

The Self-Regulation of Emotion

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A teenager goes off on an eating binge whenever she feels lonely or depressed. A bank manager runs for hours each morning to take his mind off his impending divorce. A politician is struggling to hide her joy over a rival's downfall during a press conference. A CEO practices yoga to handle the stress of her demanding work life. A student works through a childhood trauma by keeping a diary on his innermost feelings.

In these and in many other situations in everyday life, people are at once engaged in the self-regulation of action (briefly: self-regulation) and the self-regulation of emotion (briefly: emotion regulation). Self-regulation and emotion regulation are often so intertwined that it is hard to say where one ends and the other begins. Over the past few decades, both types of regulation have become the focus of considerable theoretical and empirical research (for reviews, see Baumeister, Schmeichel, & Vohs., 2007; Koole, 2009; for comprehensive overviews, see the present volume; Gross, 2007). Nevertheless, the interface between self-regulation and emotion regulation has only recently received systematic attention. Learning how self-regulation interfaces with emotion regulation is likely to generate important new insights into both processes. Among other things, self-regulation research may illuminate how people function as active agents in managing their emotional lives. Conversely, emotion regulation research may illuminate how people direct their actions in emotion-arousing contexts.

In the present chapter, we contribute to the ongoing integration between self-regulation and emotion regulation research by reviewing contemporary research on the self-regulation of emotion. This chapter has a fourfold plan. First, we consider the "emotion" part of emotion regulation, by discussing the kinds of responses that people may target in the emotion regulation process. Second, we turn to the "regulation" part of emotion regulation, by discussing the

control processes that may underlie emotion regulation. Here, we review models that emphasize effortful control processes (Erber & Erber, 2000; McRae, Oschner, and Gross, this volume; Ochsner & Gross, 2008), as well as models that touch upon more intuitive aspects of emotion regulation (Koole, 2009). Third, we consider the emerging literature on training self- and emotion-regulatory skills and how it may be informed by recent models of emotion regulation. Fourth and last, we provide a summary of our main conclusions regarding the self-regulation of emotion.

The "Emotion" in Emotion Regulation

In emotion regulation, people seek to redirect the spontaneous flow of their emotions. Emotions are understood here as people's valenced (positive or negative) reactions to events that they perceive as relevant to their ongoing concerns. Emotions in the present conception consist of multiple components, which include specific thoughts and feelings, along with behavioral and physiological responses (Cacioppo, Berntson, & Klein, 1992; Frijda, 2006; Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005). Inevitably, there is overlap between emotion regulation and related constructs such as mood regulation, coping with stress, and affect regulation. Our definition of emotion regulation is therefore broad and inclusive, and subsumes the regulation of specific emotions such as anger or fear, along with global mood states, stress, and all kinds of affective responses.

Virtually any stimulus or activity that can cause changes in people's emotional states may be recruited in emotion regulation. Thus, people can draw from a very large pool of different strategies in managing their emotional lives. Yet underneath this diversity, some broad patterns can be discerned in the kinds of emotion responses that are targeted in emotion regulation. Some researchers have sought to uncover these broad patterns through data-driven methods such as

factor analysis (Thayer, Newman, & McCain, 1994) or rational sorting (Parkinson & Totterdell, 1999). These approaches have generally failed to produce a replicable and readily interpretable set of dimensions, and have been plagued by difficulties in ensuring the comprehensiveness of the investigated set of emotion regulation strategies (Skinner, Edge, Altman, & Sherwood, 2003). Consequently, it seems more productive to begin by developing a coherent theoretical logic for analyzing the basic processes that underlie various kinds of emotion-regulatory activities.

What's Special about Emotion Regulation?

A first way to understand which types of emotion processes that are targeted in emotion regulation is to ask if there is something special about emotion regulation relative to other types of emotion processing. The late emotion theorist Lazarus (1991) made some insightful observations with regard to this issue. As Lazarus noted, people's primary emotional response to the situation can be qualitatively different from their secondary emotional response. The primary emotional response relates to people's immediate, raw response to emotion-relevant events. The secondary response relates to people's ability to cope with their primary emotional response (Baumann, Kaschel, & Kuhl, 2007). Lazarus' observations thus help to delineate how emotion regulation differs from other emotion processes. People's primary emotional response represents their immediate, unregulated emotional response. This primary response is succeeded by a secondary emotional response, which is driven by emotion regulation. The transition from primary to secondary emotional responding may occur so fast that people hardly notice it. As such, it can be challenging to empirically separate people's primary emotional response from the subsequent emotion regulation processes.

At a conceptual level, however, the distinction between primary emotion generation and subsequent emotion regulation is straightforward. To illustrate this distinction, Figure 1 displays how a prototypical emotional response unfolds in time. To keep things simple, we focus on a single emotional response with a single maximum strength. People's primary emotional response is represented by the entry gradient, or the steepness with which the emotional response reaches its full force. This primary response can be thought of as emotional sensitivity, or the ease with which people get into a specific emotional state. Emotional sensitivity is determined by any variable that influences people's initial emotional response to the situation, including qualities of the stimuli that people encounter (e.g., highly arousing stimuli are likely to trigger emotions more rapidly than mildly arousing stimuli), person characteristics (e.g., high neurotic individuals may enter negative states more quickly than low neurotic individuals), and the broader situation (e.g., during an economic crisis, threatening thoughts may spring to mind more easily).

