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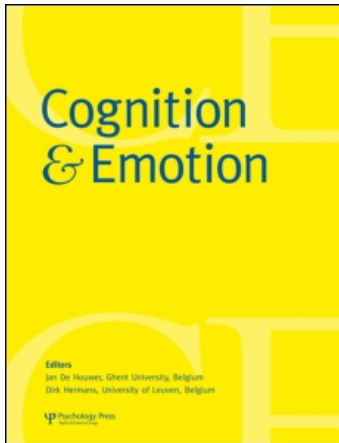
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The psychology of emotion regulation: An integrative review

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The present article reviews modern research on the psychology of emotion regulation. Emotion regulation determines the offset of emotional responding and is thus distinct from emotional sensitivity, which determines the onset of emotional responding. Among the most viable categories for classifying emotion-regulation strategies are the targets and functions of emotion regulation. The emotion-generating systems that are targeted in emotion regulation include attention, knowledge, and bodily responses. The functions of emotion regulation include satisfying hedonic needs, supporting specific goal pursuits, and facilitating the global personality system. Emotion-regulation strategies are classified in terms of their targets and functions and relevant empirical work is reviewed. Throughout this review, emotion regulation emerges as one of the most far-ranging and influential processes at the interface of cognition and emotion.

Keywords: Emotion regulation; Affect regulation; Self-regulation; Coping; Psychological defence.

Emotions are often portrayed as irresistible forces that exert a sweeping influence on behaviour. There is reason to believe, however, that people are much more flexible in dealing with their emotions. As it turns out, people can control virtually every aspect of emotional processing, including how emotion directs attention (Rothermund, Voss, & Wentura, 2008), the cognitive appraisals that shape emotional experience (Gross, 1998a), and the physiological consequences of emotion (Porges, 2007). These and other processes whereby people manage their own emotions are commonly referred to as *emotion regulation*. Emotion regulation has been linked to such important outcomes as mental health (Gross & Muñoz, 1995), physical

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health (Sapolsky, 2007), relationship satisfaction (Murray, 2005), and work performance (Diefendorff, Hall, Lord, & Streat, 2000). It thus seems vital to learn more about the psychology of emotion regulation.

The past decade has witnessed an explosion of emotion-regulation research (see Gross, 2007, for a comprehensive overview). Indeed, since the last review on this topic was published in *Cognition and Emotion* (Gross, 1999), more than 700 journal articles appeared with the term “emotion regulation” in the title or abstract, according to the PsycInfo database. The number of relevant publications becomes several times greater if one considers work on closely related topics such as mood regulation, affect regulation, and coping. The tremendous increase in research volume has rendered the study of emotion regulation one of the most vibrant areas in contemporary psychology. At the same time, it has become increasingly important to integrate the rapidly accumulating findings and insights. The need for integration is further enhanced by the multidisciplinary nature of emotion regulation research, which spans developmental, cognitive, social, personality, and clinical psychology, and, more recently, cognitive and affective neurosciences and psychophysiology.

The present article provides an integrative review of contemporary research on the psychology of emotion regulation. The relevant literature is too large to be covered exhaustively. Consequently, the present article gives priority to ideas and findings with broad implications for the psychology of emotion regulation. Because the development and disorders of emotion regulation have been reviewed elsewhere (Kring & Werner, 2004; Skinner & Zimmer-Gembeck, 2007; Southam-Gerow & Kendall, 2002; Taylor & Liberzon, 2007), the present article concentrates on emotion regulation among healthy adults. In the following paragraphs, I first consider more closely what emotion regulation is and how it relates to other forms of emotion processing. Next, I discuss several approaches to classifying strategies of emotion regulation and review empirical research on emotion-regulation strategies. Finally, I summarise the main conclusions of the present article and suggest avenues for future research on emotion regulation.

WHAT IS EMOTION REGULATION?

In everyday life, people are continually exposed to potentially emotion-arousing stimuli, ranging from internal sensations like an upset stomach to external events such as juicy gossip about a colleague or music played in supermarkets. From the fact that these kinds of stimuli only occasionally trigger full-blown emotions, one could infer that people engage in some form of emotion regulation almost all of the time (Davidson, 1998). But emotion

regulation may also become manifested in more overt ways. For instance, there are reliable observations that people may rapidly shift their attention away from threatening stimuli (Langens & Mörth, 2003), that people may overcome traumatic experiences by writing about them (Pennebaker & Chung, 2007), and that people may choose to hit a pillow instead of lashing out at the true cause of their anger (Bushman, Baumeister, & Phillips, 2001).

In each of the aforementioned cases, people resist being carried away or “hijacked” (Goleman, 1995) by the immediate emotional impact of the situation. Emotion regulation can thus be defined as the set of processes whereby people seek to redirect the spontaneous flow of their emotions. Some approaches have also considered emotion regulation by the external environment. For instance, developmental research indicates that caregivers may play a key role in regulating children’s emotional states (Southam-Gerow & Kandell, 2002) and environmental research has shown that natural settings can promote more rapid recovery from stress than urban settings (Van den Berg, Hartig, & Staats, 2007). Emotion regulation by forces outside the self is clearly important. Nevertheless, following the predominant focus of the literature (Gross, 2007), the present article concentrates on the self-regulation of emotion.

The prototype of emotion regulation is a deliberate, effortful process that seeks to override people’s spontaneous emotional responses. Some forms of emotion regulation indeed fit this prototype, by drawing upon the same psychological and neurobiological systems that are involved in the effortful control of action and attention (Ochsner & Gross, 2005, 2008; Tice & Bratslavsky, 2000). However, other forms of emotion regulation are relatively automatic and effortless (Bargh & Williams, 2007; Koole & Kuhl, 2007; Mauss, Bunge, & Gross, 2007). Furthermore, emotion regulation does not always consist of an overriding process, in as far as this implies an antagonistic stance towards one’s emotions. Indeed, some sophisticated forms of emotion regulation unfold in close collaboration with other types of emotion processing (Brown, Ryan, & Creswell, 2007; Pennebaker & Chung, 2007; Porges, 2007).

During emotion regulation, people may increase, maintain, or decrease positive and negative emotions. Accordingly, emotion regulation often involves changes in emotional responding. These changes may occur in the kinds of emotions that people have, when they have their emotions, and how they experience and express their emotions (Gross, 1999). Notably, the emotional changes that are produced by emotion regulation may or may not bring people closer to the emotional state that they desired. Indeed, some forms of emotion regulation ironically bring about the very emotional outcomes that people hope to avoid (e.g., Wegner, Erber, & Zanakos, 1993). Emotion regulation may also fail in other ways, such that people may still display unwanted emotions despite their best efforts to avoid them. When

people are chronically unable to regulate their emotions, this may seriously disrupt psychological functioning. Indeed, chronic deficits in emotion regulation contribute to all major forms of psychopathology (Bradley, 2000; Kring & Werner, 2004).

The scope of emotion regulation

Emotions have multiple components, consisting of a more or less coherent cluster of valenced (i.e., positive or negative) behavioural and physiological responses that are accompanied by specific thoughts and feelings (Cacioppo, Berntson, & Klein, 1992; Frijda, 2006; Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005). Because emotion regulation operates on people's emotions, it follows that the effects of emotion regulation can be observed across all modalities of emotional responding, including behaviour, physiology, thoughts, and feelings.

According to some classic theories of emotion, each emotion triggers a discrete pattern of behaviour, physiology, thoughts, and feelings. However, the available evidence does not support the existence of discrete emotional states (Mauss & Robinson, in press; Russell, 2003). Instead, emotional responding appears to be organised in terms of a few fundamental dimensions, including valence, arousal, and approach–avoidance. The influence of emotion regulation on people's emotional states is therefore likely to be similarly dimensional. In other words, emotion regulation may not be so much concerned with getting people in or out of discrete emotional states like anger, sadness, or joy. Rather, emotion regulation may change people's emotional states along dimensions such as valence, arousal, and approach–avoidance.

