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TARGET ARTICLE

Emotion Regulation: Current Status and Future Prospects

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One of the fastest growing areas within psychology is the field of emotion regulation. However, enthusiasm for this topic continues to outstrip conceptual clarity, and there remains considerable uncertainty as to what is even meant by "emotion regulation." The goal of this review is to examine the current status and future prospects of this rapidly growing field. In the first section, I define emotion and emotion regulation and distinguish both from related constructs. In the second section, I use the process model of emotion regulation to selectively review evidence that different regulation strategies have different consequences. In the third section, I introduce the extended process model of emotion regulation; this model considers emotion regulation to be one type of valuation, and distinguishes three emotion regulation stages (identification, selection, implementation). In the final section, I consider five key growth points for the field of emotion regulation.

In the smash Broadway musical *The Book of Mormon*, one character has this advice for a friend who's feeling down: "When you're feeling certain feelings that just don't seem right, treat those pesky feelings like a reading light and turn 'em off" (Parker, Lopez, & Stone, 2011). This advice makes it sound so easy! But can emotions really be turned on and off like this? If so, how is this done? If not, what degree of control—if any—*do* we actually have over our emotions?

Questions such as these have been with us from time immemorial. Indeed, they are central to our most enduring works of philosophy (e.g., Plato's musings on self-regulation in *The Republic*), religion (e.g., the story of Cain and Abel in the Bible), and literature (e.g., Shakespeare's portrayal of affection in *King Lear*). In the past century, the social sciences have taken up these questions too. Within psychology, Sigmund Freud directed attention to the management of feelings of anxiety (S. Freud, 1926/1959). This theme was elaborated by clinicians and researchers interested in ego defenses (Cramer, 2008; A. Freud, 1946) and attachment styles (Bowlby, 1969; Shaver & Mikulincer, 2014). It subsequently was broadened by self-regulation researchers, who focused on the management of appetitive impulses (Heatherton & Wagner, 2011; Mischel, 1974), and by stress and coping theorists, who examined how people handled (or failed to handle) a mismatch between their adaptive capacities and the demands of the environment (Lazarus & Folkman, 1984).

Building on these venerable foundations, the field of emotion regulation emerged in the mid-1990s and has been gathering steam ever since (Gross, 1998b, 1999, 2014b; Koole, 2009; Tamir, 2011). As shown in the citation plot in Figure 1, only a small number of papers on emotion regulation were published each year through the mid-1990s. Two decades later, this small stream has become a rushing torrent—in the year 2013 alone, Google Scholar indexed far more than 10,000 papers published on emotion regulation (for comparison purposes, citations to "mental control" are also plotted).

Emotion regulation is now seen as an important topic throughout psychology, as evidenced by recent work in biological (e.g., Etkin, Egner, Peraza, Kandel, & Hirsch, 2006; Hartley & Phelps, 2010), cognitive (e.g., Miller, Rodriguez, Kim, & McClure, 2014; Miu & Crişan, 2011), developmental (e.g., Eisenberg, 2000; Thompson, 2014), social (e.g., Schmader, Johns, & Forbes, 2008; Shaver & Mikulincer, 2014), industrial organizational (e.g., Côté, 2005; Grandey, Diefendorff, & Rupp, 2013), personality (e.g., Gross & John, 2003; Mayer & Salovey, 1995), clinical (e.g., Beck & Dozois, 2011; Webb, Miles, & Sheeran, 2012), and health (e.g., DeSteno, Gross, & Kubzansky, 2013;

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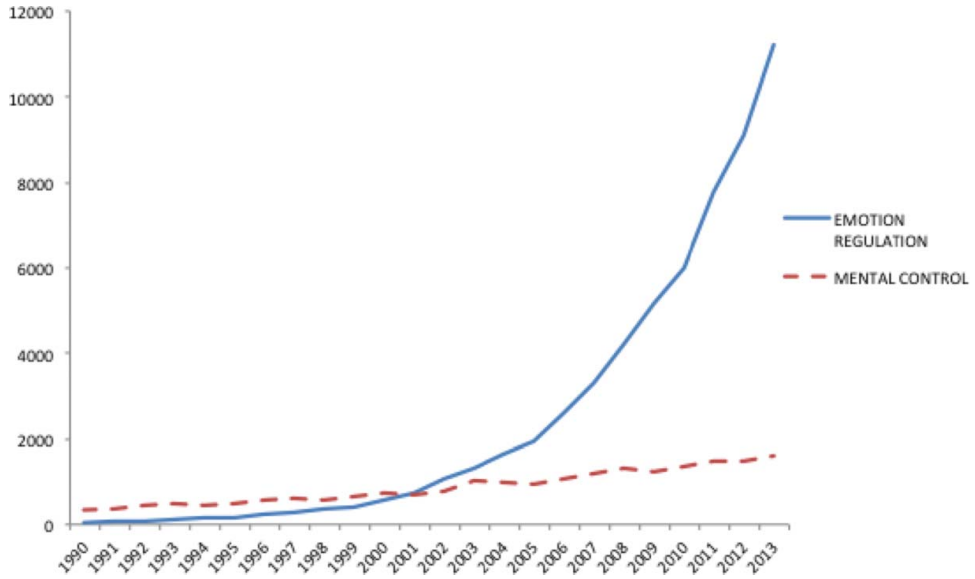

Figure 1. Emotion regulation citations. Number of publications containing the exact phrase "emotion regulation" in Google Scholar each year from 1990 to 2013 (solid line). This is *not* a cumulative plot—each data point represents 1 year's citations. For comparison purposes, the number of publications containing the exact phrase "mental control" is also provided for the same period (dashed line).

Leineweber et al., 2011) subareas (see Figure 2). Emotion regulation is also gaining attention in a variety of other disciplines, including anthropology (e.g., Tarlow, 2012), business (e.g., Côté, 2005), economics (e.g., A. Harris, Hare, & Rangel, 2013), education (e.g., Duckworth, Gendler, & Gross, in press), law (e.g., Maroney, 2006), medicine (e.g., Haque & Waytz, 2012), political science (e.g., Halperin, 2014), and sociology (e.g., Lively & Weed, 2014). In this review, I take stock of the field of emotion regulation and offer my perspective on its current status and future prospects.

Conceptual Foundations

Many different terms are used to refer to emotion- and emotion regulation-related processes. Unfortunately, scholars use these terms in diverse and frequently idiosyncratic ways. This has led to what Buck (1990) colorfully characterized as "conceptual and definitional chaos" (p. 330). This state of affairs means that an essential first step in discussing emotion and emotion regulation is to clarify how one intends to use these terms.

Emotions and Related Processes

I find it useful to view *affect* as an umbrella term for psychological states that involve valuation, defined as a relatively quick good-for-me/bad-for-me discrimination (Scherer, 1984). These affective states include, among others, (a) *stress responses* occasioned by highly taxing circumstances; (b) *emotions* such as anger, amusement, and sadness; and (c)

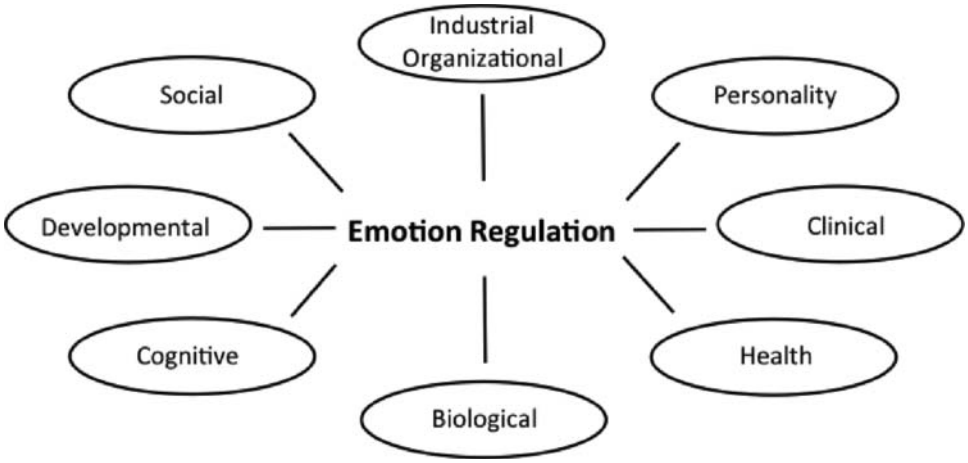

Figure 2. The centrality of emotion regulation. Emotion regulation is an active topic of investigation in all of the major sub-areas within psychology.

