the developmental period of youth, opportunities to belong, and positive social norms (Arcaira et al. 2010; George et al. 2007; Mahoney et al. 2003). School and community leaders can leverage and strengthen existing community- and school-based extracurricular programs as a means to increase students' access to contextual assets that promote high school graduation. However, the impact of these programs on high school graduation in suburban, rural, and more economically advantaged communities is not as well documented.

## Limitations and Next Steps for Future Research

Although there were multiple individual, family-related, peer-related, school-related, and community-related factors of a young person's ecology, there is more to be learned about what matters for putting and keeping a young person on a trajectory to high school graduation. For example, there is currently little known about how factors function in relation to each other, how the factors function differently across contexts and across individuals, and how the factors would function if analyzed within the same model. Although many of the studies we reviewed included demographic variation in race/ethnicity, gender, socioeconomic status, and age, the majority of the analyses did not examine variations in the effects of promotive factors across demographic groups (for notable exceptions see Connell et al. 1995; Rumberger 1995). We also only found five analyses that considered the differential effects of the promotive factors by the risk level of youth, such as aggression, prior retention, and low educational expectations (e.g., Croninger and Lee 2001; Kemple and Snipes 2000; Mahoney 2000; Myers and Schirm 1999; Rodriguez-Planas

2012). Some of the studies reviewed did examine the associations between contextual and individual assets (e.g., Connell et al. 1995; Fall and Roberts 2012), but none have examined all assets for promoting graduation situated within a developmental system. Therefore, we suggest that future research include assessments about how the risk levels and demographic factors of youth might moderate the effect of assets to promote high school graduation.

We also found several factors that did not meet our strict criteria for inclusion as assets, but for which some evidence did suggest a positive relationship with high school graduation. Peer social support, parental monitoring of adolescent children, teacher expectations of students, curricular rigor, and having a non-teacher mentor may increase students' chances of staying in and finishing high school (e.g., Hess and Copeland 2001; Hurd et al. 2012; Lee and Burkam 2003; Muller and Schiller 2000; Rumberger 1995). Additionally, school choice and neighborhood mobility programs for low-income families such as housing and school vouchers have yielded mixed results in terms of relating to improvements in graduation rates (see DeLuca and Dayton 2009 for a review). More research into potential indirect pathways, as well as understudied and factors with mixed evidence could provide additional insights into upstream intervention points for promoting high school graduation.

Finally, despite broad bodies of literature documenting the effects of both peers (e.g., Wentzel et al. 2004) and communities (e.g., Brooks-Gunn et al. 1993; Leventhal et al. 2009) on academic outcomes, we found little research that met our inclusion criteria for assets within these contexts promoting continued enrollment and graduation at these levels. We also found very few studies on the role of school administration or district policies on high school graduation (for an exception, see Daun-Barnett and St. John 2012). Expanding the understanding of the overall ecology of a young person could provide additional intervention points that potentially have interactive effects with individual-level factors.

## Conclusion

Increasing the high school graduation rate promotes positive social and economic outcomes for youth and for society. Programs and practices designed to support academic attainment should be informed by rigorous research so that they can be as effective as possible. This review provided a map for future efforts to make progress on this issue and shed light on related areas that need more investigation. These factors, and others identified by future research, could lead to efforts to surround youth with the supportive environments that they need to stay in school and graduate.

### Compliance with Ethical Standards

**Conflict of Interest** The authors declare that they have no conflict of interest.

## References

- Abar, B., Abar, C. C., Lippold, M., Powers, C. J., & Manning, A. E. (2012). Associations between reasons to attend and late high school dropout. *Learning and Individual Differences*, 22, 856–861. doi:10.1016/j.lindif.2012.05.009.
- Agodini, R., & Deke, J. (2004). *The relationship between high school vocational education and dropping out*. Princeton, NJ: Mathematica Policy Research.