Closely related to emotion regulation are constructs such as mood regulation, coping with stress, and affect regulation. Although it is possible to distinguish semantically between these constructs, their substantive overlap is considerable. At the heart of all emotional states is *core affect* (Russell, 2003), basic states of feeling good or bad, energised or enervated. The regulation of specific emotions, moods, stress, and diffuse affect is therefore always aimed at changing core affect. Moreover, the empirical borders between these different emotion constructs are very fuzzy (Russell, 2003). In view of these considerations, it seems most productive to conceive of emotion regulation broadly, as relating to the management of all emotionally charged states, including discrete emotions, mood, stress, and affect. Ultimately, it may be possible to derive more fine-grained distinctions between different types of emotional states that are being regulated. At present, however, a broad conception of emotion regulation offers the best promise of uncovering the basic principles that underlie various emotion-regulatory activities.

Emotion regulation versus emotional sensitivity

A longstanding issue is the distinction between emotion regulation and other forms of emotion processing. One seemingly straightforward approach would be to observe the differences between regulated and unregulated emotions. Unfortunately, this comparison is often difficult to make. People can regulate their emotions very rapidly (Jostmann, Koole, Van der Wulp, & Fockenberg, 2005; Rothermund et al., 2008). It is therefore often unclear “where an emotion ends and regulation begins” (Davidson, 1998, p. 308).

A conceptual solution to this problem lies in the temporal unfolding of an emotional response (Baumann, Kaschel, & Kuhl, 2007; Davidson, Jackson, & Kalin, 2000; Skinner & Zimmer-Gembeck, 2007). As it turns out, people’s primary emotional response to the situation can be qualitatively different from their secondary emotional response—see also Lazarus’ (1991) distinction between primary versus secondary appraisals. People’s primary emotional response presumably reflects their emotional sensitivity, whereas their secondary emotional response presumably reflects emotion regulation. This distinction is grounded in the conceptualisation of emotion regulation as a control process. Control processes, as they are commonly understood, consist of the monitoring and adjusting of a lower-level process with respect to a given standard (Carver & Scheier, 1998). Applied to emotion regulation, this implies that an unwanted emotional response must occur initially before any emotion regulation can take place. Although people’s primary emotional response is not yet regulated, it serves as vital input for the subsequent monitoring and control processes that constitute emotion regulation.

To illustrate the distinction between emotional sensitivity and emotion regulation, Figure 1 displays the development of an emotional response over time (after Kuhl, 2008). To simplify matters, the figure only shows a single emotional response with a single maximum strength. Emotional sensitivity is represented by the entry gradient, or the steepness with which the emotional

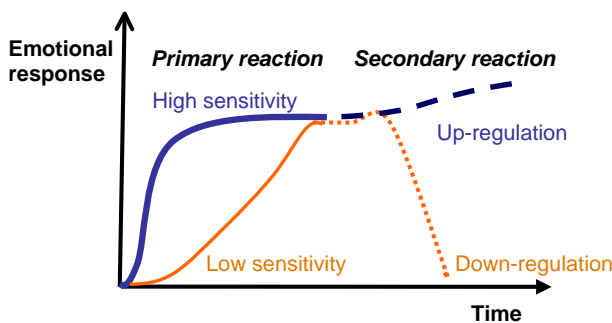


Figure 1. Model of emotional sensitivity versus emotion regulation.

response reaches its full force. Emotional sensitivity is determined by any variable that influences people's initial emotional response to the situation, including the nature of the stimuli that people encounter, personal characteristics, and the broader situation. 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. Variables that influence the exit gradient belong to the process of emotion regulation. Similar to emotional sensitivity, emotion regulation is determined by the characteristics of the person, the stimuli that the person encounters, and the broader situation.

Down-regulation processes aim to achieve a steeper exit gradient, resulting in a speedier return to the baseline (e.g., Gross, 1998a). By contrast, maintenance processes aim to achieve a flatter exit gradient, such that the emotional response is maintained over a longer period of time (e.g., Nolen-Hoeksema, 2000). Up-regulation processes may even increase the magnitude of the emotion response, for instance, when people engage in response exaggeration (Schmeichel, Demaree, Robinson, & Pu, 2006). Emotion regulation may also influence aspects of emotion processing besides the exit gradient, such as the coherence, intensity, awareness, and goal-directedness of emotional responses. Nevertheless, it is the impact on the exit gradient of an emotional response that sets emotion regulation apart from other types of emotion processing.

Distinguishing between emotional sensitivity and emotion regulation is relatively straightforward when people are engaged in the on-line regulation of their emotions. However, some forms of emotion regulation occur proactively, for instance, when people avoid an upcoming situation that is expected to elicit an undesired emotion (Aspinwall & Taylor, 1997; Zeelenberg & Pieters, 2007). In such cases, emotion regulation subjectively precedes the onset of emotion. Indeed, to the extent that proactive coping is successful, people may never experience any unwanted emotion at all. However, studies have shown that anticipating an emotional experience leads to a partial simulation of that experience, in which emotional responses of the brain and body become activated (Niedenthal, 2007; Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005). Therefore emotional sensitivity already comes into play during the anticipation of unwanted emotions. The distinction between emotional sensitivity and emotion regulation is therefore meaningful regardless of whether people regulate their emotions on line, in the heat of the moment, or proactively, before an emotion-arousing situation has actually occurred.

Separate contributions of emotional sensitivity and emotion regulation have been observed throughout the lifespan. Infants and young children display inborn physiological differences that relate to emotional sensitivity, whereas other physiological differences relate to children's ability to regulate their emotional responses (Derryberry, Reed, & Pilkenton-Taylor, 2003;

Eisenberg, Fabes, & Guthrie, 1997; Rothbart, Derryberry, & Posner, 1994). Emotion sensitivity follows an intrinsic path of development that is largely independent of environmental influences and changes less as people grow older (McCrae et al., 2000; Terracciano, Costa, & McCrae, 2005). By contrast, 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). Across the lifespan, traits related to emotion regulation and traits related to emotional reactivity interact in predicting psychological functioning (Baumann et al., 2007; Davidson, 1998; Skinner & Zimmer-Gembeck, 2007).

Summary

Emotion regulation consists of people's active attempts to manage their emotional states. In its broadest sense, emotion regulation subsumes the regulation of all states that are emotionally charged, including moods, stress, and positive or negative affect. Emotion regulation determines the offset of an emotional response, and can thus be distinguished from emotional sensitivity, which determines the onset of an emotional response. Emotional sensitivity and emotion regulation follow different developmental paths and are functionally distinct throughout the lifespan.

CLASSIFYING EMOTION-REGULATION STRATEGIES

Emotion-regulation strategies refer to the concrete approach that people take in managing their emotions. For instance, after a romantic break-up, people may focus their attention on a neutral activity (Van Dillen & Koole, 2007), cognitively reframe the situation (Tugade & Frederickson, 2004), write about their feelings (Pennebaker & Chung, 2007), or eat away at tasty but fattening foods (Tice, Bratslavsky, & Baumeister, 2001). Although the notion of "strategies" seems to imply conscious deliberation, the term as it is used in the present article is agnostic about the underlying process. The strategic aspect of a given emotion-regulation process refers to its specification of how a given act of emotion regulation is implemented. This specification requires making decisions about the implementation of emotion regulation, but people may not be always fully aware of these decisions.

The ordering problem

The potential variety of emotion-regulation strategies is enormous, given that any activity that impacts people's emotions may (at least, in principle)

be recruited in the service of emotion regulation. Finding an underlying order in people's emotion-regulation strategies therefore represents a formidable scientific challenge. One empirical method used to classify emotion-regulation strategies is exploratory factor analysis (e.g., Thayer, Newman, & McCain, 1994). However, this approach suffers from problems of interpretability and difficulties in ensuring the comprehensiveness of the categories that are derived (see Skinner, Edge, Altman, & Sherwood, 2003). For instance, in the coping domain, multiple factor analyses, even on the same set of items, have not produced a replicable structure in coping strategies (Skinner et al., 2003). Another empirical method is rational sorting, which involves grouping items that share common features and separating items that differ (e.g., Parkinson & Totterdell, 1999). Rational sorting is similarly associated with problems of comprehensiveness, and has not converged on a common set of categories in the coping domain (Skinner et al., 2003).