The offset of the emotional response is depicted in Figure 1 as the exit gradient, or the steepness with which the emotional response returns to a neutral baseline. This return to baseline may occur without any conscious regulatory effort, in a process that is known as habituation (Rankin, 2009). Habituation is a very basic form of psychological adaptation that occurs at different levels in the nervous system. Rudimentary forms of habituation can already be observed in such animals as sea slugs, who possess only a few hundred neurons (LeDoux, 2002). Although habituation can apparently occur without any higher-order processing, it nevertheless exerts an important influence on the exit gradient of emotional responding. As such, habituation may be one of the most rudimentary processes that people may recruit in emotion regulation. When more complex self-regulatory strategies fail, people may still be capable of leaving unwanted emotional states by resorting to elementary habituation processes.

Over the course of evolution, humans eventually acquired the capacity for more cognitively sophisticated forms of emotion regulation. Presumably, these more sophisticated processes increase the efficiency and flexibility of emotion regulation. Similar to emotional sensitivity, emotion regulation is determined by qualities of the stimuli that the person encounters (e.g., stimuli that appear at irregular intervals may be harder to adjust to than stimuli that appear at regular intervals), characteristics of the person (e.g., ruminators may dwell on negative experiences more than non-ruminators), and the broader situation (e.g., when at home and among friends, people may down-regulate emotional distress more quickly than when people are alone in a foreign country).

Although emotion regulation refers to the ease with which people exit a given emotional state, this should not be taken to mean that emotion regulation always serves to speed up this exiting process. Indeed, whereas some forms of emotion regulation are aimed at decreasing the intensity of an emotional response (down-regulation), other forms of emotion regulation involve the up-regulation or maintenance of an emotional response. In the latter cases emotion regulation is aimed at increasing the intensity of an emotional response (up-regulation) or at keeping the intensity of an emotional response stable over time (maintenance). Common to all instances of emotion regulation, however, is that they alter the steepness of the exit gradient, and thus determine how long (or short) the activation of an emotional response persists over time.

The Process Model of Emotion Regulation

A second way to understand which emotion processes that are targeted in emotion regulation is to ask how emotion regulation intervenes in specific components of emotional responding. The latter approach has been advanced by the process model of emotion regulation (Gross, 1998, 2001). The process model assumes that emotions are generated in a sequence of

stages. In the first stage, people encounter a situation with features that can potentially trigger an emotional response. In the second stage, people may or not attend to the emotion-relevant features of the situation. In the third stage, people generate cognitive appraisals of the situation, which may or not give rise to an emotional response. In the fourth and last stage, people express their emotions in their behavior. According to the process model, each of the four stages of emotion generation may be targeted for regulation. For the present exposition, our discussion concentrates on situations in which people want to down-regulate an unwanted emotion.

First, whenever people foresee that a given situation may give rise to unwanted emotional outcomes, people may engage in situation selection. In this strategy, people move to a different situation that is less likely to give rise to the unwanted emotion. A closely related strategy is that people may engage in situation modification, by taking actions that reduce the odds of ending up in a situation with undesirable emotional outcomes. In these two pro-active forms of emotion regulation, the regulatory activity subjectively precedes the onset of emotion. However, merely anticipating an emotional experience already leads to a partial (often unconscious) simulation of that emotion which triggers similar emotion systems as those that become activated during on-line emotion generation (Niedenthal, Barsalou, Winkielman, Krauth-Gruber, Ric, 2005). Thus, in anticipatory strategies, emotion regulation succeeds a primary emotional response that is triggered by the anticipation of unwanted emotional outcomes.

If an emotion-eliciting situation cannot be avoided, a second type of emotion regulation strategy that people may use is attentional deployment. In this strategy, people seek to direct their attention away from stimuli that give rise to undesirable emotion. For instance, people may bury themselves in work to forget about a romantic break-up, or people may engage in vigorous physical exercise to take their minds off work-related stress. Consistent with this, research has

shown that positive and negative emotions become down-regulated when people perform a cognitively demanding task during or after they have encountered an emotional event (Erber & Tesser, 1992; Van Dillen & Koole, 2007, 2009). By diverting their attention elsewhere, people may prevent that the emotional aspects of a stimulus are fully processed. As such, the emotional impact of the stimulus may be reduced.

When people are forced to pay attention to a stimulus that may arouse unwanted emotions, people may engage in a third type of strategy, which involves *cognitive change*. In this strategy, people attempt to change their cognitive appraisals to reduce the emotional impact of the situation. For instance, people may reinterpret a potentially upsetting situation as being innocuous or assume the position of a detached observer (Ochsner & Gross, 2008).