- Ahrens, K., DuBois, D. L., Lozano, P., & Richardson, L. P. (2010). Naturally acquired mentoring relationships and young adult outcomes among adolescents with learning disabilities. *Learning Disabilities Research and Practice*, 25, 201–216. doi:[10.1111/j.1540-5826.2010.00318.x](https://doi.org/10.1111/j.1540-5826.2010.00318.x).
- Allen, J. P., Pianta, R. C., Gregory, A., Mikami, A. Y., & Lun, J. (2011). An interaction-based approach to enhancing secondary school instruction and student achievement. *Science*, 333, 1034–1037. doi:[10.1126/science.1207998](https://doi.org/10.1126/science.1207998).
- Appleton, J. J., Christenson, S. L., & Furlong, M. J. (2008). Student engagement with school: critical conceptual and methodological issues of the construct. *Psychology in the Schools*, 45, 369–386. doi:[10.1002/pits.20303](https://doi.org/10.1002/pits.20303).
- Arcaira, E., Vile, J. D., & Reisner, E. R. (2010). *Achieving high school graduation: citizen schools' youth outcomes in Boston*. Washington, DC: Policy Study Associates.
- Balfanz, R., Herzog, L., & McIver, D. J. (2007). Preventing student disengagement and keeping students on the graduation path in urban middle-grades schools: early identification and effective interventions. *Educational Psychology*, 42, 223–235. doi:[10.1080/00461520701621079](https://doi.org/10.1080/00461520701621079).
- Barile, J. P., Donohue, D. K., Anthony, E. R., Baker, A. M., Weaver, S. R., & Henrich, C. C. (2012). Teacher–student relationship climate and school outcomes: implications for educational policy initiatives. *Journal of Youth and Adolescence*, 41, 256–267. doi:[10.1007/s10964-011-9652-8](https://doi.org/10.1007/s10964-011-9652-8).
- Barrow, L., Schanzenbach, D. W., & Claessens, A. (2015). The impact of Chicago's small high school initiative. *Journal of Urban Economics*, 87, 100–113.
- Belfield, C. R., & Levin, H. M. (2007). *The price we pay: economic and social consequences of inadequate education*. Washington, DC: The Brookings Institution.
- Benson, P. L., Scales, P. C., Hamilton, S. F., & Sesma, A. (2006). Positive youth development: theory, research, and applications. In W. D. Damon & R. M. Lerner (Eds.), *The handbook of child psychology* (pp. 894–941). Malden: Wiley.
- Benson, P. L., Scales, P. C., & Syvertsen, A. K. (2011). The contribution of the developmental assets framework to positive youth development theory and practice. In R. M. Lerner, J. V. Lerner, & J. B. Benson (Eds.), *Advances in child development and behavior* (pp. 195–228). London: Elsevier.
- Blank, M. J., Melaville, A., & Shah, B. P. (2003). *Making the difference: research and practice in community schools*. Washington, DC: Coalition for Community Schools.
- Bloom, H. S., & Unterman, R. (2014). Can small high schools of choice improve educational prospects for disadvantaged students? *Journal of Policy Analysis and Management*, 33, 290–319.
- Bloom, H. S., Thompson, S. L., & Unterman, R. (2010). *Transforming the high school experience: how New York City's new small schools are boosting student achievement and graduation rates*. New York: MDRC.
- Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to meta-analysis*. Hoboken: Wiley.
- Borman, G. D., & Overman, L. T. (2004). Academic resilience in mathematics among poor and minority students. *The Elementary School Journal*, 104, 177–195.
- Bornstein, M. H. (2002). *Handbook of parenting: volume I: children and parenting*. Mahwah: Laurence Erlbaum Associates.
- Bronfenbrenner, U., & Morris, P. A. (2006). The bioecological model of human development. In W. D. Damon & R. M. Lerner (Eds.), *Handbook of child psychology* (pp. 894–941). Malden: Wiley.
- Brooks, J. E. (2010). *School characteristics associated with educational resilience of low-income youth* (Doctoral Dissertation). Retrieved from Proquest Dissertations and Theses (UMI# 3445983).
- Brooks-Gunn, J., Duncan, G. J., Klebanov, P. K., & Sealander, N. (1993). Do neighborhoods influence child and adolescent development? *American Journal of Sociology*, 99, 353–395. doi:[10.1086/230268](https://doi.org/10.1086/230268).
- Bryk, A. S., & Driscoll, M. E. (1988). *The high school as community: contextual influences and consequences for students at teachers*. Madison: National Center on Effective Schools.
- Carlson, J. S., Tirt, H. B., Bender, S. L., & Benson, L. (2011). The influence of group training in the Incredible Years Teacher Classroom Management Program on preschool teachers' classroom management strategies. *Journal of Applied School Psychology*, 27, 134–154. doi:[10.1080/15377903.2011.565277](https://doi.org/10.1080/15377903.2011.565277).
- Carpenter, D. M., & Ramirez, A. (2007). More than one gap: dropout rate gaps between and among Black, Hispanic, and White students. *Journal of Advanced Academics*, 19, 32–64. doi:[10.4219/jaa-2007-705](https://doi.org/10.4219/jaa-2007-705).
- Cerasoli, C. P., Nicklin, J. M., & Ford, M. T. (2014). Intrinsic motivation and extrinsic incentives jointly predict performance: a 40-year meta-analysis. *Psychological Bulletin*, 140(4), 980–1008.
- Cohen, J. (1988). *Statistical power analysis for the social sciences*. Hillsdale: Erlbaum.
- Connell, J. P., Halpern-Felsher, B. L., Clifford, E., Crichlow, W., & Usinger, P. (1995). Hanging in there: behavioral, psychological, and contextual factors affecting whether African-American adolescents stay in high school. *Journal of Adolescent Research*, 10, 41–63. doi:[10.1177/0743554895101004](https://doi.org/10.1177/0743554895101004).
- Corsello, M., & Sharma, A. (2015). *The building assets-reducing risks program: Replication and expansion of an effective strategy to turn around low-achieving schools i3 Development Grant Final Report*. Minneapolis, MN: BARR.