The most rigorous approach to the ordering problem combines top-down (theoretical) and bottom-up (empirical) approaches. In this combined approach, one first defines the higher-order categories of emotion-regulation strategies, after which an empirical approach (such as confirmatory factor analysis) is used to test the fit of specific emotion-regulation strategies into the higher-order categories. To date, a combined top-down/bottom-up approach has not been applied to the classification of emotion-regulation strategies (though see Skinner et al., 2003, for illustrations in the coping domain). Nevertheless, researchers have proposed several concepts that seem potentially useful in fleshing out the higher-order categories of emotion-regulation strategies.

One potentially useful category distinguishes between automatic versus controlled emotion-regulation processes. An attractive aspect of this distinction is that it cuts across the complete range of emotion-regulation strategies (Mauss et al., 2007). However, automaticity is a heterogeneous construct. Indeed, a recent conceptual analysis identified as many as eight concepts associated with automaticity that may vary more or less independently: intentionality; goal dependence; controllability; autonomy; the extent to which a process is stimulus driven; consciousness; efficiency; and speed (Moors & De Houwer, 2006). For constructing a taxonomy, it is desirable to have categories that are functionally homogeneous (see Skinner et al., 2003, on criteria for a scientific taxonomy). The concept of automaticity is therefore less suitable in classifying emotion-regulation strategies.

Another influential approach, the so-called "process model" of emotion regulation, has proposed that emotion-regulation strategies may be classified by the time at which they intervene in the emotion-generation process (Gross, 1998a,b, 2001). The process model assumes that emotion responses

are generated in a fixed cycle, such that attention to emotionally relevant information precedes cognitive appraisals, which in turn precede emotionally expressive behaviour. However, research indicates that the order in which emotion responses are generated is in fact variable. Attention, cognitive appraisals, or behaviour may each occur early or late in the emotion-generation process. For instance, bodily movements may directly activate emotional experiences (Niedenthal et al., 2005; Strack, Martin, & Stepper, 1988), and merely attending to emotional stimuli may directly trigger emotional behaviour without any intervening cognitive appraisals (e.g., Neumann, Förster, & Strack, 2003). The temporal order of the emotion-generation process therefore offers no basis for systematically relating emotion-regulation strategies to different classes of emotion responses.

Targets of emotion regulation

Regardless of considerations about the timing of emotion-generation processes, the process model (Gross, 1998a,b, 2001) calls attention to the targets of emotion regulation. Emotion regulation is always directed at manipulating some emotional response. It is plausible that the type of emotional response that is targeted for regulation will at least partly determine how people go about the emotion-regulation process. The emotion-generation system that is targeted for regulation may thus serve as a higher-order category to classify different emotion-regulation strategies. Among the three most widely studied emotion-generating systems are attention, knowledge, and bodily expressions of emotion. Emotion regulation may thus target one or more of these three broad emotion-generating systems (Gross, 1998a,b, 2001; Parkinson & Totterdell, 1999; Philippot, Baeyens, Douilliez, & Francart, 2004).

The first of the emotion-generating systems, attention, consists of a set of neurological networks that allow people to select incoming information from sensory input (Fan, McCandliss, Fosella, Flombaum, & Posner, 2005). Attention has been extensively researched within cognitive psychology and cognitive neuroscience (see Posner & Rothbart, 2007, for a review). The resulting insights and methods are increasingly finding their way to the study of emotion regulation (Derakshan, Eysenck, & Meyers, 2007; Ochsner & Gross, 2005; Van Dillen & Koole, 2007, in press). For instance, emotion regulation has been examined in well-established attentional paradigms such as the emotional Stroop task (e.g., Newman & McKinney, 2002), and the dot-probe task (e.g., Fox, 1993). Attentional processing in emotion regulation has also been manipulated, for instance by providing people with an attention-demanding task (Van Dillen & Koole, 2007) or training exercises (Brown et al., 2007).

Emotion-relevant knowledge constitutes a second broad, emotion-generating system. Among the most widely studied types of emotion knowledge are cognitive appraisals, which consist of people's subjective evaluations during their encounter with emotionally significant events (Lazarus, 1991; Scherer, Schorr, & Johnstone, 2001). Particularly important is the appraisal whether or not an event is relevant to the satisfaction or frustration of important goals and motives (Lazarus, 1991; Moors, 2007). Other important appraisals include attributions of an event to self versus others, controllability of the event, accountability, expectations (Ortony, Clore, & Collins, 1988; Smith & Lazarus, 1993), and implicit theories of emotion (Tamir, John, Srivastava, & Gross, 2007b). Emotionally significant knowledge may also be retrieved from memory (e.g., Joormann & Siemer, 2004), and may differ in terms of structure and processing aspects, including their differentiation (Tugade, Frederickson, & Barrett, 2004), complexity (Kang & Shaver, 2004), and awareness (Ruys & Stapel, 2008).

The third of the emotion-generating systems includes the many embodied ways in which emotions unfold, including facial expressions, bodily postures, voluntary and involuntary motor movements, and psycho-physiological responses (see Mauss & Robinson, *in press*, for a review). In as far as attention and appraisals influence the body (e.g., Dandena, Baldwin, Baccus, Sakellaropoulou, & Pruessner, 2007; Sapolsky, 2007), one might question whether the body represents a separate emotion-generating system. Nevertheless, bodily emotion responses often follow different patterns than cognitive emotion responses (Mauss & Robinson, *in press*). Moreover, bodily emotion responses shape the course of people's emotions in ways that cannot be reduced to attention or appraisal processes (Niedenthal et al., 2005; Zajonc, 1998). A separate status for the body is further warranted because several important emotion-regulation strategies, such as expressive suppression (Gross, 1998a) and progressive muscle relaxation (Esch, Fricchione, & Stefano, 2003), primarily target bodily manifestations of emotion.

When emotion-regulation strategies are merely classified by their targeted emotion-generation system, this results in rather heterogeneous groupings. For instance, repressive coping (Langens & Mörth, 2003) and mindfulness training (Brown et al., 2007) may both target attention, even though the latter involves purposefully paying attention to negative emotion, whereas the former avoids negative emotion altogether. In this regard, mindfulness training seems more similar to expressive writing about one's emotional experiences (Pennebaker & Chung, 2007). However, expressive writing also involves acquiring more insight into one's emotions, and hence targets knowledge systems. Although these are just a few examples, it appears that some important element is still missing from the classification of emotion-regulation strategies.

Functions of emotion regulation

The missing element may be the functions of emotion regulation. By regulating their emotions, people seek to achieve certain psychological outcomes or functions. The functions of emotion regulation cut across all emotion-regulation strategies, and apply regardless of whether these strategies are directed at attention, knowledge, or the body. As such, the functions of emotion regulation represent a basic category for characterising different emotion strategies, a category that is independent of which emotion-generating system is targeted.

Traditionally, psychologists have assumed that people's emotion-regulation efforts serve hedonic needs that are aimed at promoting pleasure and preventing pain (e.g., Larsen, 2000; Westen, 1994). Negative emotional states are costly, because they mobilise a wide array of mental and physical resources within the individual (Sapolsky, 2007). Need-oriented emotion regulation may thus be adaptive, by allowing individuals to conserve these resources by promoting a rapid return to hedonically agreeable states. Because hedonic needs presumably operate on subcognitive levels of information processing (Panksepp, 1998), need-oriented emotion regulation may operate even in the absence of any conscious emotion-regulation goal. Indeed, hedonic needs may be immediately activated upon encountering emotional stimuli (Berridge & Winkielman, 2003; Neumann et al., 2003). Because the need-oriented functions of emotion regulation are directed towards immediate gratification, this type of emotion regulation often has an impulsive quality (Tice et al., 2001).