Finally, when the aforementioned strategies are not applicable, people may engage in a fourth type of strategy, which involves response modulation. In this type of emotion regulation, people directly manipulate the physiological, experiential, or behavioral expressions of their emotions. For instance, people may inhibit their spontaneous emotional expressions (Gross, 1998), exaggerate their responses to an emotional stimulus (Schmeichel, Demaree, J. L. Robinson, & Pu, 2006), or intentionally direct their emotional impulses towards a substitute object (Bushman, 2002). Other forms of response modulation are controlled breathing (Philippot, Chappelle, & Blairy, 2002) and progressive muscle relaxation (Pawlow & Jones, 2002).

The process model has made several major contributions to the understanding of emotion regulation. First, the process model identifies the key response systems that may be targeted in emotion regulation. Second, the model provides a comprehensive descriptive framework for classifying different emotion regulation strategies (Gross, 2001). Third, the process model offers an explanation for why some emotion regulation strategies may be more effective than others.

Specifically, the process model proposes that emotion regulation strategies are likely to be more successful and less effortful when they are applied earlier rather than later in the emotion generation process (Gross, 2001). This prediction has received initial support from studies that compared the effects of cognitive reappraisal with the effects of expressive suppression (e.g., Gross, 1998). In line with the process model, cognitive reappraisal has been found to be more effective than expressive suppression in down-regulating negative emotion (e.g., Gross, 1998). Moreover, cognitive reappraisal appeared to be less cognitively effortful than expressive suppression (Richards & Gross, 2000).

Though these previous results are important, the operationalizations of cognitive reappraisal and expressive suppression in relevant studies differed in at least two respects. First, the target of the strategies differed, given that reappraisal aims to bring about cognitive change and suppression aims to achieve response modulation. Second, there were temporal differences between the investigated strategies, given that reappraisal intervened earlier than suppression in the emotion-generative process. Unconfounding these two aspects would require manipulating the temporal difference while holding the target of emotion regulation constant. A recent study took an important step in this direction by comparing the effectiveness of distraction and reappraisal early and late in the emotion-generative process (Sheppes & Meiran, 2007). As predicted by the process model, late reappraisal was less effective than early reappraisal. However, distraction was effective regardless of its timing, i.e., whether it was initiated early or late. These results suggest that the link between the effectiveness and timing of emotion regulation strategies is contingent upon additional cognitive and physiological parameters (Sheppes, Catran, & Meiran, 2009; Sheppes & Meiran, 2008).

Other studies raise doubts about the notion that emotion regulation through cognitive change strategies (which are assumed to target early emotion responses) is inherently more effective than response modulation strategies (which are assumed to target late emotion responses). At least in some instances, response modulation strategies may be quite effective. For instance, studies have demonstrated emotion-regulatory effects of controlled breathing, a technique in which people are asked to produce patterns that fit with specific emotional states (Philippot, Chappelle, & Blairy, 2002). Likewise, progressive muscle relaxation, a technique in which people successively tense and relax specific muscle groups, has been shown to effectively down-regulate emotional stress (Pawlow & Jones, 2002). Conversely, some cognitive change strategies may be maladaptive. For instance, rumination is a cognitive emotion regulation strategy that has been found to be ineffective in dealing with negative emotions (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008).

A further complication is that emotion generation may be messier than the process model assumes. For instance, bodily movements may directly activate emotional experiences (Niedenthal et al., 2005), and affective stimuli may directly trigger behavioral tendencies associated with emotional responding (e.g., R. Neumann, Förster, & Strack, 2003). Different components of emotional responding may thus become activated in a highly variable order. Consequently, it seems questionable to assume a priori that the target of an emotion regulation strategy determines its timing within the emotion generation process. An emotion regulation strategy such as cognitive reappraisal might intervene early or late in the emotion generation process, depending on the circumstances. The same applies to any other emotion regulation strategy. Thus, the role of timing in determining the effectiveness of emotion regulation strategies cannot be inferred from the targets of emotion regulation. To reach firm conclusions,

the timing of a given emotion regulation strategy must be established independently, through measurement or manipulation (e.g., Sheppes & Meiran, 2007).

Taken together, the link between the targets of emotion regulation strategies and their effectiveness seems more complex than the process model (Gross, 2001) assumes. Perhaps this conclusion is not all that surprising, given that the process model exclusively focuses on the "emotion" part of emotion regulation. The "regulation" part of emotion regulation is not systematically considered by the process model. Nevertheless, it seems plausible that the effectiveness of emotion regulation depends at least partly on how well people are able to monitor whether a given situation calls for emotion regulation and how well people are capable of implementing a particular emotion regulation strategy. The latter processes are central to control models of emotion regulation, which have addressed the "regulation" in emotion regulation.

The "Regulation" in Emotion Regulation

Emotion regulation is by definition a control process. As such, emotion regulation belongs to a larger family of processes whereby people exert control over their own behavior. Indeed, modern emotion regulation research has drawn considerable inspiration from theories of human self-regulation and cognitive control (Carver & Scheier, 1999, this volume; Kuhl, 2000; Posner & Snyder, 1975; Rueda, Posner, & Rothbart, this volume). Building on these theories, researchers have proposed several models of the control processes that mediate emotion regulation.