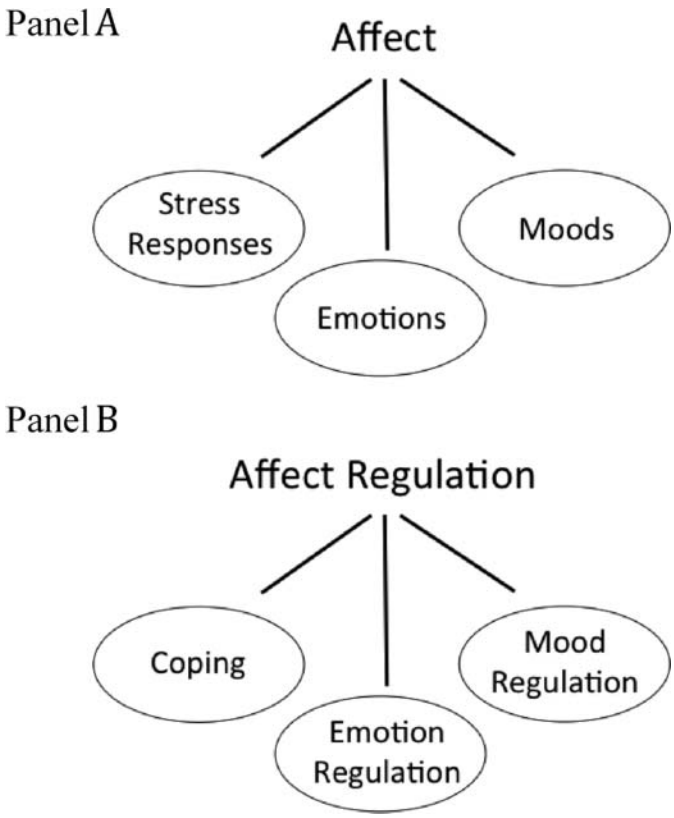

Figure 3. A hierarchical conception of affect and affect regulation. Panel A: Affect and related terms. Panel B: Affect regulation and related terms.

moods such as feeling grumpy, down, or great (see Figure 3A).

How are these various affective states related to one another? Although both stress responses and emotions involve whole-body reactions to significant events, stress responses typically refer to negative (but otherwise unspecified) affective states occasioned by an inability to manage situational demands, whereas emotions refer to more specific negative and positive affective states (Lazarus, 1993). Emotions also may be distinguished from moods (Parkinson, Totterdell, Briner, & Reynolds, 1996). Moods often last longer than emotions, and compared to moods, emotions are typically elicited by specific events and give rise to behavioral response tendencies relevant to these events. By contrast, moods are more diffuse, and although they may give rise to broad tendencies to approach or withdraw (Lang, 1995), moods seem to bias cognition more than—or at least as much as—they bias behavior (Gendolla, 2000; Siemer, 2001). If mood is the "pervasive and sustained 'emotional climate,'" then emotions are "fluctuating changes in emotional 'weather'" (American Psychiatric Association, 1994, p. 763).

Saying what emotions are *not* (e.g., not stress responses, not moods) turns out to be a lot easier than saying what emotions *are*. This is because there are many different ways to conceptualize emotion (Gross & Barrett, 2011). These range from basic emotion approaches (e.g., Ekman, 1972; Panksepp, 1998) to appraisal approaches (Lazarus, 1991; Scherer, 1984) to psychological construction approaches (Barrett, 2009; Russell, 2003) to social construction approaches (Harre, 1986; Mesquita, 2010). However, despite important differences in focus and emphasis, three key points of agreement are evident across these approaches.

Emotions involve loosely coupled changes in the domains of subjective experience, *behavior*, and *peripheral physiology* (Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005). For many, the core of emotion is the subjective experience (Barrett, Mesquita, Ochsner, & Gross, 2007; LeDoux, 2012). But emotions involve more than changes in subjective experience; they also involve tendencies to act in certain ways (and not act in others). Emotion-related behaviors include changes in facial behavior, posture, and situation-specific instrumental behaviors such as withdrawing or striking (Ekman, 1972; Frijda, 1986). Emotions also involve autonomic and neuroendocrine changes that anticipate (and provide metabolic support for) emotion-related behaviors, and also follow them, as a consequence of the emotion-related somatic activity (Kreibig, 2010; Lang & Bradley, 2010; Levenson, 1992).

Emotions unfold over time (Cunningham & Zelazo, 2007). Emotions typically are viewed as

unfolding over seconds to minutes. One way of capturing these emotion dynamics is to use the "modal model" of emotion, so called because it unites features that are common to many different approaches to emotion (Barrett, Ochsner, & Gross, 2007; Gross, 1998b). In Figure 4, I present the situation-attention-appraisal-response sequence specified by the modal model in three different formats. This sequence begins with a psychologically relevant situation. This situation can be defined either by referring to features of the external environment (e.g., the wild-eyed ax-wielding man running toward me) or by referring to the activation of internal representations (e.g., the thought that I might be chased by an ax-wielding man). Whether external or internal, situations are attended to and appraised in terms of what they mean in light of the individual's currently active goals (Moors, Ellsworth, Scherer, & Frijda, 2013). It is this contextually based evaluation that gives rise to the loosely coupled changes in experiential, behavioral, and physiological response systems that characterize emotion.

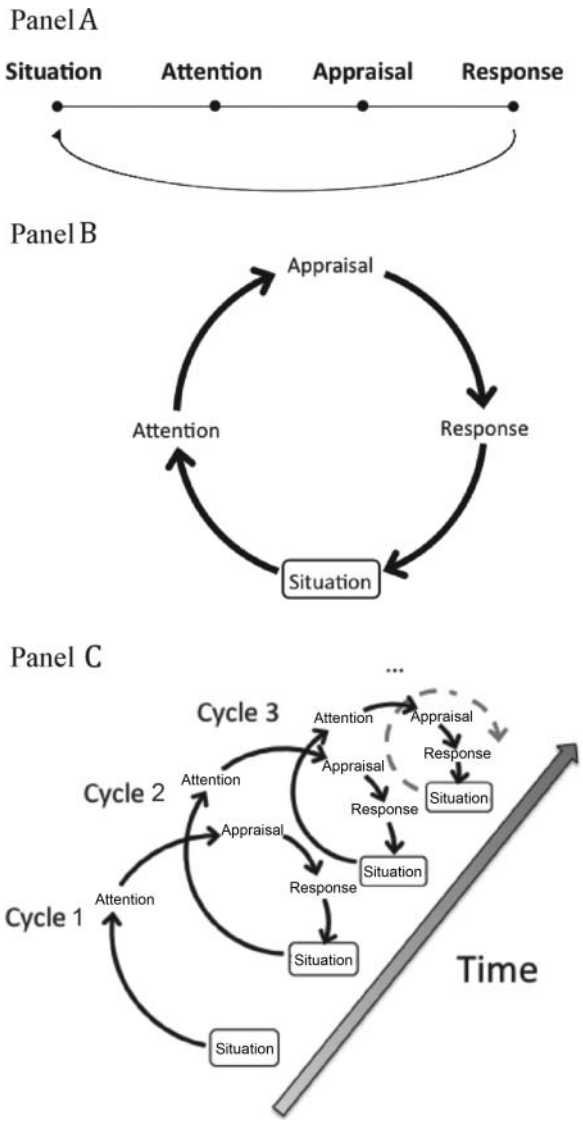

Figure 4. The modal model of emotion. Panel A: The modal model of emotion in its traditional linear format, with a feedback arrow indicating that an emotional response may change the situation that elicited the emotion in the first place (Gross, 2014a; © Guilford Press. Reproduced with permission of Guilford Press. Permission to reuse must be obtained from the rightsholder.). Panel B: The modal model of emotion in a circular format. Panel C: The modal model of emotion in spiral format, to show that it extends over time.

Emotions can be either helpful or harmful, depending on the context. Emotions are helpful when they appropriately guide sensory processing (Susskind et al., 2008), enhance decision making (Simon, 1967), provide information regarding the best course of action (Schwarz & Clore, 1983), inform us about others' behavioral intentions (Fridlund, 1994), and motivate socially appropriate behaviors (Averill, 1980) that change the situation that gave rise to the emotion in desirable ways (as shown by the feedback arrow in Figure 4A, or in circular form in Figure 4B). Examples of helpful emotions include episodes of fear that lead us to avoid potentially deadly fights, episodes of happiness that reinforce new friendships, and episodes of anger that propel us to fight for causes we care about. Emotions are harmful when they are the wrong intensity, duration, frequency, or type for a particular situation, and maladaptively bias cognition and behavior (Gross & Jazaieri, 2014). Unfortunately, examples of unhelpful emotions abound, including anger that leads one to harm oneself or a loved one, laughter that gives mortal offense, or anxiety that cripples one socially or at work. It is such instances of unhelpful emotion that motivate a consideration of emotion regulation.

Emotion Regulation and Related Processes

Affective states such as emotions often seem to come and go as they please. However, we can—and often do—exert some measure of control when an affective state directly bears on an important goal. Paralleling the distinctions among affective states in Figure 3A, *affect regulation* may be viewed as an umbrella term. Under this heading fall all of our efforts to influence our valenced responses (Westen, 1994), including (a) *coping*, (b) *emotion regulation,* and (c) *mood regulation* (see Figure 3B). Because virtually all goal-directed behavior can be construed as affect regulatory, it is frequently useful to sharpen the focus by considering one of these more specific forms of affect regulation.

Coping may be distinguished by its predominant emphasis on alleviating stress responses and its relatively long temporal horizon (e.g., coping with bereavement over months). Emotion regulation overlaps with coping but refers to attempts to

influence which emotions one has, when one has them, and how one experiences or expresses these emotions (Gross, 1998b). Moods tend to have less well-defined behavioral response tendencies than emotions, and for this reason, mood regulation may be distinguished from emotion regulation by its predominant focus on altering subjective feeling states (Larsen, 2000). Although it is useful to pay attention to the type of affect targeted for regulation, there appears to be considerable overlap among these regulatory processes.