Although hedonic needs are important, they cannot account for the full range of emotion-regulation processes (Erber, 1996; Erber & Erber, 2000). For instance, social interactions often require people to remain "cool and collected", and hence may lead people to down-regulate both negative *and* positive moods (Erber, Wegner, & Therriault, 1996). Other types of goals may similarly increase the utility of hedonically aversive states (Achtzinger, Gollwitzer, & Sheeran, 2008; Tamir, Chiu, & Gross, 2007a), and thereby motivate emotion regulation efforts to attain or maintain those states. For instance, because many people believe that fear and worry promote the attainment of avoidance goals, people who adopt avoidance goals may be motivated to maintain these negative emotions (Tamir et al., 2007a). In a related vein, changes in task demands may decrease the relevance of emotionally charged information, leading people to devote fewer processing resources to emotion-eliciting information (Van Dillen & Koole, in press). Rather than being hedonically oriented, the latter forms of emotion regulation are oriented towards the priorities that are set by specific norms, goals, or tasks. Emotion regulation may thus serve important goal-oriented functions.

Some of the functions of emotion regulation may extend even beyond single goals. In particular, emotion regulation may allow people to balance multiple goal pursuits (Koole & Kuhl, 2007; Rothermund et al., 2008) and promote integration among personality processes (Baumann, Kaschel, & Kuhl, 2005; Kuhl, 2000). Human personality consists of many interacting processes, the joint functioning of which has emergent, system-level properties that cannot be reduced to the behaviour of its individual elements (Nowak, Vallacher, Tesser, & Borkowski, 2000). As such, emotion-regulation processes at the level of the whole person serve distinct psychological functions. The person-oriented functions of emotion regulation have been elaborated by personality systems interactions theory (PSI), (Kuhl, 2000). According to PSI theory, emotion regulation may facilitate personality functioning in two major ways. First, by preventing people becoming locked up in specific motivational-emotional states, emotion regulation may promote flexibility in personality functioning (see Rothermund et al., 2008). Second, by stimulating the dynamic exchange between personality processes, emotion regulation may promote coherence and long-term stability within the overall personality system (Baumann et al., 2005).

Emotion regulation may thus serve multiple functions, including the satisfaction of hedonic needs, facilitation of specific goals and tasks, and optimisation of personality functioning. In many cases, people may combine these functions. For instance, when people experience emotional distress, boosting positive emotions may simultaneously satisfy hedonic needs, facilitate compliance with social norms for emotional neutrality, and increase the overall flexibility of the personality system. The functions may also conflict. Both goal- and person-oriented emotion regulation may require people to tolerate negative emotional states, and may thus conflict with need-oriented emotion regulation. Moreover, goal-oriented emotion regulation may conflict with person-oriented emotion regulation because the former has a narrower focus. For instance, extended activation of goal-oriented emotion regulation may cause over-activation of the sympathetic nervous system (Thayer & Lane, 2007). When the latter occurs, person-oriented emotion regulation will aim to restore autonomic balance and thus conflict with goal-oriented emotion regulation.

How people resolve conflicts between need-, goal-, or person-oriented functions is largely unknown. Conceivably, people alternate between functions. Need-oriented functions may become more important when people are experiencing acute emotional distress; goal-oriented functions when there are strong situational norms for appropriate emotional responding; and person-oriented functions when people are oriented towards their long-term well-being. It is also plausible that there exist individual differences in the preferential use of each function. For instance, need-oriented functions may be more important among repressive copers

(Derakshan et al., 2007), and person-oriented functions may be more important among individuals with a secure attachment style (Mikulincer et al., 2003) or action-oriented individuals (Kuhl & Beckmann, 1994).

Summary

Emotion-regulation strategies specify how people go about managing a particular unwanted emotion. A consensual, empirically validated taxonomy that spans all known emotion-regulation strategies has yet to be developed. Nevertheless, the literature has yielded several higher-order categories that seem useful in classifying emotion-regulation strategies. The most viable higher-order categories to this end are the emotion-generating system that is targeted and the psychological functions that are served by emotion regulation. Among the major emotion-generating systems that are targeted in emotion regulation are attention, knowledge, and the body. The main functions of emotion regulation are promoting the satisfaction of hedonic needs, facilitating goal achievement, and optimising global personality functioning.

EMPIRICAL RESEARCH ON EMOTION-REGULATION STRATEGIES

The classification of emotion-regulation strategies by their targets and functions offers a preliminary basis for reviewing the extant literature. An overview of the target by function classification is provided in Table 1. Notably, this classification scheme does not propose a new theoretical explanation of emotion-regulation strategies. Rather, it provides a descriptive framework for organising the known universe of emotion-regulation strategies. The classification will hopefully stimulate the development of more sophisticated models that can provide a mechanistic explanation for the observed differences between emotion-regulation strategies.

The remainder of this section will use the target by function classification to organise the literature on emotion-regulation strategies. For each psychological function of emotion regulation, I first discuss the criteria for deciding whether emotion-regulation strategies fit with this function. I then review the empirical evidence for emotion-regulation strategies that are oriented towards each function, which may respectively target attention, knowledge representations, or bodily manifestations of emotion. Some work has suggested that emotion-regulation strategies that target attention or knowledge are more effective than strategies that target bodily expressions of emotion (Gross, 1998a,b, 2001). Accordingly, I also consider the relative effectiveness of cognitive versus bodily emotion-regulation strategies for each psychological function of emotion regulation.

TABLE 1
Target by function classification of emotion-regulation strategies

<i>Emotion-generating system</i>	<i>Psychological function</i>		
	<i>Need-oriented</i>	<i>Goal-oriented</i>	<i>Person-oriented</i>
Attention	Thinking pleasurable or relaxing thoughts (Langens & Mörth, 2003); Attentional avoidance (Derakshian et al., 2007)	Effortful distraction (Van Dillen & Koole, 2007); Thought suppression (Wenzlaff & Wegner, 2000)	Attentional counter-regulation (Rothermund et al., 2008); Meditation (Cahn & Polich, 2006); Mindfulness training (Brown et al., 2007)
Knowledge	Cognitive dissonance reduction (Harmon-Jones & Mills, 1999); Motivated reasoning (Kunda, 1990); Self-defence (Tesser, 2000)	Cognitive reappraisal (Gross, 1998b; Ochsner & Gross, 2008)	Expressive writing (Pennebaker, 1997); Specification of emotional experience (Neumann & Philippot, 2007); Activating stored networks of emotion knowledge (Barrett et al., 2001)
Body	Stress-induced eating (Greeno & Wing, 1994); Stress-induced affiliation (Taylor et al., 2000)	Expressive suppression (Gross, 1998a); Response exaggeration (Schmeichel et al., 2006) Venting (Bushman et al., 2001)	Controlled breathing (Philippot et al., 2002); Progressive muscle relaxation (Esch et al., 2003)

Note: Cited articles refer to relevant empirical demonstrations or literature reviews.

The present review is necessarily selective, and focuses on well-controlled, process-oriented research. The main emphasis is on emotion-regulation strategies that are widely used among psychologically healthy individuals. When relevant, however, the present review considers individual differences in emotion regulation. For instance, if an emotion-regulation strategy is used particularly often by certain individuals, highlighting this group can bring into sharper focus those processes that are involved in this particular emotion-regulation strategy. Moreover, in as far as individual differences in emotion regulation are stable over time, their study can shed more light on

the potential long-term consequences of using specific emotion-regulation strategies.

Need-oriented emotion regulation

Need-oriented emotion regulation is driven by people's needs to experience hedonically rewarding states, which consist of low levels of negative and high levels of positive emotion. Because needs can operate on a subcognitive level (Panksepp, 1998), need-oriented strategies can emerge in the absence of explicit goals or instructions to strive for a favourable hedonic state. The strongest evidence for need-oriented emotion regulation is provided by emotion-regulation behaviour that maximises short-term emotional benefits at the expense of long-term well-being (cf. Tice et al., 2001). Nevertheless, need-oriented emotion regulation does not inevitably lead to poor long-term outcomes. Theoretically, need-oriented emotion regulation should mainly undermine long-term well-being in cases where there exists a conflict between short-term hedonic benefits and long-term outcomes. In the absence of such conflicts, need-oriented emotion regulation may be adaptive. Consequently, discriminate use of need-oriented emotion regulation could be beneficial, whereas chronic use of need-oriented emotion regulation is likely to have adverse consequences.