Goal-Oriented Models of Emotion Regulation

Social and personality psychologists have suggested that emotion regulation may be understood as a form of effortful self-regulation (Erber & Erber, 2000; Larsen, 2000; Tice &

Bratslavsky, 2000). Self-regulation is conceived as a cybernetic control process, which consists of two main components. First, there is a monitoring process, which compares the individual's current state with a desired state. Second, there is an operating system which reduces any discrepancies between these two states (Carver & Scheier, 1998). Thus, when people engage in emotion regulation, they may compare their current emotional state to a desired emotional state and take appropriate steps to bring their current emotional state closer to the desired emotional state. Self-regulatory systems of this sort are typically hierarchically ordered (Carver & Scheier, 1998), with lower-order goals being geared towards concrete behavior control, and higher-order goals being oriented towards more abstract principles. Accordingly, emotion regulation processes may range from the control of concrete behavior (e.g., "Take a deep breath and count to ten") to abstract goals (e.g., "I want to be in control of my emotions").

A related approach has proposed that emotion regulation is governed by cognitive control processes. Cognitive control is a super-ordinate control process that allows people to override strongly activated but situation-inappropriate action tendencies (Posner & Snyder, 1975). Cognitive control may be applied to emotional responses whenever hot, emotion-driven response tendencies threaten to interfere with cool, more cognitively driven response tendencies (McClure, Botvinick, Yeung, Greene, & Cohen, 2007; Ochsner & Gross, 2008; Schmeichel, 2007). Cognitive control involves two major processes that are associated with distinct neural structures (Botvinick, Braver, Barch, Carter, & Cohen, 2001). The first is a conflict monitoring process, which constantly, efficiently, and nonconsciously scans for the presence of conflicts between alternative response tendencies. Whenever such conflicts are detected, an effortful regulatory process is engaged to override the unwanted response tendency that is proportional to the level of response conflict.

The link between emotion regulation and cognitive control has been confirmed by neuro-imaging studies, which have observed a close correspondence between the neurological systems involved in both types of control. For instance, reappraisal of emotions, which consists of actively reinterpreting the meaning of a stimulus to lessen its emotional impact, leads to increased activation in the dorsal anterior cingulate cortex and prefrontal cortex, areas that also support other forms of cognitive control (Botvinick et al., 2001; Miller & Cohen, 2001). Importantly, activation of these control systems leads to corresponding changes in the activity of regions such as the amygdala and/or insula, which are important for assessing the emotional relevance of a stimulus, (e.g., Beauregard, Levesque, & Bourgouin, 2001; Ochsner et al., 2002; for a review, see Ochsner & Gross, 2008). Such findings support the view that emotion regulation may rely on cognitive control processes.

Self-regulation and cognitive control models have been highly influential in shaping modern thinking about emotion regulation. Both models converge on key points about the nature of goal-directed control processes (M. D. Robinson, Schmeichel, & Inzlicht, 2009). Moreover, self-regulation and cognitive control models agree in their characterization of emotion regulation as an effortful top-down control process that is guided by goals, i.e., largely conscious verbal/symbolic representations of desired outcomes and intended actions. We therefore refer to self-regulation and cognitive control models jointly as goal-oriented models of emotion regulation.

There are two main ways in which goal-oriented emotion regulation may operate. First, people often hold beliefs about the utility of particular emotional states. These beliefs may be derived from verbal instructions about the desirability of certain emotional states (e.g., Achtzinger, Gollwitzer, & Sheeran, 2008; Gross, 1998), by implicit or explicit beliefs about the

utility of particular emotional states (Tamir, Chiu, & Gross, 2007), or by more abstract theories that people hold about emotion regulation (Tamir, John, Srivastava, & Gross, 2007). When people believe that the utility of other emotional states is higher than the utility of their present emotional state, this may give rise to goal-oriented emotion regulation.

Second, an ongoing goal, task, or norm may change the relevance of emotionally charged information. Emotionally charged information that is (potentially) relevant to the ongoing task is likely to be maintained, whereas emotionally charged information that is irrelevant is likely to be ignored or down-regulated (Van Dillen & Koole, 2007, 2009). Because goals, norms, or tasks may favor various types of emotional outcomes, goal-oriented emotion regulation may either promote or inhibit emotional states that are hedonically rewarding.

Beyond Goals: Need- and Person-Oriented Emotion Regulation

Goal-oriented models capture important aspects of the emotion regulation process. Nevertheless, some forms of emotion regulation fit less well with the goal-oriented model. For instance, certain emotion regulation processes unfold in the absence of explicit goals and display many aspects of automatic processing (Koole & Jostmann, 2004; Mauss, Bunge, & Gross, 2007). Likewise, there are forms of emotion regulation that do not involve any explicit attempts to control one's emotion states, and even efforts to stay away from goal-directed control processes (Brown, Ryan, & Creswell, 2000). As such, it seems useful to consider how goal-oriented models of emotion regulation may be complemented by other types of emotion-regulatory processes.

Need-Oriented Emotion Regulation. A first extension of the goal-oriented model relates to basic hedonic needs to seek pleasure and avoid pain. The far-ranging psychological significance of hedonic needs was first elaborated by Freud (1920/1961), when he proposed his

classic pleasure principle. Freud regarded the pleasure principle as the prime directive of the id, an impulsive, child-like aspect of personality. Although Freud's personality theory soon fell into disrepute, the importance of hedonic needs continues to be recognized by modern theories of emotion regulation (e.g., Larsen, 2000; Westen, 1994).