The defining feature of emotion regulation is the *activation of a goal to influence the emotion trajectory* (Gross, Sheppes, & Urry, 2011). Sometimes this goal is itself the desired end point—for example, I may regulate my sadness in order to feel less sad. At other times, however, an emotion regulation goal is merely a means for achieving some other valued end—for example, I may be motivated to look more interested in a conversation than I really am in order to get a job. Many prototypic examples of emotion regulation are conscious, such as willfully inhibiting one's laughter at a child's misbehavior. However, emotion regulation can also be engaged outside of conscious awareness, such as when one quickly turns away from upsetting material (Gyurak, Gross, & Etkin, 2011).

Often, the person who has the goal to regulate emotion is interested in regulating his or her own emotions; I refer to this as *intrinsic emotion regulation*. Intrinsic emotion regulation has been a particular focus in the adult literature on emotion regulation (Gross, 2014b). At other times, the person who has the goal to regulate emotion is interested in regulating another person's emotions; I refer to this as *extrinsic emotion regulation*. Extrinsic emotion regulation has been a particular focus in the developmental literature (e.g., in parent–child interactions), although it is also of growing interest in the adult literature as well (Bloch, Haase, & Levenson, 2014; Levenson, Haase, Bloch, Holley, & Seider, 2014; Zaki & Williams, 2013). It is possible, of course, for a single action to have both intrinsic and extrinsic regulatory functions. For example, I may soothe a crying child to keep myself from snapping. This type of emotion regulation features prominently in the negative state relief conception of helping behavior (Cialdini, Darby, & Vincent, 1973).

When asked about their emotion regulation, people often describe efforts to down-regulate negative emotions, with a particular focus on decreasing the experiential and behavioral aspects of anger, sadness, and anxiety (Gross, Richards, & John, 2006). People also report trying to up-regulate positive emotions, with a particular focus on feelings of love, interest, and joy (Quoidbach, Berry, Hansenne, & Mikolajczak, 2010). These reports are consistent with traditional hedonic accounts of emotion regulation, which hold that people are motivated to decrease negative states and increase positive states (Larsen, 2000). However, the down-regulation of negative emotions and the up-regulation of positive emotions can be seen as just two cells in a 2×2 matrix, shown in Figure 5. Counterhedonic regulation (in gray cells) is often motivated by instrumental goals (Tamir, 2009), such as trying to appear calm after a major victory (Kalokerinos, Greenaway, Pedder, & Margetts, 2014), or increasing anger when trying to collect payment on debts (Sutton, 1991). Counterhedonic regulation also may be motivated by broader cultural imperatives regarding the emotions that should be shown (Szczurek, Monin, & Gross, 2012) or felt (Mesquita, de Leersnyder, & Albert, 2014; Tsai, 2007) in particular contexts.

Sometimes, people change the *intensity* of emotion by increasing or decreasing emotion experience or behavior (e.g., hiding one's feelings of distress from one's colleagues at work: Smith & Kleinman, 1989). At other times, people change the *duration* of emotion by increasing or decreasing how long an emotion lasts (e.g., drawing out a positive feeling by sharing good news with others: Gable, Reis, Impett, & Asher, 2004). At still other times, people change the *quality* of an emotional response (e.g., seeing the humorous side of an embarrassing situation: Samson & Gross, 2012). To achieve these goals (or ends), people employ emotion regulation strategies (the means to achieve these ends). Although "strategies" has a very conscious flavor, I mean to use this term broadly, including both processes that are under deliberate control and processes that operate implicitly. In the next section, I consider emotion regulation strategies and their associated outcomes.

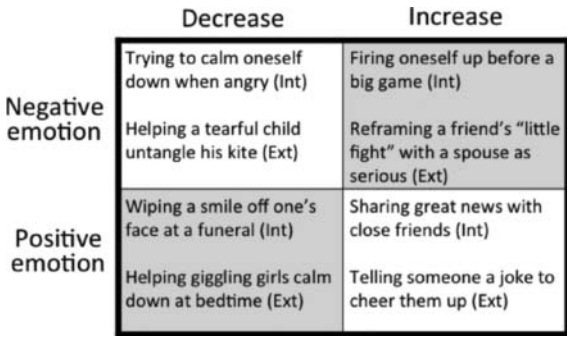

Figure 5. Examples of emotion regulation. Emotion regulation goals may include decreasing or increasing either negative emotion or positive emotion. Decreasing negative emotion appears to be the most common regulation goal in everyday life, followed by increasing positive emotion. For each example of emotion regulation, I note whether it is intrinsic (Int) or extrinsic (Ext) (adapted from Gross, 2014a; © Guilford Press. Adapted with permission of Guilford Press. Permission to reuse must be obtained from the rightsholder.).

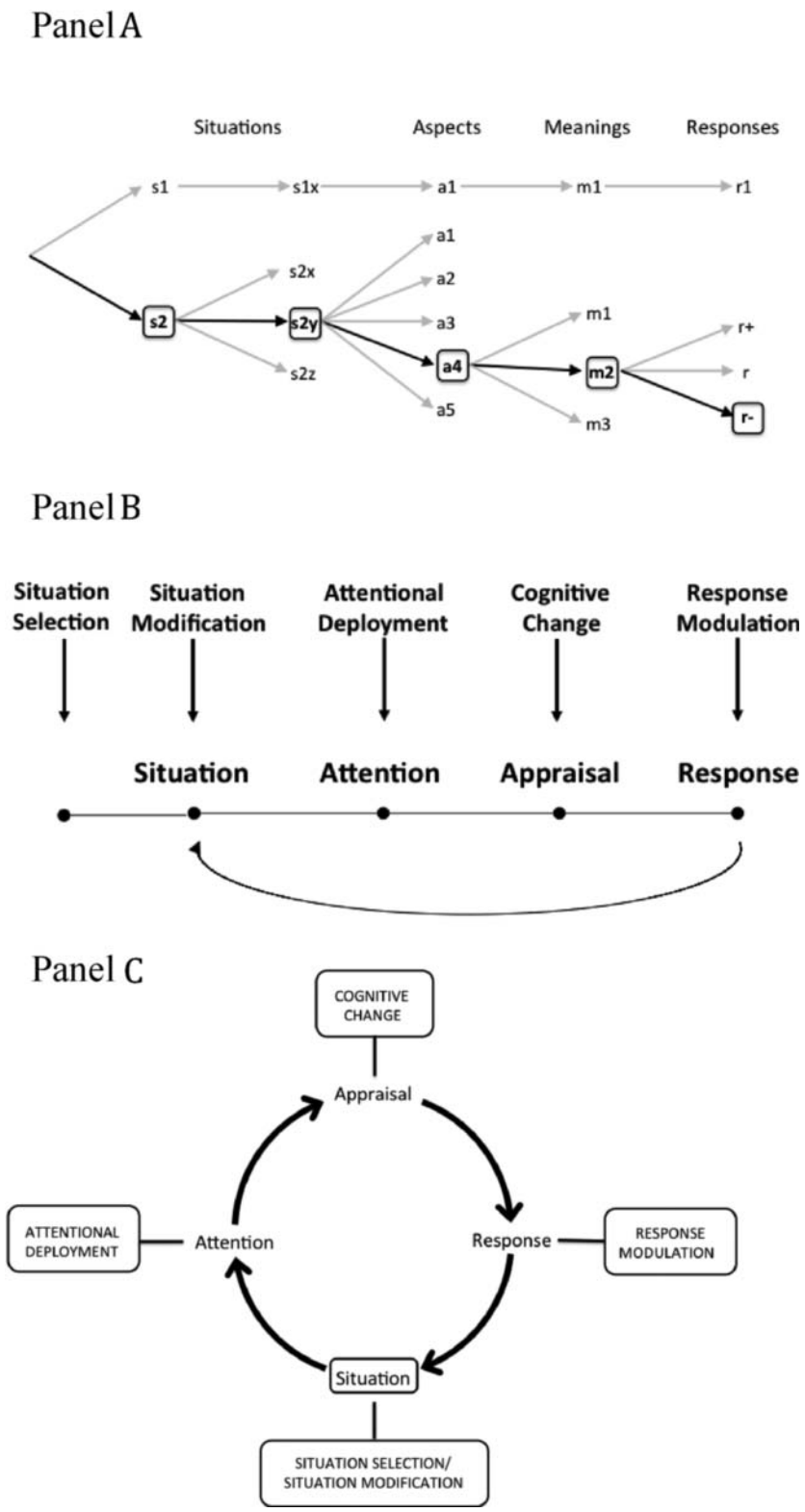

Figure 6. The process model of emotion regulation. Panel A: How a person might make a series of emotion regulation choices at different points in the emotion-generative process (adapted from Gross, 1998b; see text for elaboration; © American Psychological Association. Adapted with permission of the American Psychological Association. Permission to reuse must be obtained from the rightsholder.). Panel B: The process model of emotion regulation was derived by identifying each of the major points in the modal model at which the emotion-generative process might be altered (this figure builds upon Figure 4A; Gross, 2014a; © Guilford Press. Reprinted with permission of Guilford Press. Permission to reuse must be obtained from the rightsholder.). Panel C: The process model of emotion regulation depicted in circular format (this figure builds upon Figure 4B).

The Process Model of Emotion Regulation

Emotion regulation can take a bewildering variety of forms, including focusing on one's breathing, punching a pillow, texting a friend, going for a run, having a drink, taking a nap, reading a book, quitting one's job, biting one's lip, or thinking about a situation differently. One major focus in the field of emotion regulation has been finding ways of organizing the large number of strategies that people use to regulate their emotions, and then assessing whether different strategies are associated with different outcomes.