Attention. Some of the most robust evidence for need-oriented regulation of attention is based on research on individual differences in repressive coping style (Derakshan et al., 2007; Weinberger, Schwarz, & Davidson, 1979). In this research, individuals who score high on a measure of social desirability (indicative of a self-aggrandising response style) and low on a measure of trait anxiety are identified as repressors. Over many studies, repressors have been found to avoid negative emotional stimuli to a greater degree than non-repressors (see Derakshan et al., 2007, for a review). For instance, relative to non-repressors, repressors avert their gaze more often from unpleasant emotional stimuli (Haley, 1974; Olson & Zanna, 1979), and spend less time reading negative personality feedback (Baumeister & Cairns, 1992).

Attentional avoidance of negative stimuli among repressors has further emerged in well-established cognitive tasks, including the emotional Stroop task (Myers & McKenna, 1996; Newman & McKinney, 2002), the dot-probe task (Fox, 1993), and the lexical decision task (Langens & Mörth, 2003). A sophisticated model of repressive coping is vigilance-avoidance theory, which proposes that repressors respond to threatening stimuli in two stages (Derakshan et al., 2007). The first stage, which is presumably automatic and non-conscious, consists of a vigilance response of elevated behavioural and physiological anxiety. The second stage, which presumably involves

more strategic and controlled processes, consists of attentional avoidance and cognitive denial of anxiety.

When faced with threatening information, repressors may also increase their attention to positive information (Boden & Baumeister, 1997; Langens & Mörth, 2003). The level of threat may determine whether repressors cope with threats by avoiding negative information or seeking out positive information (Langens & Mörth, 2003). When threat levels are low, repressors may avoid emotionally threatening information by shifting their attention away from the threat. When threat levels are high, repressors may be forced to pay a certain amount of attention to the threat and thus resort to more effortful distraction strategies such as generating positive imagery.

Repressive coping is associated with short-term relief from emotional distress (e.g., Boden & Baumeister, 1997). Many long-term outcomes that are linked to repressive coping are negative. Relative to non-repressors, repressors possess less insight into their own emotional states (Lane, Sechrest, Riedel, Shapiro, & Kaszniak, 2000), and display intrusive thoughts, even after initial success at thought suppression (Geraerts, Merckelbach, Jelicic, & Smeets, 2006). Repressive coping is also associated with adverse health outcomes¹ (see Myers, 2000; Myers et al., in press, for reviews), such as heightened susceptibility to infectious disease (Jamner, Schwarz, & Leigh, 1988), inhibited immune function (Barger, Bachen, Marsland, & Manuck, 2000), and increased risk for coronary heart disease, cancer, and asthma (Weinberger, 1990).

Knowledge. Ever since Freud (1915/1961) introduced the notion of psychological defence mechanisms, generations of researchers have been intrigued by the idea that people may distort their perceptions of reality to ward off anxiety and other types of negative emotion. In social psychology, Festinger's (1957) pioneering work on cognitive dissonance reduction (see Harmon-Jones & Mills, 1999, for a recent overview) has spawned a large and sophisticated body of research on interpretive biases (Baumeister &

¹ The literature on repressive coping has reported some positive effects on health (e.g., Coifman, Bonanno, Ray, & Gross, 2007). However, this research used affective–autonomic response discrepancy (AARD) as an index of repressive coping. With the AARD measure, repressors are those who report low levels of negative affect following threat while simultaneously displaying high levels of physiological activity, such as elevated heart rate or skin conductance. An important problem of this index is that the underlying physiological measures are not informative about emotional valence. Thus, high AARD scores could be due to unreported negative emotion or unreported positive emotion. To the extent that AARD scores are driven by unreported positive emotion, this measure may index counter-regulation processes (Rothermund et al., 2008) rather than repressive coping. Because of this ambiguity, the present review only considers the results for the more conventional self-report measure of repressive coping.

Newman, 1994; Pyszczynski & Greenberg, 1987; Tesser, 2000). Among other things, people may engage in selective criticism of threatening information (Liberman & Chaiken, 1992), trivialise the information (Simon, Greenberg, & Brehm, 1995), selectively forget the information (Sedikides & Green, 2004), make self-serving attributions (Campbell & Sedikides, 1999), inflate their self-conceptions in a non-threatened domain (McGregor, 2006), engage in downward social comparison (Taylor & Lobel, 1989), and derogate others (Fein & Spencer, 1997). From this list of defences, which is far from complete, it appears that people may recruit virtually any type of judgement for defensive purposes (Roese & Olson, 2007).

Defensive processes are mutually substitutable (Tesser, 2000), consistent with the notion that they serve the common purpose of emotion regulation. The emotion regulation function of defensive bias is further supported by findings that affirming positive views of the self down-regulates negative emotion, especially when emotion is assessed by physiological or implicit measures (Creswell et al., 2005; Koole, Smeets, van Knippenberg, & Dijksterhuis, 1999; Roese & Olson, 2007). In addition, defensive bias is associated with neural activity in regions that are implicated in emotion regulation, such as the ventromedial prefrontal cortex (Westen, Kilts, Blagov, Harenski, & Hamann, 2006). Notably, defensive bias is not associated with activation in brain regions that support effortful self-regulation, even though such regions are implicated in goal-oriented emotion-regulation strategies (Ochsner & Gross, 2008).

The potential adaptiveness of defensive bias has been subject to considerable debate. Extreme and rigid forms of defensive bias appear to undermine psychological adjustment (Colvin & Block, 1994). Moreover, defensive bias has been linked to the repressive coping style (Derakshan et al., 2007), which in turn is associated with poor health outcomes (Myers, 2000; Myers et al., in press). However, more moderate and flexible forms of defensive bias are positively associated with mental health (Baumeister, 1989; Kunda, 1990; Taylor, Kemeny, Reed, Bower, & Gruenewald, 2000).

Body. Bodily activities that provide immediate gratification represent a major target for need-oriented emotion regulation. One such activity is eating. Eating palatable food provides pleasant sensations to the mouth and stomach, and thus can be used for need-oriented emotion regulation. Stress-induced eating is a common emotion-regulation strategy, especially among restrained eaters (Greeno & Wing, 1994). Chronic use of eating as an emotion-regulation strategy may result in unhealthy behaviour patterns such as overeating or binge eating (Heatherton & Baumeister, 1991). There are also psychological disadvantages associated with this strategy, given that chronic overeaters have greater difficulty identifying and making sense of their emotional states (Whiteside et al., 2007). Notably, the emotional profile

of overeaters resembles that of repressors, suggesting that stress-induced eating may be linked to repressive coping (cf. Derakshan et al., 2007).

The emotion regulation effects of eating may be partly explained by attentional processes. For instance, binge eating may down-regulate emotional distress by focusing people's attention on their immediate physical sensations (Heatherton & Baumeister, 1991). However, eating also has neuro-endocrine effects that may reduce emotional distress. For instance, eating palatable food can stimulate the endogenous release of opioids (Adam & Epel, 2007; Morley & Levine, 1980). Because opioids relieve stress, this mechanism may explain why individuals engage in stress-induced eating. Animal research has offered some support for this model: When rats are treated with opioid antagonists, they display a marked reduction in stress-induced eating (Hawkins, Cubic, Baumeister, & Barton, 1992).

Physical activities other than eating may also be recruited in need-oriented emotion regulation. Potential candidates are stress-induced consumption behaviours such as alcohol intake (Mohr, Brennan, Mohr, Armeli, & Tennen, 2008; Sher & Grekin, 2007; Zack, Poulos, Fragopoulos, Woodford, & MacLeod, 2006) and smoking (Gilbert et al., 2007). Other bodily emotion-regulation strategies that may be at least partly need-oriented are regular physical exercise, particularly when people have developed exercise habits (Thayer, 1987), and stress-induced proximity seeking, particularly among women (Taylor et al., 2000). These bodily emotion-regulation strategies may provide immediate hedonic benefits, in as far as they involve behaviours that can be easily and spontaneously executed.