- Covington, M. V. (2000). Goal theory, motivation, and school achievement: an integrative review. *Annual Review of Psychology*, 51, 171–200. doi:[10.1146/annurev.psych.51.1.171](https://doi.org/10.1146/annurev.psych.51.1.171).
- Crain, R. L., Allen, A., Thaler, R., Sullivan, D., Zellman, G. L., Little, J. W., & Quigley, D. D. (1999). *the effects of academic career magnet education on high schools and their graduates*. Berkeley, CA: National Center for Research in Vocational Education.
- Croninger, R. G., & Lee, V. E. (2001). Social capital and dropping out of high school: benefits to at-risk students of teachers' support and guidance. *Teachers College Record*, 103, 548–581. doi:[10.1111/0161-4681.00127](https://doi.org/10.1111/0161-4681.00127).
- Daun-Barnett, N., & St. John, E. P. (2012). Constrained curriculum in high schools: the changing math standards and student achievement, high school graduation and college continuation. *Education Policy Analysis Archives*, 20, 1–25. doi:[10.14507/epaa.v20n5.2012](https://doi.org/10.14507/epaa.v20n5.2012).
- DeLuca, S., & Dayton, E. (2009). Switching social contexts: the effects of housing mobility and school choice programs on youth outcomes. *Annual Sociology Review*, 35, 457–491. doi:[10.1146/annurev-soc-070308-120032](https://doi.org/10.1146/annurev-soc-070308-120032).
- DiPaoli, J. L., Fox, J. H., Ingram, E. S., Maushard, M., Bridgeland, J. M., & Balfanz, R. (2015). *Building a Grad Nation: progress and challenge in ending the high school dropout epidemic*. Washington, DC: America's Promise Alliance.
- Driscoll, A. K. (1999). Risk of high school dropout among immigrant and native Hispanic youth. *International Migration Review*, 33, 857–875. doi:[10.2307/2547355](https://doi.org/10.2307/2547355).
- Durlak, J. A., Weissberg, R. P., & Pachan, M. (2010). A meta-analysis of after-school programs that seek to promote personal and social skills in children and adolescents. *American Journal of Community Psychology*, 45, 294–309. doi:[10.1007/s10464-010-9300-6](https://doi.org/10.1007/s10464-010-9300-6).
- Eccles, J., & Gootman, J. A. (2002). *Community programs to promote youth development*. Washington, DC: National Academy of Sciences.
- Eccles, J. S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual Review of Psychology*, 53, 109–132. doi:[10.1146/annurev.psych.53.100901.135153](https://doi.org/10.1146/annurev.psych.53.100901.135153).
- Elliott, M. N., Hanser, L. M., & Gilroy, C. L. (2002). Career academies: additional evidence of positive student outcomes. *Journal of Education for Students Placed At Risk*, 7, 71–90.
- Ellis, P. D. (2010). *The essential guide to effect sizes, statistical power, meta-analysis, and the interpretation of results*. Cambridge: Cambridge University Press.
- Englund, M. M., Egeland, B., & Collins, W. A. (2008). Exceptions to high school dropout predictions in a low-income sample: do adults make a difference? *Journal of Social Issues*, 64, 77–94. doi:[10.1111/j.1540-4560.2008.00549.x](https://doi.org/10.1111/j.1540-4560.2008.00549.x).