An Overview of the Process Model

One commonly used framework for studying emotion regulation strategies is the *process model of emotion regulation* (Gross, 1998b). This information-processing framework takes as its starting point the modal model of emotion (Figure 4), which—as we have seen—specifies the sequence of steps involved in emotion generation.

Consider the rendering of the process model in Figure 6A. On the left side, I have drawn a decision point at which a person can choose between two situations (Situation 1 [S1] and Situation 2 [S2]). If one of the determinants of this choice is the likely emotional impact of the two situations, then this decision counts as *situation selection*. The solid line toward S2 rather than S1 represents that decision. Once selected, a situation may be altered so as to modify its emotional impact. This constitutes *situation modification*. In Figure 6A, I've shown how a person might adjust a situation to instantiate one of three hypothetical variants of that situation (S2y, rather than S2x or S2z). Because any given situation has a number of aspects that might be attended to, a person can direct attention to one aspect of the situation (a4) rather than others (a1, a2, a3, or a5). When motivated by a consideration of the emotional impact of one aspect of a situation versus another, this directing of attention counts as *attentional deployment*. However, even a single aspect of a situation has many potential meanings (m1, m2, and m3). *Cognitive change* refers to selecting which of several potential emotional meanings will be attached to a situation, and it is this meaning (m2) that gives rise to the experiential, behavioral, and physiological response tendencies that define emotion. Finally, *response modulation* refers to altering one or more of these response tendencies once they have been elicited, illustrated in Figure 6A by a decrease in emotional response tendencies (r–), as contrasted with either no change in response tendencies (r), or an increase in response tendencies (r+).

The process model of emotion regulation treats each step in the modal model as a potential target for regulation. As shown in Figures 6B and 6C, and as just described, this approach yields five families of emotion regulation strategies that are distinguished by the point in the emotion-generative process at which they have their primary impact (Gross, 1998b). Although regulation strategies can be—and often are—used in combination, the heuristic value of this framework arises from its ability to simplify a complex problem space and direct attention to each of the separate families of emotion regulation.

The process model of emotion regulation makes the prediction that different emotion regulation strategies—and the specific tactics by which these strategies are implemented in any given situation—should have different consequences for how a person feels, thinks, and acts, both immediately and over the longer term. This prediction flows from two related ideas. First, because emotions develop over time, intervening at different points in the emotion-generative process should lead to different patterns of emotion experience, expression, and physiology. Second, because different emotion regulation strategies make different cognitive demands, these differences might themselves have consequences. Emotion regulation may be viewed as altering an emotion trajectory that would have occurred in the absence of that emotion regulation strategy, and different regulation strategies and tactics should alter the emotion trajectory in different ways.

To test the idea that different emotion regulation strategies should have different consequences, researchers have used both experimental and correlational methods. This work is yielding a rich and nuanced understanding of how specific emotion regulation strategies affect both the people who are doing the regulating and the people around them. In the following five subsections, I elaborate upon each family of emotion regulatory strategies, and selectively review some of the findings associated with each (for a quantitative meta-analysis based on the process model, see Webb, Miles, et al., 2012).

Situation Selection

Situation selection refers to taking actions that make it more (or less) likely that one will be in a situation that one expects will give rise to desirable (or undesirable) emotions. Examples include arranging to go to a movie, or avoiding a mean coworker. Situation selection is among the most forward looking of the regulation strategies (Aspinwall & Taylor, 1997), and it has been linked to successful attempts at making life changes (Heatherton & Nichols, 1994). It also features prominently in many cognitive-behavioral

forms of therapy. Some of these interventions are designed to increase a person's exposure to helpful situations, such as interactions with friends or other pleasant activities that will enhance positive states (Jacobson, Martell, & Dimidjian, 2001). Other interventions are designed to decrease a person's exposure to harmful situations, such those that will trigger drug use (Kober & Bolling, 2014). Of interest, even without clinical interventions, there appear to be changes in the use of situation selection over the course of the lifespan. For example, older adults are more likely than younger adults to select social partners who will provide more emotionally meaningful interactions (Carstensen, Gross, & Fung, 1997). As Carstensen, Isaacowitz, and Charles (1999) put it, "By shaping the social world, negative emotional responses can be avoided and positive ones optimized" in older adults (p. 168).

Despite the commonness of situation selection, it is often difficult to tell how one will feel in different situations (in the case of intrinsic regulation). One literature that has explored this issue is the affective forecasting literature. This literature suggests that people show an impact bias, meaning that they tend to overestimate the intensity and duration of negative and positive affective states that arise from significant events such as failing to obtain or obtaining tenure (Wilson & Gilbert, 2005), although the nature and extent of this bias remains a matter of dispute (Levine, Lench, Kaplan, & Safer, 2012; Wilson & Gilbert, 2013). Hard as it is to predict one's own emotional responses, it may be harder still to correctly judge how another person will feel in various situations (in the case of extrinsic regulation).

Situation Modification

Situation modification refers to taking actions that directly alter a situation in order to change its emotional impact. Examples include filing away a rejection letter rather than leaving it on one's desktop, or—as a teacher—assigning students to work groups in order to (a) increase their interest (extrinsic regulation) and (b) decrease one's own frustration at trying to help each in turn when classroom time is limited (intrinsic regulation). Because modifying one situation may effectively create a "new" situation, it is sometimes difficult to draw a bright line between situation selection and situation modification. Also, although "situations" can be external or internal, situation modification—as I am defining it here—has to do with modifying external, physical environments. I consider modifying "internal" environments (i.e., thoughts) next, in the context of cognitive change.

Actions that modify a situation in ways that will alter its emotional impact have been considered previously under the heading of problem-focused coping (Lazarus & Folkman, 1984) or primary control (Rothbaum, Weisz, & Snyder, 1982). Such actions feature prominently in Heckhausen and colleagues' motivational theory of life span development, which holds that situation modification is a key feature of adaptation across the life span (Heckhausen, Wrosch, & Schulz, 2010). However, not all forms of situation modification are adaptive. For example, in social anxiety disorder, individuals engage in "safety behaviors" such as standing apart from a social gathering (Werner & Gross, 2010). Although these situation modification behaviors lead to short-term relief, they prevent full exposure to the feared situations, preventing longer term benefits of exposure (Clark, 2001). Despite the importance accorded to situation modification, there has been surprisingly little work done on the immediate and longer term impact of strategic attempts to change a situation as a means of influencing the unfolding emotional response.

Attentional Deployment

Attentional deployment refers to directing one's attention with the goal of influencing one's emotional response. This family of emotion regulation strategies is distinguished from the other families of regulation strategies because it is used from infancy (Rothbart, Ziaie, & O'Boyle, 1992) through late life (Isaacowitz, Toner, & Neupert, 2009). One common form of attentional deployment is distraction, which redirects attention within a given situation (e.g., from an emotion-eliciting feature of a scene to a neutral feature of a scene) or shifts attention away from the present situation altogether (e.g., thinking about one's vacation plans while in a depressing meeting). Note that distraction may involve changes in one's gaze and/or shifts in one's internal focus, such as when someone calls to mind memories that help to instantiate a desired emotional state.

Behavioral studies have shown that in appetitive contexts, children who spontaneously engage in distraction are better able to delay gratification than children who do not (Rodriguez, Mischel, & Shoda, 1989). Experimental induction of distraction has also been shown to lead to greater delay of gratification (Mischel, Ebbesen, & Zeiss, 1972). In negative emotion-eliciting contexts, distraction leads to diminished emotional responses to painful and negative emotion-eliciting material (Bennett, Phelps, Brain, Hood, & Gray, 2007; Rusting, 1998). From electroencephalogram studies, we know that distraction acts very early in the emotion-generative process (by 300 ms: Thiruchselvam, Blechert, Sheppes, Rydstrom, & Gross, 2011), effectively down-regulating the late positive potential, which is associated with positive and negative arousal (Dunning & Hajcak, 2009). Functional magnetic resonance imaging studies of distraction

have shown that distraction effectively down-regulates subcortical emotion-generative structures such as the amygdala (Ferri, Schmidt, Hajcak, & Canli, 2013; McRae et al., 2010).

Cognitive Change

Cognitive change refers to modifying one's appraisal of a situation in order to alter its emotional impact. Sometimes, cognitive change is applied to an external situation (e.g., "This interview isn't do-or-die; it's a chance for me to learn more about the industry."). At other times, cognitive change is applied to an internal "situation" (e.g., "My racing heart isn't a sign of anxiety; it means my body is preparing for the speech."). One particularly well-studied form of cognitive change is reappraisal, which targets either the meaning of a potentially emotion-eliciting situation (as in the aforementioned examples), or the self-relevance of a potentially emotion-eliciting situation (e.g., "This event doesn't directly involve me or anyone I love."; see Kross & Ayduk, 2011). Although reappraisal is most commonly used to decrease negative emotion, it can be used to increase or decrease negative or positive emotions (Ochsner & Gross, 2005). Other forms of cognitive change alter how one thinks about one's capacity to manage situational demands (e.g., "Although making this presentation to the management team feels overwhelming, I know I can handle it using the techniques I've learned."). However, the term "reappraisal" is now used so broadly that it is often coextensive with the entire family of cognitive change strategies.