Consistent with the notion of need-oriented emotion regulation, developmental psychologists have observed that children display early forms of self-soothing, such as sucking or turning away from angry faces, within three months after birth (Calkins & Leerkes, this volume; Kopp, 1989; Rothbart, Ziaie, & O'Boyle, 1992). These hedonic behaviors emerge regardless of caregiver intervention and well before children are capable of forming linguistic representations that can support abstract goals. It thus appears that need-oriented emotion regulation is driven by elementary, sublinguistic processes. The elementary nature of hedonic needs is bolstered by findings that, among adult participants, tendencies to approach positive affective stimuli and to avoid negative affective stimuli can be triggered automatically and without conscious intent (Chen & Bargh, 1999; R. Neumann, Förster, & Strack, 2003). Moreover, hedonic biases in information processing display important aspects of automaticity (Paulhus & Levitt, 1987; Roese & Olson, 2007; Tesser, 2000). These and related findings suggest that basic hedonic tendencies may remain engrained in the human psyche throughout people's lives.

Although hedonic needs are grounded in pre-linguistic processes, they may acquire the capacity to bias conscious reasoning processes (Kunda, 1990), as evidenced by numerous ego-defensive biases (Baumeister & Newman, 1994; Pyszczynski & Greenberg, 1987; Tesser, 2000). For instance, people may engage in selective criticism of threatening information (Lieberman & Chaiken, 1992), make self-serving attributions (Campbell & Sedikides, 1999), or engage in

downward social comparison (Taylor & Lobel, 1989). Notably, defensive bias is associated with neural activity in regions such as the ventromedial prefrontal cortex, which have been implicated in emotion regulation (Westen, Kilts, Blagov, Harenski, & Hamann, 2006). At the same time, defensive bias is not associated with activation in brain regions that support effortful self-regulation (Ochsner & Gross, 2008; Van Dillen, Heslenfeld, & Koole, 2009), suggesting that defensive bias is mediated by different processes than goal-oriented emotion regulation.

Need-oriented emotion regulation is narrow in its aims, in that hedonic needs are invariably oriented towards a positive hedonic balance in the immediate present. Because people's goals typically have a broader temporal horizon, conflicts may arise between need-oriented emotion regulation and self-regulatory efforts that are geared towards longterm goals. Indeed, a provocative series of experiments found that emotional distress may cause need-oriented emotion regulation to take precedence over goal-directed forms of self-regulation (Tice, Bratslavsky, and Baumeister (2001). Relatedly, field studies indicate that harmful activities that people may use in need-oriented emotion regulation, such as binge eating or excessive alcohol intake, are more prevalent under high levels of emotional distress (Greeno & Wing, 1994; Mohr, Brennan, Mohr, Armeli, & Tennen, 2008).

Despite the potential for conflict with broader self-regulation processes, need-oriented emotion regulation is likely to have important benefits. Enduring negative emotional states invoke considerable psychological costs because such states mobilize many mental and physical resources within the individual (Sapolsky, 2007). By shortening the duration of negative emotional states, need-oriented emotion regulation may allow people to preserve important resources. Moreover, even though need-oriented emotion regulation is rigid in its aims, there

may be considerable flexibility in the means by which people attain hedonically favorable outcomes (Tesser, 2000).

Person-Oriented Emotion Regulation. A second extension of the goal-oriented model of emotion regulation derives from existential/humanistic approaches to personality (e.g., Maslow, 1968; Frankl, 1975), and has roots in Asian philosophy (Cahn & Polich, 2006; Tang & Posner, 2009) and many religious traditions (Koole, McCullough, Kuhl, & Roelofsma, in press). These seemingly disparate paradigms have converged on notions of self-regulatory process that goes beyond fragments of the self (such as goals or hedonic needs), and rather encompasses the functioning of the whole person. In person-oriented emotion regulation, the person's functioning is coordinated by integrating as many subsystems and processes as possible for supporting a chosen course of action. Person-oriented emotion regulation thus supports an “inner democracy” (Kuhl, 2000), by regulating people's actions in harmony with the totality of people's inner needs, motives, and autobiographical experiences. These integrated networks of personality systems are closely connected with the autonomic nervous system. Person-oriented emotion regulation is not mediated by explicit intentions, but rather by integrated feelings or intuitions about appropriate courses of action (Baumann & Kuhl, 2002).

There are two main ways in which emotion regulation may coordinate the functioning of the whole person. First, person-oriented emotion regulation may prevent people from becoming trapped in specific motivational-emotional states, thus promoting flexibility in global personality functioning (Rothermund, Voss, & Wentura, 2008). Second, by facilitating emotional changes, emotion regulation may promote coherence in personality functioning and personal growth (Baumann et al., 2005).