- Erickson, L. D., & Phillips, J. W. (2012). The effects of religious-based mentoring on educational attainment: more than just a spiritual high? *Journal for the Scientific Study of Religion*, 51, 568–587. doi:[10.1111/j.1468-5906.2012.01661.x](https://doi.org/10.1111/j.1468-5906.2012.01661.x).
- Fall, A. M., & Roberts, G. (2012). High school dropouts: interactions between social context, self-perceptions, school engagement, and student dropout. *Journal of Adolescence*, 35, 787–798. doi:[10.1016/j.adolescence.2011.11.004](https://doi.org/10.1016/j.adolescence.2011.11.004).
- Feinberg, M. E., Greenberg, M. T., Osgood, D. W., Sartorius, J., & Bontempo, D. (2007). Effects of the communities that care model in Pennsylvania on youth risk and problem behaviors. *Prevention Science*, 8, 261–270. doi:[10.1007/s1121-007-0073-6](https://doi.org/10.1007/s1121-007-0073-6).
- Finn, J. D., & Rock, D. A. (1997). Academic success among students at risk for school failure. *Journal of Applied Psychology*, 82, 221–234. doi:[10.1037/0021-9010.82.2.221](https://doi.org/10.1037/0021-9010.82.2.221).
- George, R., Cusick, G. R., Wasserman, M., & Gladden, R. M. (2007). *After-school programs and academic impact: a study of Chicago's after school matters (Report # 112)*. Chicago: Chapin Hall Center for Children.
- Gest, S. D., Rulison, K. L., Davidson, A. J., & Welsh, J. A. (2008). A reputation for success (or failure): the association of peer academic reputations with academic self-concept, effort, and performance across the upper elementary grades. *Developmental Psychology*, 44, 625–636. doi:[10.1037/0012-1649.44.3.625](https://doi.org/10.1037/0012-1649.44.3.625).
- Greenberg, M. T., Weissberg, R. P., O'Brien, M. U., Zins, J. E., Fredericks, L., Resnik, H., & Elias, M. J. (2003). Enhancing school-based prevention and youth development through coordinated social, emotional, and academic learning. *American Psychologist*, 58, 466–474. doi:[10.1037/0003-066X.58.6.7466](https://doi.org/10.1037/0003-066X.58.6.7466).
- Grusec, J. E., & Davidov, M. (2007). Socialization in the family: the role of parents. In J. E. Grusec & P. D. Hastings (Eds.), *Handbook of socialization: theory and research*. New York: The Guilford Press.
- Hahn, A., Leavitt, T., & Aaron, P. (1994). *Evaluation of the quantum opportunities program? Did the program work? A report on the post-secondary outcomes and cost effectiveness of the QOP Program*. Waltham: Brandeis University Center for Human Resources.
- Hammond, C., Linton, D., Smink, J., & Drew, S. (2007). *Dropout risk factors and exemplary programs: a technical report*. Clemson: National Dropout Prevention Center.
- Harlow, K., & Baenen, N. (2001). *The effectiveness of the Wake Summerbridge summer enrichment program (E & R Report No. 01.47)*. Raleigh: Wake County Public School System.
- Hawkins, J. D. (2006). Science, social work, prevention: finding the intersections. *Social Work Research*, 30, 137–152. doi:[10.1093/swr/30.3.137](https://doi.org/10.1093/swr/30.3.137).