When used to down-regulate negative emotions, relative to no regulation, reappraisal leads to decreased levels of negative emotion experience (Feinberg, Willer, Antonenko, & John, 2012; Gross, 1998a; Kross & Ayduk, 2011; Lieberman, Inagaki, Tabibnia, & Crockett, 2011; Ray, McRae, Ochsner, & Gross, 2010; Szasz, Szentagotai, & Hofmann, 2011; Wolgast, Lundh, & Viborg, 2011), has no impact on or even decreases sympathetic nervous system responses—at least in low to moderate intensity situations (Gross, 1998a; Kim & Hamann, 2012; Sheppes & Meiran, 2007; Shiota & Levenson, 2012; Stemmler, 1997; Wolgast et al., 2011), and leads to lesser activation in emotion-generative brain regions such as the amygdala (Goldin, McRae, Ramel, & Gross, 2008; Kanske, Heissler, Schonfelder, Bongers, & Wessa, 2011; Ochsner & Gross, 2008; Ochsner et al., 2004) and ventral striatum (Staudinger, Erk, Abler, & Walter, 2009). Cognitively, reappraisal either has no impact on subsequent memory or actually improves it (Hayes et al., 2011; Kim & Hamann, 2012; Richards & Gross, 2000) and can actually enhance performance on exams (Jamieson, Mendes, Blackstock, & Schmader, 2010; Jamieson, Mendes, & Nock, 2013).

Response Modulation

Response modulation refers to directly influencing experiential, behavioral, or physiological components of the emotional response after the emotion is well developed. Examples include using alcohol, cigarettes, drugs, and even food to alter one's feeling state (Khantzian, 1985) or using physical exercise and deep breathing to alter one's physiological responses (Thayer & Lane, 2000). One of the best studied forms of response modulation, however, is expressive suppression, which refers to ongoing efforts to inhibit one's emotion-expressive behavior.

Compared to no regulation, expressive suppression leads to decreased positive but not negative emotion experience (Brans, Koval, Verduyn, Lim, & Kuppens, 2013; Gross, 1998a; Gross & Levenson, 1993; 1997; Stepper & Strack, 1993; Strack, Martin, & Stepper, 1988), increased sympathetic nervous system responses (Demaree et al., 2006; Gross, 1998a; Gross & Levenson, 1993, 1997; C. R. Harris, 2001; Richards & Gross, 2000), and greater activation in emotion-generative brain regions such as the amygdala (Goldin et al., 2008). Suppression also leads to worse memory (Johns, Inzlicht, & Schmader, 2008; Richards, Butler, & Gross, 2003; Richards & Gross, 1999, 2000, 2006). In the social domain, suppression leads to lesser liking and greater cardiovascular responses in social interaction partners (Ben-Naim, Hirschberger, Ein-Dor, & Mikulincer, 2013; Butler et al., 2003).

The Extended Process Model of Emotion Regulation

What leads a person to use one rather than another of the various emotion regulation strategies described by the process model? In Figure 6B, these strategies appear to be triggered "from above," but the model is silent as to how these various emotion regulation strategies are actually started or stopped. What initiates emotion regulation? What directs specific emotion regulation strategies? And why do some people regulate emotions successfully while others fail to regulate emotions as they should?

An Overview of the Extended Process Model

To answer these questions, I present the *extended process model of emotion regulation*. The extended process model starts with the idea that emotions—like other types of affect—involve valuation. That is because the defining feature of affect is a "good for

me" versus "bad for me" discrimination, and this is what is meant by valuation.

It is now thought that there are many different valuation systems, although just how many is not yet clear (Rangel, Camerer, & Montague, 2008). My own view is congruent with Elliot's (2006) proposition that "humanity's lengthy evolutionary history appears to have resulted in multiple levels of valence-based evaluative mechanisms, ranging from rudimentary spinal cord reflexes (Sherington, 1906) to subcortical affective computions [*sic*] (LeDoux, 1995; Shizgal, 1999) to our vaunted cortical processes (Davidson, 1993; Lang, 1995)" (p. 113). These valuation systems differ in many important ways. For example, different valuation systems "care" about different types of inputs. They also differ in the time scale over which they operate, in their plasticity (how much they change due to experience), and in the actions they prompt when they encounter a significant input (an input that is relevant to that particular valuation system) (Ochsner & Gross, 2014).

Despite their differences, valuation systems share a number of core features. In Figure 7A, I present a highly schematized valuation system (see Carver & Scheier, 1982, 2013; Magen & Gross, 2010; Miller, Galanter, & Pribram, 1960; Powers, Clark, & McFarland, 1960a, 1960b; Rangel et al., 2008; Wiener, 1948). In this scheme, the "W" (world) refers to the internal or external world. The "P" (perception component) refers to a perception of whatever that valuation system is tuned to "see." The "V" (valuation component) refers to an evaluation of that perception as indifferent, good for me, or bad for me. More specifically, valuation involves the juxtaposition of a representation of the world with a representation of a desired state of the world (a goal or target state). The "A" (action component) refers to the action impulses engendered by that valuation with the aim of addressing the gap between the perceived state of the world and the desired state of the world. Some of these actions may be "mental" (e.g., increasing the activation strength of a particular representation); others may be "physical" (e.g., cardiac acceleration, or the extension of a limb). The correspondence between Figure 4B and Figure 7A is obvious; the former is simply a more specific version of the latter. Thus, the point-to-point mapping between the two figures is Situation → World, Attention → Perception, Appraisal → Valuation, and Response → Action.

What is most important about this conception of valuation is its dynamic aspect, which is shown in Figure 7B. The action impulses that are produced by any given valuation cycle have as their target one or more of the aspects of the world ("W") that initially triggered that valuation cycle. These cycle-by-cycle changes to the internal or external world are indicated in Figure 7B by the incrementing subscript for the

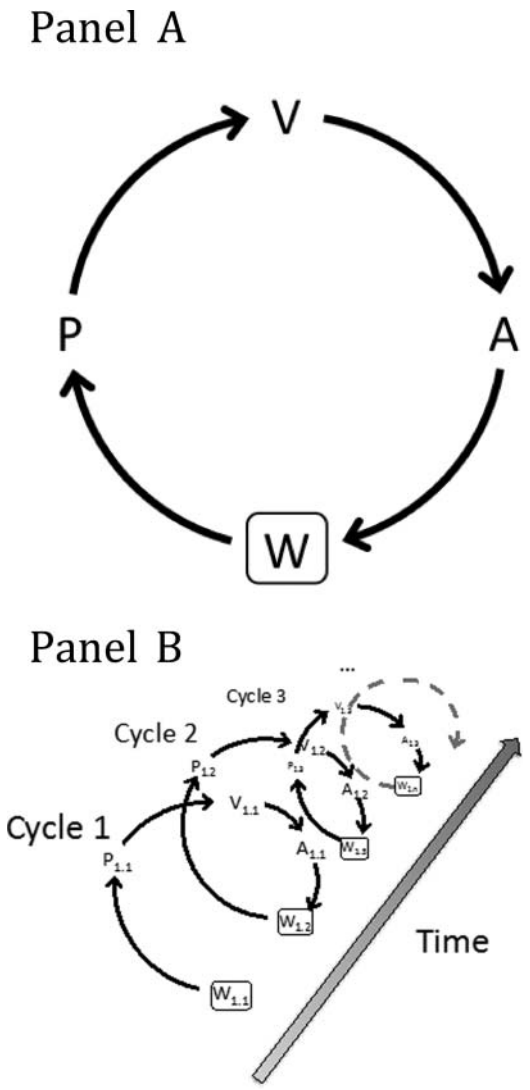

Figure 7. The valuation process. Panel A: The world ("W") gives rises to perceptions ("P"). When valued ("V") as either negative or positive, these valuations give rise to actions ("A") that can alter the state of the world. Emotion is one type of valuation, as is evident from the correspondence between Figure 7A and Figure 4B (see text for details). Panel B: Valuation takes place over time, as shown in this spiral depiction of the valuation process (adapted from Ochsner & Gross, 2014; © Guilford Press. Reprinted with permission of Guilford Press. Permission to reuse must be obtained from the rightsholder.).

"W" in each valuation cycle ($W_{1.1}$, $W_{1.2}$, etc.). Changes in "Ws" in each cycle lead to changes in perception, with follow-on changes to subsequent valuation and action. Hence, the first valuation cycle is denoted $W_{1.1}$-$P_{1.1}$-$V_{1.1}$-$A_{1.1}$, the second is denoted $W_{1.2}$-$P_{1.2}$-$V_{1.2}$-$A_{1.2}$, and so forth. This figure shows the valuation system cycling indefinitely, but in actuality a valuation system becomes inactive when the discrepancy between the goal/target state and world that led to the initial valuation is below threshold for that valuation system (because the representation of either the world or the goal/target state has changed).

As we move through our daily lives, many different valuation systems are typically active simultaneously. Each is sensitive to different aspects of a particular situation, and each activates action impulses relevant to its own evaluation of that situation. The concurrent activation of multiple valuation systems frequently leads the valuation systems to interact with one another. Sometimes, valuation systems are mutually supportive. For example, when working on a paper with a friend, both my happiness at spending time with a friend and my interest in the ideas energize me to focus my thoughts and get our paper written. At other times, valuation systems pull in different directions, and their divergent action outputs compete with one another. For example, it is warm in my bed and I want to stay put, but I also want to go for a run so that I'll live for a long time in good health. Now two opposing motives must be reconciled: One would lead me to stay in bed; the other would lead me to get out of bed. This state of affairs may be resolved passively (the stronger action impulse wins), or may require adjudication by another valuation system.