Flexibility in emotional functioning may be promoted by counter-regulation (Rothermund et al., 2008), a process whereby people switch their attention towards emotional states that are opposite in valence to emotional states that are momentarily activated. Counter-regulation has emerged as a distinct pattern in various attentional biases towards positive or negative information (Derryberry, 1993; Rothermund et al., 2008; Tugade & Frederickson, 2004). Depending on the valence of the emotion that predominates in a given context, counter-regulation may inhibit either positive or negative emotion (Rothermund et al., 2008). If counter-regulation supports flexible self-regulation, then the pattern should be especially apparent among individuals who display high levels of self-regulatory efficiency. Consistent with this, counter-regulation is markedly stronger among individuals disposed towards flexible action control (Jostmann, Koole, Van der Wulp, & Fockenberg, 2005; Koole & Coenen, 2007; Koole & Jostmann, 2004), and markedly weaker among individuals suffering from chronic anxiety, phobia, or dysphoria (Mathews & MacLeod, 2005).

Integration and personal growth may be promoted by emotion regulation strategies that foster deep cognitive processing of people's emotional experiences. For instance, expressive writing can turn initially disturbing emotional experiences into coherent narratives (Pennebaker & Chung, 2007), which down-regulates emotional distress and promotes self-insight (Klein & Boals, 2001). After a painful experience has been integrated into more extended cognitive networks, people may subsequently deal more effectively with similar emotional experiences. Indeed, individuals with more differentiated knowledge of self and emotion show greater efficiency in emotion regulation (Barrett, Gross, Conner, & Benvenuto, 2001; Rafaeli-Mor & Steinberg, 2002).

Person-oriented emotion regulation seeks to bridge the duality between mind and body. Indeed, bodily activities are typically integrated in emotion-regulatory activities such as meditation or mindfulness exercises. Research indicates that bodily activities such as controlled breathing or progressive muscle relaxation have a distinct influence on emotion regulation, which cannot be reduced to attentional or appraisal processes (Boiten, Frijda, & Wientjes, 1994; Esch, Fricchione, & Stefano, 2003; Philippot et al., 2002; Rausch, Gramling, & Auerbach, 2006).

Enhancing the Capacity for Emotion Regulation through Training

Given the important role that emotion regulation plays in self-regulatory functioning, it is important to learn about ways to enhance people's emotion-regulatory abilities. In recent years, a growing number of studies have shown that people's competencies at emotion regulation can be enhanced through training (for reviews, see Baumeister, Gailliot, DeWall, & Oaten, 2006; MacLeod, Koster, & Fox, 2009; Tang & Posner, 2009). This evidence could have far-ranging implications, by contributing to the development of more effective therapies and interventions aimed at overcoming self- and emotion-regulatory deficits. In addition, studying the effects of training may provide a new paradigm for unravelling the causal mechanisms that underlie emotion regulation. As such, there is great interest in the effects of training on the capacity for emotion regulation.

Studies examining the effects of training on emotion regulation have so far been guided by "inspired guesswork" (MacLeod et al., 2009, p. 95) rather than a systematic analysis of the underlying causal mechanisms. Nevertheless, a systematic theoretical analysis is necessary to obtain a scientific understanding of how emotion-regulatory abilities may be altered and enhanced through training. In this regard, the models of the targets and control processes of emotion regulation that were discussed in previous sections of this chapter may serve as a

preliminary framework for interpreting the effects of training on emotion regulation. As such, we rely on these models in considering which types of mechanism may be implicated in training emotion regulation abilities.

Which Emotion Responses Are Targeted in Training Studies? A first question that arises is whether training has differential effects on emotional sensitivity (i.e., people's primary emotional response) versus emotion regulation (i.e., people's secondary emotional response). Training studies have not systematically distinguished between these different components of emotion processing. However, developmental research indicates that emotional sensitivity follows an intrinsic path of development that is largely independent of environmental influences (McCrae et al., 2000; Terracciano, Costa, & McCrae, 2005), whereas competencies at emotion regulation are strongly influenced by the quality of children's social interactions with their caregivers (Mikulincer, Shaver, & Pereg, 2003; Southam-Gerow & Kendall, 2002) and continue to improve even into old age (Carstensen, Fung, & Charles, 2003; Gröpel, Kuhl, & Kazén, 2004; John & Gross, 2004). As such, there are grounds for suspecting that emotion regulation is more susceptible to training than emotional sensitivity.

A further question is which types of emotional responses may be enhanced through training. We are not aware of studies that have systematically addressed the effects of training on situation selection or situation modification, the first emotion-regulatory strategies proposed by the process model (Gross, 2001). The remaining strategies proposed by the process model have received more empirical attention. Studies on cognitive bias modification have sought to change attentional or interpretive biases with regard to emotional information, typically by training attentional or interpretative procedures in a speeded response task (MacLeod et al., 2009). Both types of training have been found to facilitate more efficient disengagement from intrusive

thoughts and negative emotional states (Dandeneau, Baldwin, Sakellaropoulo, & Pruessner, 2004; MacLeod et al., 2009; see also a special section in the first issue of the *Journal of Abnormal Psychology*, 2009). In addition, a number of successful training programs has included the regulation of bodily expressions of emotion, such as relaxation and breath adjustment (Tang & Posner, 2009). Taken together, research suggests that most of the major response systems that may be targeted in emotion regulation are implicated in programs that are designed to enhance emotion-regulatory abilities.