Summary

Need-oriented strategies regulate emotional responses to promote the satisfaction of hedonic needs. Overall, the literature has emphasised the need to minimise negative emotion over the need to maximise positive emotion. On an attentional level, need-oriented emotion regulation may occur through avoidance of threatening information or distraction by positive information, tendencies that are especially prevalent among repressive copers. On a representational level, need-oriented emotion regulation may take the form of various interpretive biases, which may serve anxiety-reducing functions. Finally, on a physical level, need-oriented emotion regulation may occur through activities such as eating, physical exercise, or proximity seeking. Regardless of whether they target attention, knowledge representations, or the body, need-oriented strategies of emotion regulation are associated with immediate emotional relief that often comes at the expense of long-term well-being (Tice et al., 2001).

Goal-oriented emotion regulation

Goal-oriented emotion regulation is directed by a single verbally reportable goal, norm, or task. There are two major ways in which goal-oriented emotion regulation may operate. First, goal-oriented emotion regulation may be driven by people's beliefs about the utility of particular emotional states. These beliefs may be influenced by verbal instructions about the desirability of certain emotional states (e.g., Achziger et al., 2008; Gross, 1998a), by implicit or explicit beliefs about the utility of particular emotional states (Tamir et al., 2007a), or by more abstract theories that people have about emotion regulation (Tamir et al., 2007b). 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, in press). Because goals, norms, or tasks may favour various types of emotional outcomes, goal-oriented emotion regulation may either promote or inhibit emotional states that are hedonically rewarding.

Attention. Goals can control attention in a top-down manner (Posner & Rothbart, 2007). Accordingly, attention forms a prime target for goal-oriented emotion-regulation strategies. Erber et al. (1996) found that people who anticipated interacting with an unknown other attended more to materials of the opposite emotional valence to their current mood state. Presumably, people engaged in this form of attention regulation because it is counter-normative to behave highly emotionally in dealing with strangers. Importantly, social-interaction goals fostered attention to negative stimuli when people's initial moods were positive. As such, these studies demonstrate that goal-oriented emotion regulation can be dissociated from people's hedonic needs (see Erber & Erber, 2000).

A critical factor in goal-oriented regulation of attention appears to be the availability of distracting stimuli. Indeed, simply instructing individuals "not to think about" an unwanted emotion may ironically serve to heighten the activation of this emotion (Wegner et al., 1993; Wegner & Gold, 1995). Research on mental control (Wegner, 1994) has found that providing people with a focused distracter (such as, "Think about a red Volkswagen) greatly increases the efficiency of thought suppression attempts. Depressed individuals seem to have particular difficulties in finding suitable distracters (Wenzlaff, Wegner, & Roper, 1988). As such, the breakdown of self-generation of distracters may play a key role in the persistence of depression (Joormann & Siemer, 2004).

Given that any demanding task can divert attention, even neutral tasks may have emotion-regulatory implications (Erber & Tesser, 1992). Indeed, studies have shown that distraction with neutral materials can reduce depression (Morrow & Nolen-Hoeksema, 1990; Nolen-Hoeksema & Morrow, 1993), and anger (Gerin, Davidson, Goyal, Christenfeld, & Schwartz, 2006; Rusting & Nolen-Hoeksema, 1998). For instance, in one study (Nolen-Hoeksema & Morrow, 1993), focusing attention on descriptions of geographic locations and objects led depressed participants to experience reductions in depressed mood, whereas focusing on current feeling states and personal characteristics led depressed participants to experience increases in depressed mood.

The effects of performing a neutral task on emotion regulation may be understood in terms of underlying working-memory processes (Van Dillen & Koole, 2007). Emotional states spontaneously and unintentionally activate emotion-congruent cognitions in working memory (Bower & Mayer, 1989; Siemer, 2005). This congruent processing stream may be interrupted when working memory is loaded with an alternative task. Consistent with this model, tasks that draw upon working memory have been found to be particularly effective in reducing the emotional impact of vivid emotion-laden stimuli (Erber & Tesser, 1992; Van Dillen & Koole, 2007, in press). Moreover, performing a working-memory task attenuates the neural response to negative emotional stimuli (Van Dillen, Heslenfeld, & Koole, 2008). Working-memory load can even eliminate attentional interference of negative stimuli (Van Dillen & Koole, in press), an effect that has previously been regarded as automatic (Pratto & John, 1991).

Knowledge. The explicit goals and norms that guide goal-oriented emotion regulation are encoded in a linguistic format (Ochsner & Gross, 2005, 2008). Goal-oriented emotion regulation is therefore highly compatible with linguistic appraisal processes. During *cognitive reappraisal*, people reduce the emotional impact of an event by changing their subjective evaluations of this event (Gross, 1998a,b, 2001). Cognitive reappraisal may take the form of: (a) reinterpreting situational or contextual aspects of stimuli (e.g., imagining a potentially upsetting image is fake); or (b) distancing oneself from stimuli by adopting a detached, third-person perspective (Ochsner & Gross, 2008). Cognitive reappraisal can inhibit the experience of unwanted emotions, although it does not consistently decrease psycho-physiological arousal (Gross, 1998a; Steptoe & Vogele, 1986). The strategy draws upon working-memory resources (Schmeichel, Volokhov, & Demaree, in press), but is relatively efficient in that it does not impair people's memory for ongoing social interactions (Richards & Gross, 2000).

Reappraisal processes have been intensely researched in neuroimaging studies (e.g., Beauregard, Levesque, & Bourgouin, 2001; Ochsner, Bunge,

Gross, & Gabrieli, 2002; see Ochsner & Gross, 2005, 2008, for reviews). These studies have shown consistently that cognitive reappraisal inhibits activation in emotional regions, including the amygdalae and insula, and increases activation in dorsal anterior cingulate cortex and prefrontal cortex, regions that support working memory, language, and long-term memory. During reappraisal, emotional regions of the brain may become inversely coupled to the activation of specific regions in the prefrontal cortex (Urry et al., 2006). These findings are consistent with the idea that reappraisal triggers top-down control of emotion-generating systems. Notably, reappraisal activates some of the same brain regions as tasks involving top-down attention control (Ochsner et al., 2002), and the effects of reappraisal are partly explained by shifts in visual attention away from emotion-eliciting stimuli (Van Reekum et al., 2007). Some reappraisal processes may thus be driven by attentional mechanisms rather than changes in knowledge representations.

Body. The verbal processes that mediate goal-oriented emotion regulation have limited access to embodied emotion processes (Loewenstein, 1996; Nordgren, van der Pligt, & van Harreveld, 2006). Accordingly, goal-oriented emotion regulation may resort to more indirect ways of regulating the body. Goal-oriented control of the body is typically focused on outward bodily manifestations of emotion, such as facial expressions or overt movements and bodily postures, because these are under the control of explicit norms and goals.

One goal-oriented strategy of emotion regulation that targets the body is *expressive suppression* (Gross, 1998a,b, 2001). In this strategy, people actively inhibit their emotional expressions. For example, an individual might try to keep a straight face while telling a lie. Expressive suppression has been found to draw upon working-memory resources (Schmeichel et al., in press), to interfere with people's memory of ongoing social interactions (Richards & Gross, 2000), and increase sympathetic control of the heart (Demaree et al., 2006). Despite its effortful nature, expressive suppression does little to prevent the experience of unwanted emotions, even when it effectively inhibits bodily expressions of emotion (Gross, 1998a; Schmeichel et al., in press).

The foregoing suggests that expressive suppression may often create a discrepancy between inner experience and outer expression, a condition that may arouse "expressive dissonance" (Robinson & Demaree, 2007). Indeed, individuals who chronically use expressive suppression report a sense of being inauthentic or "fake" in their social relationships (Gross & John, 2003). These alienating effects may be part of the reason why chronic expressive suppression is linked to low emotional well-being (Gross & John, 2003). Notably, the negative effects of expression suppression may be specific

to members of Western cultures (Butler, Lee, & Gross, 2007). Whereas Western cultures traditionally value open emotion expression, Asian cultures traditionally value emotional restraint (Frijda & Sundararajan, 2007). Consequently, expressive suppression may be perceived as less negative by individuals with Asian cultural values. Consistent with this, recent work has shown that, among individuals with Asian cultural values, expressive suppression is associated with neither increased negative emotion nor reduced social responsiveness (Butler et al., 2007).