The notion of interacting valuation systems lies at the heart of the extended process model of emotion regulation. According to this model, emotions are instantiated via valuation systems. Emotion regulation occurs when one valuation system (which I refer to as a second-level valuation system) takes another valuation system (one that is generating emotion, which I refer to as a first-level valuation system) as a target and evaluates it either negatively or positively, activating action impulses that are intended to modify the activity in the first-level valuation system. This description is well aligned with my definition of emotion regulation as the activation of a goal to modify the unfolding emotional response.

This type of interaction between valuation systems is shown in Figure 8A. As is evident in this figure, the aspect of the world that is being attended to and acted upon by the second-level valuation system is the first-level valuation system that is generating emotion. Figure 8B shows that the interaction of the two valuation systems plays out over time. Note that the first-level valuation system (which was also depicted in Figure 7B) has subscripts that begin with "1" (e.g., $W_{1.1}$-$P_{1.1}$-$V_{1.1}$-$A_{1.1}$), whereas the second-level valuation system has subscripts that begin with "2" (e.g., $W_{2.1}$-$P_{2.1}$-$V_{2.1}$-$A_{2.1}$).

To make this concrete, let's take a situation in which the "W" of the first-level valuation system is my children misbehaving at an elderly relative's house and the "P" is my perception that they are misbehaving. The "V" is activated by the discrepancy between my representation of the world as it is (poorly behaved children) and my representation of the world as I would like it to be (well-behaved children). The negative valuation of their misbehavior gives rise to action impulses ("As")—experiential, behavioral, and physiological changes—that constitute anger (e.g., a feeling of tightness; facial, vocal, and postural changes; increased heart rate). These responses may narrow the gap between the world as it is and the world as I would like it to be. This sequence of events is captured by the first-level valuation component of Figure 8A/B. The interesting part comes as I register my anger, where my anger is the "W" of the second-level valuation system, and my perception of my anger is the "P" of the second-level valuation system. Given my goal to not show anger toward my children in this context, I negatively value ("V") my rising anger and undertake actions ("As") that will down-regulate my experience and expression of anger. That is, I seek to regulate my anger, and keep doing so until the gap between my second-level valuation system's perception of the world and my regulation goal coincide.

In general, there are five ways the second-level valuation system can influence the first-level valuation system that is generating emotion. As shown in Figure 9, these include (a) taking steps to change the situation to which one will be exposed, (b) changing one or more relevant aspects of the external world, (c) influencing which portions of the world are perceived, (d) altering the way the world is cognitively represented, and (e) modifying emotion-related actions. The inset to Figure 9 shows how these intervention points map onto the emotion regulation strategies enumerated in Figure 6. In particular, situation selection and situation modification refer to changing the external world to which one is exposed, attentional deployment refers to changing the perception of the world, cognitive change refers to altering the way the world is cognitively represented, and response modulation refers to modifying the actions that are activated by the emotion. In the case of my misbehaving children, these regulatory options might take the form of (a) asking my children if they'd like to go outside to play, (b) taking out a board game for the children to play with, (c) distracting myself by working out travel logistics for the next day, (d) reminding myself how jet lagged my children are and how boring they must find our discussion of distant relations they've never met, or (e) biting my lip and trying to hide my anger.

To elaborate upon this extended process model of emotion regulation, in the following sections I segment emotion regulation into three separable valuation systems that correspond to three different stages of the emotion regulation cycle (for similar segmentation, see Bonanno & Burton, 2013; Webb, Gallo, Miles, Gollwitzer, & Sheeran, 2012). These stages are (a) the *identification stage* (concerned with whether to regulate emotion), (b) the *selection stage*

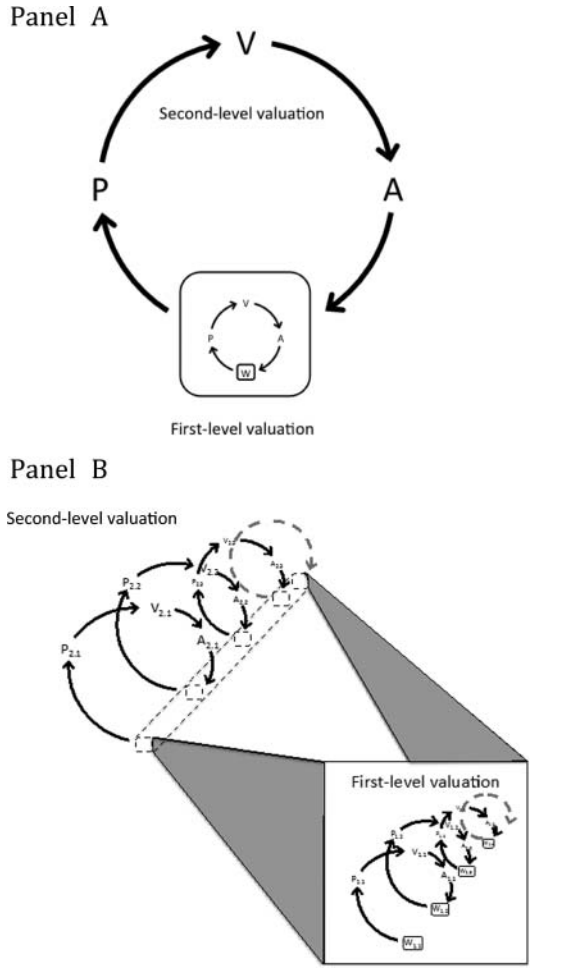

Figure 8. A valuation perspective on emotion regulation. Panel A: When the object of valuation is another valuation system—in particular, one that is instantiating emotion—emotion regulation is said to be taking place. In this case, the aspect of the world that is giving rise to the "W-PVA" cycle is itself a valuation. Panel B: These interacting first- and second-level valuation systems extend over time.

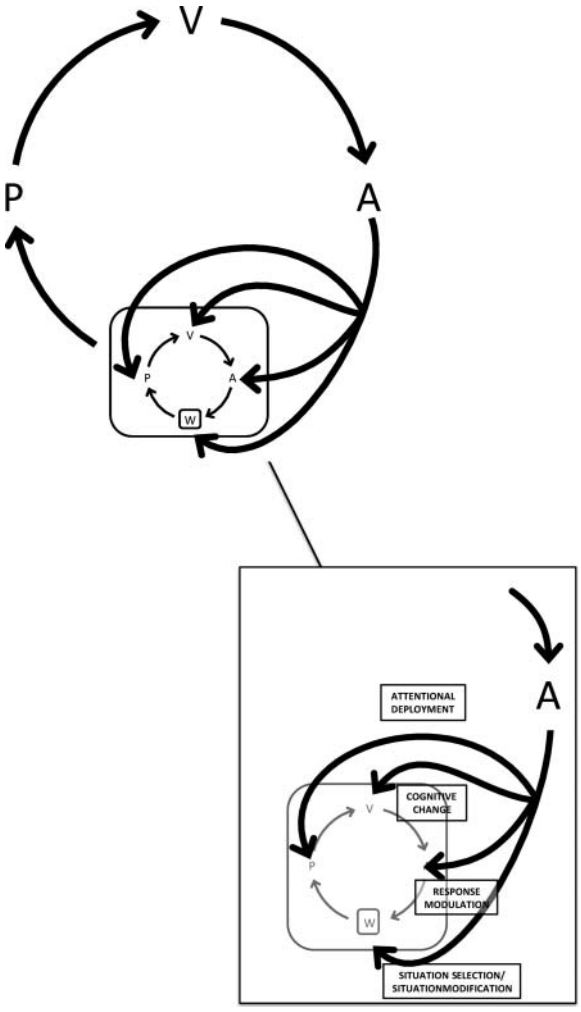

Figure 9. Emotion regulation strategies. Emotion regulation refers to actions that seek to influence emotion by changing (a) the world, (b) the perception of the world, (c) the way the world is cognitively represented, or (d) emotion-related actions. As shown in the inset, the second-level W-PVA cycle's actions represent the families of emotion regulation strategies featured by the process model of emotion regulation, namely, (a) situation selection/situation modification, (b) attentional deployment, (c) cognitive change, and (d) response modulation (note the correspondence between Figure 9 and Figure 6C).

(concerned with what strategy to use to regulate emotion), and (c) the *implementation stage* (concerned with implementing a particular tactic suited to the present situation). Because each stage is concerned with a different decision point, each represents key a point of potential failure in emotion regulation.