- Hawkins, J. D., Catalano, R. F., & Kuklinski, M. R. (2012). Communities that care: bridging science and community practice to prevent adolescent health and behavior problems including violence. In D. M. Patel & R. M. Taylor (Eds.), *Social and economic costs of violence*. Washington, DC: National Academies Press.
- Hayes, G. L. (1998) *An evaluation of a staff mentor program for at risk students in an Oregon high school: CAKE (caring for kids effectively)* (Doctoral dissertation). Retrieved from Proquest Dissertations and Theses (UMI # 9834861).
- Hayward, B. J., & Tallmadge, G. K. (1995). *Strategies for keeping kids in school: Evaluation of dropout prevention and reentry projects in vocational education*. Final Report. Washington, DC: US Government Printing Office.
- Heckman, J. J. (2008). Schools, skills, and synapses. *Economic Inquiry*, 46, 289–324. doi:[10.1111/j.1465-7295.2008.00163.x](https://doi.org/10.1111/j.1465-7295.2008.00163.x).
- Hernandez, D. J., & Napierala, J. S. (2014). Early education, poverty, and parental circumstances among Hispanic children: pointing toward needed public policies. *Association of Mexican American Educators Journal*, 7, 30–39.
- Hess, R. S., & Copeland, E. P. (2001). Students' stress, coping strategies, and school completion: a longitudinal perspective. *School Psychology Quarterly*, 16, 389–405. doi:[10.1521/scpq.16.4.389.19899](https://doi.org/10.1521/scpq.16.4.389.19899).
- Hill, N. E., & Tyson, D. F. (2009). Parental involvement in middle school: a meta-analytic assessment of the strategies that promote achievement. *Developmental Psychology*, 45, 740–763. doi:[10.1037/a0015362](https://doi.org/10.1037/a0015362).
- Hurd, N. M., Sánchez, B., Zimmerman, M. A., & Caldwell, C. H. (2012). Natural mentors, racial identity, and educational attainment among African American adolescents: exploring pathways to success. *Child Development*, 83, 1196–1212. doi:[10.1111/j.1467-8624.2012.01769.x](https://doi.org/10.1111/j.1467-8624.2012.01769.x).
- Jeynes, W. (2012). A meta-analysis of the efficacy of different types of parental involvement programs for urban students. *Urban Education*, 47, 706–742. doi:[10.1177/0042085912445643](https://doi.org/10.1177/0042085912445643).
- Jimerson, S., Egeland, B., Sroufe, L. A., & Carlson, B. (2000). A prospective longitudinal study of high school dropouts examining multiple predictors across development. *Journal of School Psychology*, 38, 525–549. doi:[10.1016/S0022-4405\(00\)00051-0](https://doi.org/10.1016/S0022-4405(00)00051-0).
- Jimerson, S. R., Ferguson, P., Whipple, A. D., Anderson, G. E., & Dalton, M. J. (2002). Exploring the association between grade retention and dropout: a longitudinal study examining socio-emotional, behavioral, and achievement characteristics of retained students. *The California School Psychologist*, 7, 51–62. doi:[10.1007/BF03340889](https://doi.org/10.1007/BF03340889).
- Kemple, J. J., & Snipes, J. C. (2000). *Career Academies: impacts on students' engagement and performance in high school*. New York: MDRC.
- Kulik, J. A. (1998). Curricular tracks and high school vocational education. In A. Gamoran (Ed.), *The quality of vocational education: background papers from the 1994 national assessment of vocational education*. Washington, DC: U.S. Department of Education.
- Lee, V. E., & Burkam, D. T. (2003). Dropping out of high school: the role of school organization and structure. *American Educational Research Journal*, 40, 353–393. doi:[10.3102/00028312040002353](https://doi.org/10.3102/00028312040002353).
- Lee, V. E., & Smith, J. B. (1997). High school size: which works best and for whom? *Educational Evaluation and Policy Analysis*, 19, 205–227.
- Lerner, R. M. (2012). Developmental science: past, present, and future. *International Journal of Developmental Science*, 6, 29–36. doi:[10.3233/DEV-2012-12102](https://doi.org/10.3233/DEV-2012-12102).
- Lerner, J. V., Phelps, E., Forman, Y. E., & Bowers, E. P. (2009). Positive youth development. In R. M. Lerner & L. Steinberg (Eds.), *Handbook of adolescent psychology*. Malden: Wiley.
- Leventhal, T., Dupéré, V., & Brooks-Gunn, J. (2009). Neighborhood influences on adolescent development. In R. M. Lerner & L. Steinberg (Eds.), *Handbook of adolescent psychology* (3rd ed., pp. 411–443). New York: Wiley.
- Levesque, K., Laird, J., Hensley, E., Choy, S. P., Cataldi, E. F., & Hudson, L. (2008). Career and technical education in the United States: 1990 to 2005. Statistical Analysis Report. NCES 2008-035. National Center for Education Statistics.
- Mahoney, J. L. (2000). School extracurricular activity participation as a moderator in the development of antisocial patterns. *Child Development*, 71, 502–516. doi:[10.1111/1467-8624.00160](https://doi.org/10.1111/1467-8624.00160).
- Mahoney, J. L., & Cairns, R. B. (1997). Do extracurricular activities protect against early school dropout? *Developmental Psychology*, 33, 241–253. doi:[10.1037/0012-1649.33.2.241](https://doi.org/10.1037/0012-1649.33.2.241).
- Mahoney, J., Cairns, B. D., & Farmer, T. W. (2003). Promoting interpersonal competence and educational success through extracurricular activity participation. *Journal of Educational Psychology*, 95, 409–418. doi:[10.1037/0022-0663.95.2.409](https://doi.org/10.1037/0022-0663.95.2.409).
- Maxwell, N. L., & Rubin, V. (1997). *The relative impact of a career academy on post-secondary work and education skills in urban, public high schools*. Hayward, CA: Human Investment Research and Education Center, California State University.