Given the difficulties of expressive suppression (at least, among members of Western cultures), goal-oriented regulation processes may try to redirect bodily emotion responses rather than eliminating them altogether. For instance, people may engage in *response exaggeration*, by deliberately exaggerating their responses to an emotional stimulus (Schmeichel et al., 2006). Another redirection strategy is *venting*, an emotion-regulation process in which people intentionally give free reign to their emotional impulses (Breuer & Freud, 1893–1895/1955; see Bushman et al., 2001). Venting is a popular strategy in controlling anger and aggression (Bushman et al., 2001). On the surface, venting seems to be the opposite of expressive suppression. Nevertheless, venting is a goal-driven strategy to regulate bodily expressions of emotion, just as expressive suppression (Bushman et al., 2001). Although venting is widely advertised, research indicates that venting anger actually increases anger and aggression (Geen & Quanty, 1977). Presumably, venting adds fuel to the flame by heightening the activation of angry thoughts and action tendencies (Bushman, 2002), which in turn promote angry emotion and behaviour.

Summary

Goal-oriented strategies of emotion regulation are driven by a single explicit goal, task, or norm. Some of the most effective goal-oriented strategies direct attention away from stimuli that could trigger unwanted emotions. Effortful tasks that draw upon working memory resources have been found to be particularly potent distracters. Other relatively effective goal-oriented strategies use cognitive reappraisal, a process that modifies the emotional impact of events by changing people's assessments of these events. Some of the least effective goal-oriented strategies target bodily expressions of emotion, through processes such as expressive suppression, response exaggeration, or venting. Overall, in the domain of goal-oriented emotion regulation, cognitive strategies appear to be more effective than bodily strategies.

Person-oriented emotion regulation

Person-oriented emotion regulation maintains the integrity of the overall personality system, which consists of the entirety of a person's needs, goals,

motives, and other self-aspects. A first signature of person-oriented emotion regulation is its holistic focus. Whereas need-oriented and goal-oriented emotion regulation focus on aspects of emotional or task-related functioning, person-oriented emotion regulation is geared to the functioning of the whole person. A second signature of person-oriented emotion regulation is contextual sensitivity, which is expressed in the ability to alternate between different motivational, cognitive, or affective subsystems in a context-appropriate manner (Rothermund et al., 2008). A third signature of person-oriented emotion regulation is integration, which is manifested in the coordinated functioning of personality systems that are traditionally regarded as antagonistic, such as positive versus negative emotions, body versus mind, passion versus reason, and top-down versus bottom-up processing.

Attention. An important pattern in the person-oriented regulation of attention is the *counter-regulation principle* (Rothermund et al., 2008). According to this principle, people are equipped with attentional biases that prevent the perseveration of current motivational or emotional states. Attentional counter-regulation presumably helps to restore a balanced receptiveness to positive and negative information despite currently active affective-motivational states. Counter-regulation thus fosters contextual sensitivity, an important signature of person-oriented emotion regulation.

Counter-regulation processes are indirectly supported by many studies showing that positive and negative events tend to have only short-term consequences for people's emotional states (e.g., Gilbert, Lieberman, Morewedge, & Wilson, 2004). In addition, controlled experimental studies have confirmed the existence of attentional biases in the opposite direction as people's current emotional-motivational states (Derryberry, 1993; Rothermund et al., 2008; Tugade & Frederickson, 2004). Depending on the context, attentional counter-regulation may inhibit either positive or negative emotion (Rothermund et al., 2008). Accordingly, counter-regulation is distinct from need-oriented emotion regulation. Consistent with its global adaptive functions, attentional counter-regulation is most pronounced among individuals disposed towards flexible action control (Jostmann et al., 2005; Koole & Coenen, 2007; Koole & Jostmann, 2004), and largely absent among individuals suffering from chronic anxiety, phobia, or dysphoria (Mathews & MacLeod, 2005).

Person-oriented regulation of attention may be stimulated by activities such as meditation (Cahn & Polich, 2006) and mindfulness training (Brown et al., 2007). Meditation refers to practices that "self-regulate the body and mind, thereby affecting mental events by engaging in a specific attentional set" (Cahn & Polich, 2006, p. 180). Mindfulness training evolved out of certain meditative practices, and encourages people to engage in a mere

noticing of their internal and external experiences in an objective manner, without the biasing influence of pre-existing cognitive schemas (Brown et al., 2007). Meditation and mindfulness training both foster emotion-regulation abilities (see Brown et al., 2007; Cahn & Polich, 2006, for reviews). The mechanisms that underlie meditation and mindfulness training are incompletely understood. Nevertheless, both practices promote personality integration, as indicated by greater neurological synchronisation (Cahn & Polich, 2006) and increased congruence between implicit and explicit self-aspects (Brown & Ryan, 2003; Koole, Govorun, & Cheng, 2008). The latter findings fit with the involvement of person-oriented emotion regulation.

Knowledge. Common sense has long held that people may overcome traumatic experiences by “putting their feelings in perspective” or “working through” their emotions. These metaphors appear to describe cognitive integration processes, in which emotionally charged information becomes incorporated into larger networks of the person’s experiences. Though initially painful, cognitive integration processes may eventually down-regulate unwanted emotions and create the conditions for personal growth (Baumann & Kuhl, 2002; Kuhl, 2000). Integration of aversive emotional experiences thus represents an important form of person-oriented emotion regulation.

Expressive writing is one activity that may foster integration of emotional experiences. Studies have shown that expressive writing down-regulates emotional distress and improves both physical and psychological health (Pennebaker, 1997; Pennebaker & Chung, 2007). These beneficial effects may arise because expressive writing helps to turn initially disturbing emotional experiences into coherent narratives (Smyth, True, & Souto, 2001), which down-regulates emotional distress and promotes insight into the self and one’s emotions (Klein & Boals, 2001; Pennebaker, Mayne, & Francis, 1997).

Once emotion-relevant knowledge has been acquired, this knowledge may assist in subsequent emotion-regulation efforts. Specifically, as people’s emotion knowledge becomes broader and more differentiated, new emotional experiences may be incorporated more easily into their existing cognitive schema (Kuhl, 2000). Individuals who possess relatively differentiated knowledge of self and emotion indeed display more efficient emotion regulation, both in childhood (Diamond & Aspinwall, 2003) and adulthood (Barrett, Gross, Conner, & Benvenuto, 2001; Linville, 1985, 1987; Rafaeli-Mor & Steinberg, 2002). Autobiographical knowledge about the self and emotion may thus form an extended memory system that allows people to down-regulate unwanted emotions (Kuhl, 2000; Philippot et al., 2004).

People may access the emotion-regulatory functions of the autobiographical memory system whenever they process the specific details of an emotional experience. Indeed, imagining the distinctive details of emotional memories, rather than their general aspects, reduces the emotional intensity

of these memories (Neumann & Philippot, 2007). Furthermore, deficits in emotion regulation, such as chronic depression and ruminative thinking, are associated with reduced specificity of autobiographical memory (Williams et al., 2007). Experimental studies have shown that concrete, experiential thoughts (e.g., “How did you feel moment by moment?”), relative to abstract, attributional thoughts (e.g., “Why did you feel this way?”), lead to faster recovery from a negative emotion (Moberly & Watkins, 2006; Watkins, 2004). Concrete rather than abstract processing of emotional experience also leads to global improvements in cognitive flexibility (Watkins & Moulds, 2005), consistent with the person-oriented functions of this type of emotion regulation.