This decomposition of the second-level valuation system into three functionally coupled valuation systems is shown in Figure 10A. The way that each of these valuation systems dynamically "calls" the next valuation system in line is shown in Figure 10B. This figure shows how the second-level valuation system (whose valuation cycles are labeled $W_{2.1}$-$P_{2.1}$-$V_{2.1}$-$A_{2.1}$, etc.) may be decomposed into three valuation systems (shown in the inset of Figure 10B): identification (whose valuation cycles are labeled $W_{2A.1}$-$P_{2A.1}$-$V_{2A.1}$-$A_{2A.1}$, etc.), selection (whose valuation cycles are labeled $W_{2B.1}$-$P_{2B.1}$-$V_{2B.1}$-$A_{2B.1}$, etc.), and implementation (whose valuation cycles are labeled $W_{2C.1}$-$P_{2C.1}$-$V_{2C.1}$-$A_{2C.1}$, etc.). The key idea here is that one of the action outputs of the first valuation cycle is the activation of a representation that serves as a goal in a down-stream valuation system. Earlier, I noted that valuation is active when a discrepancy is perceived between a representation of the world and a representation of a goal/target state. However, at that point, I did not specify where the representation of a goal/target state came from. Now we can see that one way such representations of a goal/target state may be activated is by an "up-stream" valuation system. Although some valuation cycles can directly narrow the gap between the representations of world and goal/target state that activated the valuation cycle, for more complex operations, it is often

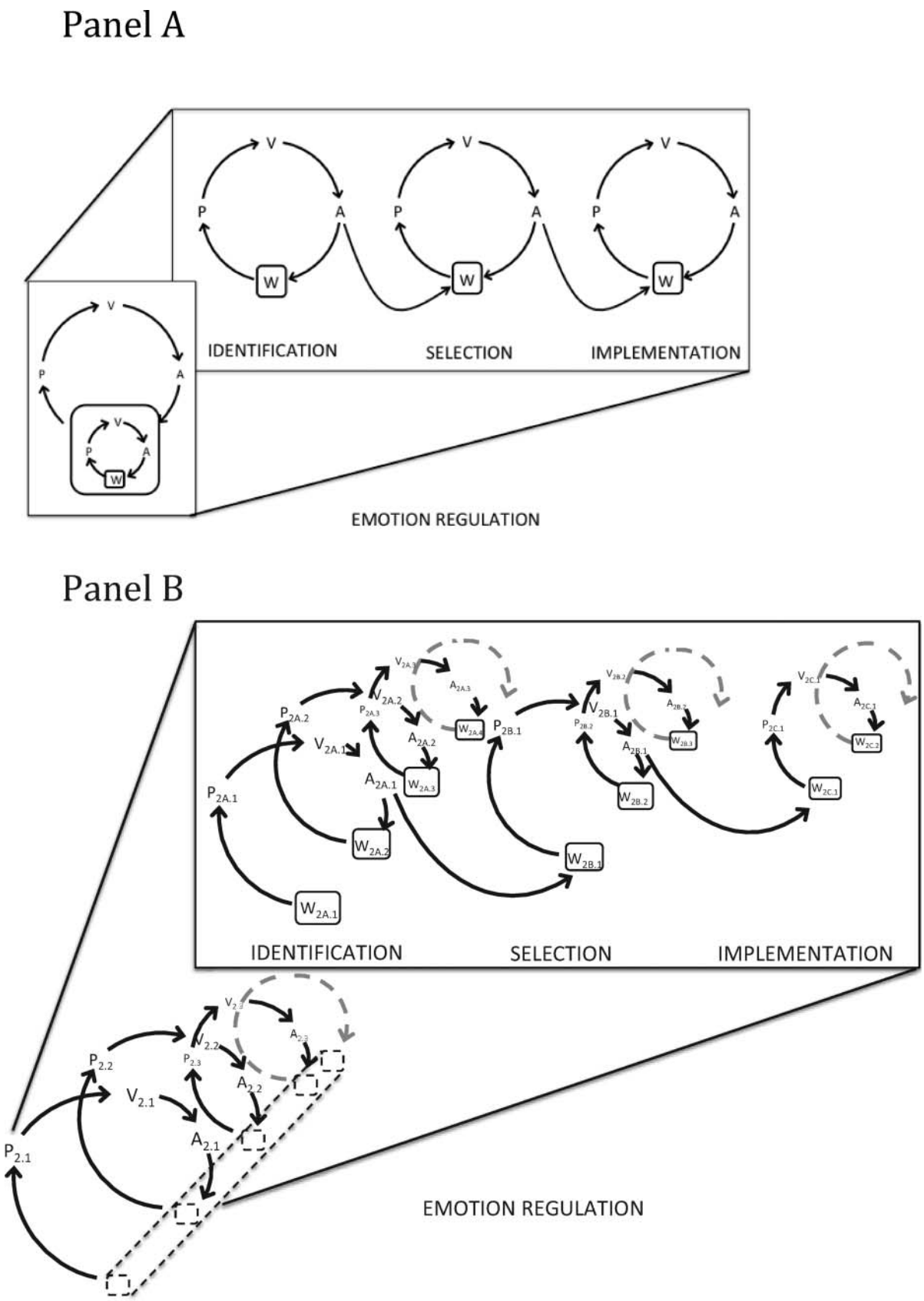

Figure 10. The extended process model of emotion regulation. Panel A: The extended process model distinguishes three stages of emotion regulation: (a) identification (which entails deciding whether to regulate), (b) selection (which entails deciding which strategy to select), and (c) implementation (which entails implementing a tactic). This may change the first-level valuation system (see text for details). Panel B: These three emotion regulation stages extend over time and are functionally linked (see text for details).

necessary to trigger other valuation systems, which can trigger still other valuation systems in turn. This arrangement is by no means unique to emotion regulation but instead reflects a much broader principle of hierarchical design.

In the following sections, I consider each of the three emotion regulation stages (corresponding to the three valuation systems) in turn. In addition, I consider the processing dynamics that emerge as the second-level valuation system iterates over time. I also illustrate how the extended process model might be able to help explain emotion regulation failure (not regulating emotion when it would be useful to do so) and emotion misregulation (regulating in ways that are harmful rather than helpful) (for a more detailed analysis of emotion regulation and psychopathology, see Sheppes, Suri, & Gross, in press).

The Identification Stage

The first stage of emotion regulation is the identification stage. This is when the emotion that is being instantiated by the first-level valuation system is detected. It is then evaluated as a candidate for regulation, and a determination is made as to whether to regulate or not. The three substeps of the identification stage are depicted in Figure 10 as perception, valuation, and action substeps, where the task of the perception substep is to detect the emotion, and the task of the valuation substep is to determine whether the value attached to the emotion is sufficiently negative or positive to activate regulation. If so, this leads the action substep to activate a representation, namely, the goal to regulate the emotion. This represents a change in the (internal) world, as shown in Figure 10.

Because emotional awareness is useful for emotion regulation (Barrett, Gross, Conner, & Benvenuto, 2001; Samson, Huber, & Gross, 2012), deficiencies at the perceptual substep may lead to emotion regulation failure. People differ in their emotional awareness (Taylor, 1994), and these differences can influence emotion regulation. For example, in one study, greater levels of interoceptive awareness were associated with more successful reappraisal (Füstös, Gramann, Herbert, & Pollatos, 2013). Of interest, one of the active ingredients in mindfulness interventions—which have been shown to enhance emotion regulation—may be increased awareness of emotion-related bodily changes (Teper, Segal, & Inzlicht, 2013). Regulation failures also may arise at the valuation substep. This happens when a person fails to place adequate value on the regulation goal (Inzlicht, Schmeichel, & Macrae, in press). For example, a person with bipolar disorder may place a positive value on manic feelings, leading to costly emotion regulation failure—not due to a lack of awareness, but rather due to a faulty valuation of the emotion. Finally, emotion regulation problems may arise at the action substep. One source of difficulty at this substep may be psychological inertia. This refers to the tendency to continue to act as one has previously (such as not regulating one's emotions), even when this default behavior may not be the most adaptive choice (Suri, Whittaker, & Gross, in press). A second source of difficulty may be people's general beliefs about emotions. If people believe emotions are relatively immutable, they regulate emotions less successfully than if they believe emotions are mutable (Mauss & Tamir, 2014; Romero, Master, Paunesku, Dweck, & Gross, 2014; Tamir, John, Srivastava, & Gross, 2007), perhaps because they only weakly activate a goal to regulate emotion, even when they have detected an emotion they wish could be regulated. This weakly activated regulation goal may fare poorly in competition with other concurrently activated goals, resulting in regulation failure.

The Selection Stage

The activation of the emotion regulation goal (by the action substep of the identification stage) triggers the second stage of emotion regulation. This is the selection stage. The focus here is the selection of an emotion regulation strategy. The first substep is the perceptual substep; here, potential emotion regulation strategies are represented. These strategies are then evaluated by the valuation substep in light of contextual factors such as available cognitive (Urry & Gross, 2010) and physiological (Beedie & Lane, 2012) resources, and the type and strength of the emotional impulse (Raio, Orederu, Palazzolo, Shurick, & Phelps, 2013; Sheppes & Gross, 2011). For example, people prefer reappraisal to distraction when emotion intensity is low but prefer distraction to reappraisal when emotion intensity is high, perhaps because at high intensity levels reappraisal is less effective (Sheppes, Scheibe, Suri, & Gross, 2011; Sheppes et al., 2014). The action output is the activation of a goal to use a particular strategy. As described in the original process model (Figure 6), emotion regulation strategies can influence the first-order valuation system by targeting relevant portions of the external world (situation selection, situation modification), the perceptual input (attentional deployment), the valuation (cognitive change), or the action output (response modulation). Because the activation of a strategy represents a change in the (internal) world, the world is drawn into Figure 10.