- McNeal, R. B. (1995). Extracurricular activities and high school dropouts. *Sociology of Education*, 68, 62–80. doi:[10.2307/2112764](https://doi.org/10.2307/2112764).
- Miller, D. C., & Warren, L. K. (2011). *Comparative indicators of education in the United States and other G-8 countries: 2011 (NCES 2011-007)*. Washington, DC: National Center for Education Statistics.
- Muller, C., & Schiller, K. S. (2000). Leveling the playing field? Students' educational attainment and states' performance testing. *Sociology of Education*, 73, 196–218. doi:[10.2307/2673216](https://doi.org/10.2307/2673216).
- Myers, D., & Schirm, A. (1999). *The impacts of upward bound: phase I of the national evaluation (MPR Ref # 8046-515)*. Washington, DC: Mathematica Policy Research.
- Myers, D., Olsen, R., Seftor, N., Young, J., & Tuttle, C. (2004). *The impacts of regular upward bound: results from the third follow-up data collection (MPR Ref # 8464-600)*. Washington, DC: Mathematica Policy Research.
- Nathan, A. (2013). *Does upward bound have an effect on student educational outcomes? A reanalysis of the Horizons Randomized Controlled Trial Study*. (Doctoral Dissertation). Retrieved from ProQuest Dissertations and Theses. (UMI #3560135).
- Nover, A., Godsay, S., Kirby, E. H., & Kawashima-Ginsberg, K. (2010). *Electoral engagement and college experience*. Medford: Center for Information and Research on Civic Learning and Engagement.
- Nye, C., Turner, H., & Schwartz, J. (2006). Approaches to parent involvement for improving the academic performance of elementary school age children: a systematic review. *Campbell Systematic Reviews*, 2, 2–49. doi:[10.4073/csr.2006.4](https://doi.org/10.4073/csr.2006.4).
- O'Connor, S. M. (1995). *Evaluation of a mentoring program for youth at-risk*. (Doctoral Dissertation). Retrieved from Proquest Dissertations and Theses. (Order # 9517983).
- Olson, J. M., Roese, N. J., & Zanna, M. P. (1996). Expectancies. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: handbook of basic principles* (pp. 211–238). New York: Guilford Press.
- Ou, S. R., & Reynolds, A. J. (2008). Predictors of educational attainment in the Chicago Longitudinal Study. *School Psychology Quarterly*, 23, 199–229. doi:[10.1037/1045-3830.23.2.199](https://doi.org/10.1037/1045-3830.23.2.199).
- Pallardy, G. J. (2013). High school socioeconomic segregation and student attainment. *American Educational Research Journal*, 50, 714–754. doi:[10.3102/0002831213481240](https://doi.org/10.3102/0002831213481240).
- Payton, J., Weissberg, R. P., Durlak, J. A., Dymnicki, A. B., Taylor, R. D., Schellinger, K. B., & Pachan, M. (2008). *The positive impact of social and emotional learning for kindergarten to eighth-grade students*. Chicago: Collaborative for Academic, Social, and Emotional Learning.
- Pellerin, L. A. (2005). Applying Baumrind's parenting typology to high schools: toward a middle-range theory of authoritative socialization. *Social Science Research*, 34, 283–303. doi:[10.1016/j.ssresearch.2004.02.003](https://doi.org/10.1016/j.ssresearch.2004.02.003).
- Pintrich, P. R. (2003). A motivational science perspective on the role of student motivation in learning and teaching contexts. *Journal of Educational Psychology*, 95, 667–686.
- Pittman, K. J., Irby, M., Tolman, J., Yohalem, N., & Ferber, T. (2005). *Preventing problems, promoting development, encouraging engagement competing priorities or inseparable goals?* Washington, DC: The Forum for Youth Investment.
- Plank, S. (2001). Career and technical education in the balance: An analysis of high school persistence, academic achievement, and postsecondary destinations. St. Paul, MN: National Research Center for Career and Technical Education, University of Minnesota.
- Plank, S. B., DeLuca, S., & Estacion, A. (2008). High school dropout and the role of career and technical education: A survival analysis of surviving high school. *Sociology of Education*, 81, 345–370.
- Poulin, F., Dishion, T. J., & Haas, E. (1999). The peer influence paradox: Friendship quality and deviancy training within male adolescent friendships. *Merrill-Palmer Quarterly*, 45, 42–61.
- Putnam, R. (2015). *Our kids: the American dream in crisis*. New York: Simon & Schuster.
- Randolph, K. A., Fraser, M. W., & Orthner, D. K. (2004). Educational resilience among youth at risk. *Substance Use & Misuse*, 39, 747–767. doi:[10.1081/JA-120034014](https://doi.org/10.1081/JA-120034014).
- Rasinski, K. A., & Pedlow S. (1994). Using transcripts to study the effectiveness of vocational education. *Journal of Vocational Education Research*, 19, 23–43.
- Ream, R. K., & Rumberger, R. W. (2008). Student engagement, peer social capital, and school dropout among Mexican-American and Non-Latino White students. *Sociology of Education*, 81, 109–139.
- Rivera-Batiz, F. L. (2003). The impact of school-to-work programs on minority youth employment and student outcomes. In W. J. Stull & N. M. Sanders (Eds.), *The school to work movement: origins and destinations*. Westport: Praeger Publishers.
- Rodriguez-Planas, N. (2012). Mentoring, educational services, and incentives to learn: what do we know about them? *Evaluation and Program Planning*, 34, 481–490. doi:[10.1016/j.evalprogplan.2012.02.004](https://doi.org/10.1016/j.evalprogplan.2012.02.004).
- Ross, C. E., & Broh, B. A. (2000). The roles of self-esteem and the sense of personal control in the academic achievement process. *Sociology of Education*, 73, 270–284. doi:[10.2307/2673234](https://doi.org/10.2307/2673234).