Which Control Processes Can Be Trained? Goal-oriented models of emotion regulation (Erber & Erber, 2000; Ochsner & Gross, 2008) propose a close correspondence between effortful self-regulation and goal-oriented emotion regulation. In line with this, a number of training studies have found that training effortful self-regulation may yield important benefits for emotion regulation. For instance, in one study, physical exercise led to significant reductions in perceived stress and increases in self-reported ability to control one's temper (Oaten & Cheng, 2006a). Similar effects on emotion regulation have been reported when people had trained other effortful self-regulatory behaviors, such as regular academic study (Oaten & Cheng, 2006b) or prudent money management (Oaten & Cheng, 2007). Goal-oriented models would also predict an effect in the opposite direction, such that practicing goal-oriented emotion regulation should improve people's capacity for effortful self-regulation of non-emotional behaviors. As far as we know, the latter prediction has yet to be submitted to empirical testing.

Other training studies seem to involve need-oriented forms of emotion regulation. In particular, studies within the cognitive bias modification paradigm have often focused on changing processing biases in a more hedonically favorable direction (MacLeod et al., 2009). Notably, the cognitive bias modification paradigm has originated in the study of attentional

processes among individuals high in trait anxiety (Mathews & MacLeod, 2005). As such, it may be that anxiety problems are associated with abnormalities in need-oriented emotion regulation. Consistent with this, exaggerated forms of need-oriented emotion regulation are empirically associated with repressive coping style (Weinberger, Schwarz, & Davidson, 1979), a coping style that is characterized by latent anxiety (Derekshan, Eysenck, & Myers, 2007). The link between anxiety problems and deficits in need-oriented emotion regulation warrants more attention in future research.

Finally, several training programs seem aimed at cultivating person-oriented self-regulation and emotion regulation processes. In so-called mindfulness meditation training, people are encouraged to focus their attention to the present and to refrain from evaluating their ongoing experience (Kabat-Zinn, 1990). Mindfulness training has been found to reduce the symptoms of stress, depression, and anxiety among many different clinical populations (Bishop, 2002). Mindfulness training presumably fosters these broad emotion-regulatory effects by reducing negative ruminations about the self (Ramel, Goldin, Carmona, & McQuaid, 2004) and by promoting integrative processes (Koole, Govurun, Chang, & Gallucci, in press). A related research program has examined the effects of integrated body-mind training (Tang & Posner, 2009). In the latter program, trainees are guided by a coach in body relaxation, breath adjustment, mental imagery, music, and mindfulness training to gradually achieve a balanced state of relaxation and focused attention. Research indicates that integrated body-mind training fosters top-down attention control, lowers negative emotion, stress-related cortisol increases, and increases in immune functioning (Tang et al., 2007). Moreover, integrated bod-mind training has been found to increase the coordination between attentional networks and the autonomic nervous system (Tang et al., 2009).

In sum, the effects of training emotion-regulatory abilities can be meaningfully related to existing models of emotion regulation. Although training research has not systematically pursued the distinction between emotional sensitivity and emotion regulation, developmental research suggests that emotion regulation may be particularly susceptible to training. Furthermore, training studies indicate that the regulation of various emotion response systems can be improved through training, including the regulation of attention, cognitive appraisals, and expressive responses. Different training programs further seem to invoke different control processes, which some programs emphasizing goal-oriented emotion regulation, and others emphasizing need- or person-oriented emotion regulation.

Summary and Conclusions

When people self-regulate, they are frequently confronted with potentially emotion-arousing situations. Processes of self-regulation are therefore closely connected with processes of emotion regulation. The present chapter has highlighted key aspects of the interface between self-regulation and emotion regulation, by addressing some of the basic psychological processes that underlie the self-regulation of emotion.

In the first section of the present chapter, we considered the "emotion" in emotion regulation, or the targets of emotion regulation. We conceived of emotion regulation processes broadly, as the processes whereby people regulate any type of affective or emotionally charged response, including attention, cognitive representations, and physical or behavioral responses. Emotion regulation targets the offset of emotional responding and is thus distinct from processes involve the onset of emotional responding, or emotional sensitivity. The process model of emotion regulation has offered a comprehensive analysis of the various emotional response systems that people may target for regulation. The model suggests that people may regulate their

emotions by selecting or altering emotion-eliciting situations, attentional deployment, cognitive change, or response modulation.

In the second section of the present chapter, we took a closer look at the "regulation" in emotion regulation, by reviewing the types of control processes that people may use during emotion regulation. Control processes determine how people monitor whether emotion regulation is required and how people implement specific acts of emotion regulation. Goal-oriented models have portrayed emotion regulation as an effortful self-regulation or cognitive control process. Although goal-oriented models explain important aspects of emotion regulation, emotion regulation may also serve other types of regulatory functions. The extended functions of emotion regulation include the satisfaction of hedonic needs, facilitation of specific goals and tasks, and coordination of global personality functioning.