Body. In regulating bodily expressions of emotion, person-oriented emotion regulation seeks to forge a mutual exchange between higher mental processes and peripherally mediated emotion responses. Throughout this exchange, mind and body are equally important, and each system is allowed to express its natural tendencies. It is noteworthy that meditation (Cahn & Polich, 2006) and mindfulness training (Brown et al., 2007), which are often regarded as attentional strategies of emotion regulation, typically include bodily activities such as breathing and relaxation exercises. This dual focus on mind and body fits with the holistic orientation of systematic emotion regulation.

One bodily activity that may foster person-oriented emotion regulation relies on the voluntary control of breath. Some forms of controlled breathing may facilitate emotion regulation, in that specific breathing patterns are associated with general mood and distinct emotions (Boiten, Frijda, & Wientjes, 1994). Indeed, voluntarily engaging in specific breathing patterns can selectively activate specific emotional states (Philippot, Chapelle, & Blairy, 2002) and reduce emotional distress (Franck, Schäfer, Stiels, Wasserman, & Hermann, 1994; Meuret, Wilhelm, & Roth, 2001). The effects of controlled breathing involve both bottom-up processes, such as respiratory feedback (Philippot et al., 2002), and top-down processes, given that attention to one’s own respiratory rhythms enhances the emotion-regulation effects of controlled breathing (Arch & Craske, 2006; Clark & Hirschman, 1990; Zeier, 1984). This co-ordinated interplay of top-down and bottom-up functions fits with the integrative aspects of person-oriented emotion regulation.

Another bodily activity that may foster person-oriented emotion regulation relies on muscle relaxation (Esch et al., 2003). Much research has used Jacobson’s (1928) classic technique of *progressive muscle relaxation*. In this technique, people successively tense and relax their muscle groups in different parts of the body. Experimental studies have shown that progressive muscle relaxation down-regulates state anxiety and perceived stress (Pawlow

& Jones, 2002; Rankin, Gilner, Gfeller, & Katz, 1993; Rausch, Gramling, & Auerbach, 2006). Progressive muscle relaxation further reduces heart rate and salivary cortisol (Pawlow & Jones, 2002) and stress-related disease (Carlson & Hoyle, 1993; Esch et al., 2003). Consistent with the involvement of high-level processes in progressive muscle relaxation, the technique is most effective when it is combined with attention to muscle sensations (Borkovec & Hennings, 1978) or biofeedback (Lehrer, 1982).

Summary

Person-oriented strategies of emotion regulation promote the overall functioning of the personality system. Some person-oriented emotion-regulation strategies rely on counter-regulation, a process that directs attention to information that is of opposite valence to people's current emotional state. Alternatively, person-oriented emotion regulation may foster cognitive integration of unwanted emotional experiences, through activities such as expressive writing. Over time, integration of emotional experiences may give rise to an extensive autobiographical knowledge base, and accessing this knowledge base may further stimulate person-oriented emotion regulation. Bodily forms of person-oriented emotion regulation involve such activities as controlled breathing and progressive muscle relaxation. Person-oriented emotion regulation is associated with long-term benefits, regardless of whether it targets attention, knowledge, or the body.

SUMMARY, CONCLUSIONS, AND FUTURE DIRECTIONS

The present article has reviewed contemporary insights and findings on the psychology of emotion regulation. Emotion regulation was defined as the set of processes whereby people seek to redirect the spontaneous flow of their emotions. In a broad sense, emotion regulation refers to the set of processes whereby people manage all of their emotionally charged states, including specific emotions, affect, mood, and stress. Emotion regulation determines how easily people can leave a given emotional state. It can thus be distinguished from emotional sensitivity, which determines how easily people can enter an emotional state.

Presently, there exists no consensual and empirically validated taxonomy of emotion-regulation strategies. Nevertheless, researchers have identified several higher-order categories that could lay the foundation for such a taxonomy. The most viable higher-order categories for classifying emotion-regulation strategies are currently the emotion-generating systems that are targeted in emotion regulation (Gross, 1998a,b, 2001) and the psychological functions of emotion regulation. Among the chief targets of emotion regulation are attention, cognitive emotion-relevant knowledge, and bodily

manifestations of emotion. Among the major psychological functions of emotion regulation are the satisfaction of hedonic needs, supporting goal pursuits, and maintenance of the global personality system.

A dual classification in terms of targets and functions was found to be helpful in organising the literature on emotion-regulation strategies. Need-oriented emotion regulation includes strategies of: (a) turning attention away from negative information or towards positive information; (b) interpretative biases; and (c) bodily activities such as binge eating or smoking. Goal-oriented emotion regulation includes strategies of: (a) distraction through cognitive load; (b) cognitive reappraisal; and (c) bodily activities such as expressive suppression, response exaggeration, and venting. Finally, person-oriented emotion regulation includes strategies of: (a) attentional counter-regulation; (b) cognitive activities such as expressive writing or accessing autobiographical memories; and (c) bodily activities such as controlled breathing and progressive muscle relaxation. There is consistent empirical support for each of these strategies, though more work remains necessary to fully understand their underlying processes.

The hypothesis that cognitive strategies are more effective than bodily strategies of emotion regulation (Gross, 1998a,b, 2001) was only partly supported. With respect to goal-oriented emotion regulation, attentional and reappraisal strategies indeed appear to have an edge over bodily strategies such as expressive suppression or venting. However, the picture is different with respect to need- and person-oriented emotion regulation. In the domain of need-oriented emotion regulation, cognitive strategies appear to be relatively ineffective, especially in the long run. For instance, attentional avoidance of threatening information among repressors is associated with intrusive thoughts and poor health outcomes (Geraerts et al., 2006; Myers, 2000). Conversely, in the domain of person-oriented emotion regulation, bodily strategies appear to be relatively effective. For instance, progressive muscle relaxation effectively down-regulates stress and stress-related disease (Pawlow & Jones, 2002; Esch et al., 2003). Taken together, the advantage of cognitive over bodily strategies of emotion regulation appears to be specific to goal-oriented emotion regulation and does not apply across all known emotion-regulation strategies.

Because emotions are fundamentally embodied (Niedenthal, 2007), all emotion-regulation processes must ultimately interface with bodily functions. Nevertheless, only few studies to date have systematically addressed the physiology of emotion regulation. One intriguing line of work suggests an important role for *cardiac vagal tone* in emotion regulation (Appelhans & Luecken, 2006; Porges, 2007; Thayer & Lane, 2000, 2007). The vagal nerve may function as an active brake on heart rate that puts the individual into a calm emotional state. In emotion regulation, vagal tone may be dynamically controlled in a top-down manner by cortical systems (Porges, Doussard-

Roosevelt, & Maita, 1994; Thayer & Lane, 2000, 2007). Identifying mechanisms such as vagal tone will be of key significance in relating the physiology of emotion regulation to its cognitive and neurological manifestations.

At a general level, the present article attests to the considerable growth and vitality of modern research on emotion regulation. There is good reason to believe that emotion regulation research will continue to flourish, given the growing recognition that emotion regulation plays a major role in physical and psychological well-being, combined with the development of ever more powerful methods of investigation. One particularly exciting set of recent discoveries has been that emotion-regulatory competencies are susceptible to social learning experiences (see also Butler et al., 2007). Indeed, emotion-regulatory competencies may be improved through directed exercises (Brown et al., 2007; Dandeneau et al., 2007; Serrano, Latorre, Gatz, & Montañés, 2004) and may continue to develop even into old age (Carstensen et al., 2003). Studying the social-cognitive processes that allow people to improve their competencies in emotion regulation is likely to generate important new insights into the nature of emotion regulation. Moreover, such investigations may eventually lead to better interventions for improving emotion-regulatory competencies.

Some might fear that boosting people's capacity for emotion regulation will inevitably narrow emotional experience. In fact, research suggests just the opposite. Drawing from Chinese poetics and Confucian philosophy, Frijda and Sundararajan (2007) described how emotional restraint contributes to a deeper and more differentiated appreciation of one's emotions. In line with this, empirical evidence indicates that individuals with high emotion-regulation competencies are characterised by greater self-reflexivity and a more profound awareness of their emotions (Barrett et al., 2001; Brown et al., 2007). People's emotional lives are thus likely to become enriched as people learn new and more powerful ways of regulating their emotions.

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