- Rueger, S. Y., Malecki, C. K., & Demaray, M. K. (2010). Relationship between multiple sources of perceived social support and psychological and academic adjustment in early adolescence: comparisons across gender. *Journal of Youth and Adolescence*, 39, 47–61. doi:[10.1007/s10964-008-9368-6](https://doi.org/10.1007/s10964-008-9368-6).
- Rumberger, R. W. (1995). Dropping out of middle school: a multilevel analysis of students and schools. *American Educational Research Journal*, 32, 583–625. doi:[10.2307/1163325](https://doi.org/10.2307/1163325).
- Rumberger, R. W., & Lim, S. A. (2008). *Why students drop out of school: a review of 25 years of research*. Santa Barbara: California Dropout Research Project.
- Ryabov, I. (2011). Adolescent outcomes in school context: network effects reexamined. *Journal of Adolescence*, 34, 915–927. doi:[10.1016/j.adolescence.2010.12.004](https://doi.org/10.1016/j.adolescence.2010.12.004).
- Ryan, A. M. (2001). The peer group as a context for the development of young adolescents' motivation and achievement. *Child Development*, 72, 1135–1150. doi:[10.1111/1467-8624.00338](https://doi.org/10.1111/1467-8624.00338).
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55, 68–78. doi:[10.1037/0003-066X.55.1.68](https://doi.org/10.1037/0003-066X.55.1.68).
- Schirm, A., Stuart, E., & McKie, A. (2006). *The Quantum Opportunities Program demonstration: final impacts (MPR Ref # 8279-932)*. Washington, DC: Mathematica Policy Research.
- Schwartz, A. E., Stiefel, L., & Wiswall, M. (2013). Do small schools improve performance in large, urban districts? Causal evidence from New York City. *Journal of Urban Economics*, 77, 27–40.
- Skinner, E., Furrer, C., Marchand, G., & Kinderman, T. (2008). Engagement and disaffection in the classroom: part of a larger motivational dynamic? *Journal of Educational Psychology*, 100, 765–781. doi:[10.1037/a0012840](https://doi.org/10.1037/a0012840).
- Spencer, M. B. (2006). Phenomenology and ecological systems theory: development of diverse groups. In R. M. Lerner & W. Damon (Eds.), *Handbook of child psychology (6th ed.): vol 1, theoretical models of human development* (pp. 829–893). Hoboken: Wiley.
- Spoth, R., Redmond, C., Shin, C., & Azevedo, K. (2004). Brief family intervention effects on adolescent substance initiation: school-level growth curve analyses 6 years following baseline. *Journal of Consulting and Clinical Psychology*, 72, 535–542.
- Stearns, E., Moller, S., Blau, J., & Potochnick, S. (2007). Staying back and dropping out: the relationship between grade retention and school dropout. *Sociology of Education*, 80, 210–240. doi:[10.1177/003804070708000302](https://doi.org/10.1177/003804070708000302).
- Stein, G. L., & Hussong, A. (2007). Social and academic expectations about high school for at-risk rural youth. *American Secondary Education*, 36, 59–79.
- Steinberg, L. (2001). We know some things: adolescent-parent relationships in retrospect and prospect. *Journal of Research on Adolescence*, 11, 1–20. doi:[10.1111/1532-7795.00001](https://doi.org/10.1111/1532-7795.00001).
- Stone, S. (2006). Correlates of change in student reported parent involvement in schooling: a new look at the National Education Longitudinal Study of 1988. *American Journal of Orthopsychiatry*, 76, 518–530. doi:[10.1037/0002-9432.76.4.518](https://doi.org/10.1037/0002-9432.76.4.518).
- Strayhorn, T. L. (2010). The role of schools, families, and psychological variables on math achievement of black high school students. *The High School Journal*, 93, 177–194. doi:[10.1353/hsj.2010.0003](https://doi.org/10.1353/hsj.2010.0003).
- Suh, S., Suh, J., & Houston, I. (2007). Predictors of categorical at-risk high school dropouts. *Journal of Counseling & Development*, 85, 196–203. doi:[10.1002/j.1556-6678.2007.tb00463.x](https://doi.org/10.1002/j.1556-6678.2007.tb00463.x).
- Sum, A., Khatiwada, I., & McLaughlin, J. (2009). *The consequences of dropping out of high school: joblessness and jailing for high school dropouts and the high cost for taxpayers (Paper # 23)*. Boston: Center for Labor Market Studies Publications.
- Teachman, J. D., Paasch, K., & Carver, K. (1997). Social capital and the generation of human capital. *Social Forces*, 75, 1343–1359. doi:[10.1093/sf/75.4.1343](https://doi.org/10.1093/sf/75.4.1343).
- Tenenbaum, H. R., Porche, M. V., Snow, C. E., Tabors, P., & Ross, S. (2007). Maternal and child predictors of low-income children's educational attainment. *Journal of Applied Developmental Psychology*, 28, 227–238. doi:[10.1016/j.appdev.2007.02.002](https://doi.org/10.1016/j.appdev.2007.02.002).
- Tyler, J. H., & Lofstrom, M. (2009). Finishing high school: alternative pathways and dropout recovery. *The Future of Children*, 19, 77–103. doi:[10.1353/foc.0.0019](https://doi.org/10.1353/foc.0.0019).
- Ungar, M. (2011). The social ecology of resilience: addressing contextual and cultural ambiguity of a nascent construct. *American Journal of Orthopsychiatry*, 81, 1–17. doi:[10.1111/j.1939-0025.2010.01067.x](https://doi.org/10.1111/j.1939-0025.2010.01067.x).
- Veenstra, R., Dijkstra, J., Steglich, C., & van Zalk, M. W. (2013). Network-behavior dynamics. *Journal of Research on Adolescence*, 23, 399–412. doi:[10.1111/jora.12070](https://doi.org/10.1111/jora.12070).
- Wang, M. T., & Eccles, J. S. (2012). Adolescent behavioral, emotional, and cognitive engagement trajectories in school and their differential relations to educational success. *Journal of Research on Adolescence*, 22, 31–39. doi:[10.1111/j.1532-7795.2011.00753.x](https://doi.org/10.1111/j.1532-7795.2011.00753.x).
- Wang, M. T., & Fredericks, J. (2014). The reciprocal links between school engagement, youth problem behaviors, and school dropout during adolescence. *Child Development*, 85, 722–737. doi:[10.1111/cdev.12138](https://doi.org/10.1111/cdev.12138).