The third section of the present chapter discussed emerging research on the effects of training on emotion-regulatory abilities. In reviewing the training literature, we drew upon key concepts from the emotion regulation literature. Our brief review suggests that there exists considerable integrative potential between the two literatures. Emotion regulation researchers have much to gain from studying how training studies afford new insights into the causal mechanisms of emotion regulation. Conversely, training researchers may benefit from paying closer attention to specific mechanisms and processes. In this regard, the emotion regulation literature offers a rich set of methods and concepts to develop a mechanistic understanding of how emotion-regulatory abilities are shaped and altered by experience.

More generally, the study of emotion regulation has broad implications for psychologists' understanding of self-regulation processes. In recent years, psychological theories have predominantly emphasized goals as the core mental representation that drives human self-

regulation (Austin & Vancouver, 1996; Baumeister et al., 2006; Carver & Scheier, 1998).

However, as the present chapter indicates, goals only account for a limited number of emotion regulation processes. Some forms of emotion regulation operate on levels that are more elementary than goals, and appear to be driven by powerful hedonic needs. Other forms of emotion regulation transcend single goals, and seek to forge a union between passion and reason, mind and body, and other dualities that may divide the human psyche. A complete understanding of human self-regulation thus extends beyond goals, and includes the regulation of people's deep-seated emotional needs and overall personality functioning.

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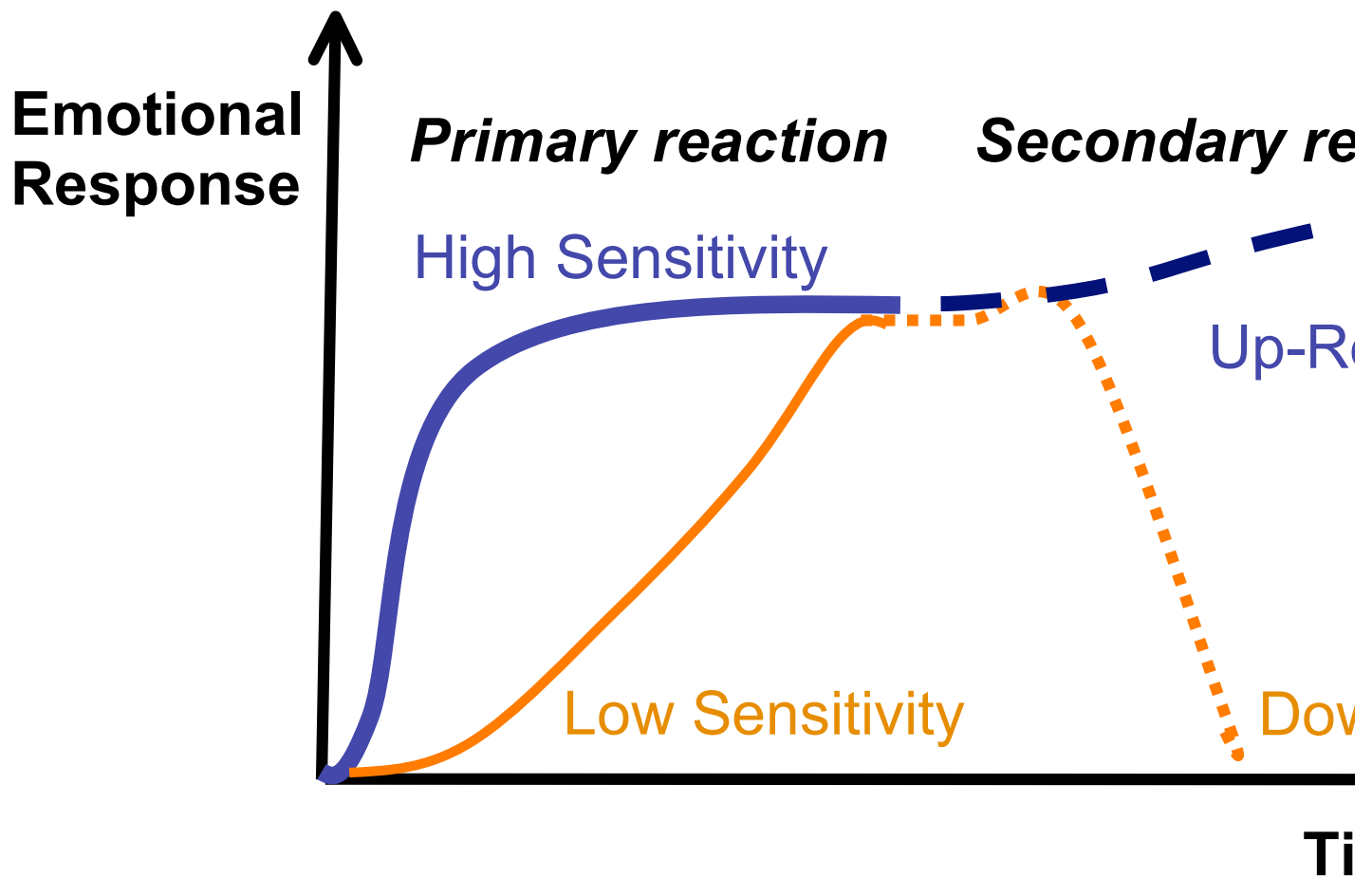
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Figure 1: Hypothetical Model of Emotional Sensitivity versus Emotion Regulation



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