- Wang, M. T., & Holcombe, R. (2010). Adolescents' perceptions of school environment, engagement, and academic achievement in middle school. *American Educational Research Journal*, 47, 638–662. doi:[10.3102/0002831209361209](https://doi.org/10.3102/0002831209361209).
- Welner, K. G., & Carter, P. L. (2013). Achievement gaps arise from opportunity gaps. In P. L. Carter & K. G. Welner (Eds.), *Closing the opportunity gap: what America must do to give every child an even chance* (pp. 169–180). New York: Oxford University Press.
- Wentzel, K. R., & Wigfield, A. (1998). Academic and social motivational influences on students' academic performance. *Educational Psychology Review*, 10, 155–175. doi:[10.1023/A:1022137619834](https://doi.org/10.1023/A:1022137619834).
- Wentzel, K. R., Barry, C. M., & Caldwell, K. A. (2004). Friendships in middle school: influences on motivation and school adjustment. *Journal of Educational Psychology*, 96, 195–203. doi:[10.1037/0022-0663.96.2.195](https://doi.org/10.1037/0022-0663.96.2.195).
- Wentzel, K. R., Donlan, A. E., & Morrison, D. (2012). Peer relationships and social motivational processes. In A. M. Ryan & G. W. Ladd (Eds.), *Peer relationships and adjustment at schools*. Charlotte: Information Age.
- Zaff, J. F., & Smerdon, B. (2009). Putting children front and center: building coordinated social policy for America's children. *Applied Developmental Science*, 13, 105–118. doi:[10.1080/10888690903041469](https://doi.org/10.1080/10888690903041469).
- Zaff, J. F., Donlan, A. E., Pufall Jones, E., & Lin, E. S. (2015). Supportive developmental systems for children and youth: a theoretical framework for comprehensive community initiatives. *Journal of Applied Developmental Psychology*. doi:[10.1016/j.appdev.2015.03.004](https://doi.org/10.1016/j.appdev.2015.03.004).
- Zaff, J. F., Donlan, A. E., Pufall Jones, E., Lin, E. S., & Anderson, S. (2016). Comprehensive community initiatives creating supporting youth systems. In J. F. Zaff, E. Pufall Jones, A. E. Donlan, & S. Anderson (Eds.), *Comprehensive community initiatives for positive youth development*. New York: Taylor & Francis.
- Zimmerman, M. A., & Schmeelk-Cone, K. H. (2003). A longitudinal analysis of adolescent substance use and school motivation among African American youth. *Journal of Research on Adolescence*, 13, 185–210. doi:[10.1111/1532-7795.1302003](https://doi.org/10.1111/1532-7795.1302003).