Emotion regulation failure and misregulation may arise in several ways at the selection stage. At the perception substep, a person may "see" very few emotion regulation strategies to choose from. This may be because that person has few strategies in her

repertoire, perhaps due to an excessive reliance on one regulation strategy. However, a perception that there are few regulatory options also may reflect a momentary failure to accurately represent available options. Regulation problems also may arise at the valuation substep, if contextual factors are inappropriately weighed. For example, a person with social anxiety disorder may overvalue avoidance (a type of situation selection), even when the short-term relief associated with avoiding a social engagement comes at a steep, longer term price. Finally, problems also may arise at the action substep. One source of difficulties may be the belief that one cannot effectively employ a particular emotion regulation strategy. This is referred to as low emotion regulation self-efficacy. Self-efficacy beliefs may shape how robustly a person activates a particular regulation strategy. These beliefs also may have an impact at the perception and valuation substeps. Fortunately, self-efficacy beliefs can be modified. For example, in the context of generalized social anxiety disorder, patients who received cognitive-behavioral therapy (vs. those randomized to a waitlist group) showed increased reappraisal self-efficacy, and these changes in self-efficacy mediated the effects of therapy on clinical improvement (Goldin et al., 2012).

The Implementation Stage

The implementation stage is initiated when the selection stage activates the representation of an emotion regulation strategy. The task of the implementation stage is to translate this general strategy (e.g., cognitive change) into tactics that are appropriate to the specific situation one is in (e.g., think about this particular rebuff as an accidental oversight rather than a deliberate insult; McRae, Ciesielski, & Gross, 2012). To enable the translation of a general strategy into situation-specific tactics, the perceptual substep must represent relevant features of the world as well as various ways of implementing a particular strategy. At the valuation substep, these various tactics are evaluated, and the most promising are selected for implementation. It is this implementation that constitutes the output of the action substep. Without the implementation stage's action substep, the rest of the emotion regulation stages would be toothless. It is only via the implementation of a regulation tactic that the first-level emotion-generative valuation system is regulated.

As with the prior stages, emotion regulation difficulties may arise at each of this stage's substeps. At the perceptual substep, few tactics may be evident, either because of a lack of skill in translating a given emotion regulation strategy into tactics in a novel context or because of a failure to represent all of the relevant available tactics. At the valuation substep, tactics may be mistakenly assigned either a higher or lower value than they deserve in a given context, perhaps because of an insufficient appreciation of a relevant contextual variable (e.g., the type or intensity of emotion, or the cognitive resources required to implement a particular emotion regulation tactic). Finally, the action substep itself may give rise to problems, as tactics are bungled in their implementation. This last substep has been a major focus in research on emotion regulation difficulties in psychopathology, and a number of studies have documented problems in implementing emotion regulation in various types of psychopathology (e.g., Heller et al., 2009).

Processing Dynamics: Maintaining, Switching, and Stopping

Like all valuation systems, a second-order valuation system that is engaged in emotion regulation operates over time. These extended processing dynamics must be considered for a complete view of emotion regulation. An initial perception of an emotion that should be targeted activates a goal to regulate, and this goal activation leads to strategy selection, and then to the implementation of a particular emotion regulation tactic. This tactic may have an impact on the first-order valuation system, thereby altering the perceptual input to the second-order valuation system. This new perceptual input to the second-order valuation system represents the current emotion. If the targeted emotion is still above the relevant threshold, the identification stage continues to activate the goal to regulate this emotion, and if the change from Cycle 1 to Cycle 2 has been satisfactory, the selection stage is likely to continue to select the same emotion regulation strategy. In a similar fashion, the implementation stage is likely to continue to implement the same emotion regulation tactic unless a relevant feature of the external or internal environment has changed (e.g., the relevant resources are no longer available). This second "cycle" of the second-order valuation system—which largely duplicates the first "cycle"—may well be extended for a third "cycle," a fourth, and so on. When the action outputs of the three emotion regulation stages are highly similar across cycles, we refer to this as *emotion regulation maintenance*. (I say "highly similar" rather than "the same" because strictly speaking, no situation is ever the same from moment to moment, which means that there will inevitably be at least minor changes from one cycle to the next.) Emotion regulation maintenance is best described as an emergent property because it reflects highly similar outcomes across identification, selection, and implementation stages.

At some point—and possibly as soon as the second "cycle" of the second-order valuation system—one of two things can happen to interrupt the maintenance

dynamic. First, the target emotion may fail to change, or even change in an undesirable direction. If this happens, the identification stage will represent continued (inappropriate) levels of the target emotion, which will continue to activate a goal to regulate emotion. However, at the selection and/or implementation stage, a new emotion regulation strategy may be activated and/or a new tactic may be implemented. These outcomes constitute *emotion regulation switching* because the goal to regulate is still active, but the means that are being used to achieve that goal have been adjusted in light of unfavorable prior results. Alternatively, if the targeted emotion is altered so that it falls below the threshold set by the identification stage, or if repeated efforts to regulate have failed, the goal to regulate emotion may no longer be activated. This constitutes *emotion regulation stopping*.

These processing dynamics may be particularly fertile soil for difficulties with emotion regulation. For example, emotion regulation maintenance requires that the goal to regulate emotion be successfully shielded from other competing goals. One way emotion regulation difficulties may arise is when a person successfully initiates emotion regulation, but then falters, and fails to maintain that initial trajectory, possibly due to interference from other currently active goals. A second path to emotion regulation difficulties arises from problems with emotion regulation switching. Here one could imagine problems arising from either a "failure to settle," indicated by repeated changes in strategy and tactics before an appropriate investment of resources yields the desired changes in emotion, or a "failure to switch," indicated by a failure to change strategies (or tactics) in light either of obvious failures or relevant changes in the situation and/or one's resources. A third path to failure involves emotion regulation stopping. It seems likely that either premature or delayed stopping could be problematic. Premature stopping—before an emotion has been adjusted as would be most appropriate—would give rise to emotion regulation failure. Delayed stopping is a more interesting case. Here, emotion regulation remains in force well after the need for regulation has passed. The cost of this type of failure would seem to vary as a function of the resources expended on unnecessary regulation, as well as the "collateral damage" associated with overregulated emotion (e.g., sustained physiological activation; making social interactions awkward or unnatural).

Growth Points for the Field

Our discussion of the extended process model suggests a number of questions. These include broad questions about valuation (e.g., What principles govern the interactions among valuation systems? To what extent do these principles vary according to the particular valuation systems in question? As valuation systems interact over time, how are they changed by these interactions?), more specific questions about emotion regulation (e.g., What are the details of the identification, selection, and implementation stages? How can we better understand emotion regulation maintenance, switching, and stopping? In what ways are the mechanisms underlying emotion regulation processes different from [or similar to] other forms of valuation?), and questions about the application of the extended process model (e.g., How might the extended process model be integrated into broader theories of motivation and employed to examine individual differences, including those related to age, culture, and prior experiences? Can this model be applied to understanding both intrinsic and extrinsic emotion regulation? In what ways might this model be used to guide research on the etiology and treatment of clinical disorders and to shed light on underlying transdiagnostic factors?) As these questions hint, the breadth and scope of topics related to emotion regulation is breathtaking. In the following sections, I consider five growth points that I think are particularly exciting.

Blends, Sequences, and Flexibility

Much of the research to date has contrasted one (or more) specific types of emotion regulation with a no-regulation control condition. Examining relatively "pure" forms of emotion regulation is important for both theoretical and practical reasons, and this research strategy has been very productive, yielding important new insights regarding the unique and shared consequences of specific types of emotion regulation. I believe this will continue to be a valuable approach moving forward, using new laboratory and field contexts, with new outcomes, and a keener appreciation of the moderating role of personality and culture. One pressing question here is how each strategy (e.g., reappraisal) gets translated into specific tactics. Another is how strategies may be combined. When asked how they regulate emotions, we found that both healthy and socially anxious adults reported using a number of different forms of emotion regulation (Werner, Goldin, Ball, Heimberg, & Gross, 2011). Similar findings are evident when considering children who have anxiety disorders (Carthy, Horesh, Apter, & Gross, 2010) or autism spectrum disorder (Samson, Hardan, Podell, Philipps, & Gross, in press). It is not yet known what blends of strategies are most effective in particular situations. However, there is growing interest in interventions that seem to

blend various emotion regulation strategies. For example, mindfulness interventions are thought to contain several component emotion regulation elements, including increased attentional deployment and cognitive change, as well as decreased expressive suppression (Farb, Anderson, Irving, & Segal, 2014). The extended process model is a natural framework for systematically examining such blends.

An examination of different forms of emotion regulation (whether "pure" or "blended") leads to the inevitable question, What is the best form of emotion regulation? Efforts to answer this question have taken many forms, from qualitative summaries to quantitative meta-analyses (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Webb, Miles, et al., 2012). However, I am skeptical that it will be possible to answer this question as posed. Different regulation strategies have different consequences, but the outcome profile that is "best" in a particular case will depend upon the details of the person, the situation, and the goals that person has in that situation. To illustrate, take the example of reappraisal versus suppression. It is tempting to see reappraisal as "better" than suppression, and in the main, reappraisal does have a more adaptive profile than suppression. However, it turns out that the adverse social consequences of suppression are not evident in individuals with bicultural European/Asian values (Butler, Lee & Gross, 2007; Soto, Perez, Kim, Lee, & Minnick, 2011; see also Wei, Su, Carrera, Lin, & Yi, 2013). Similarly, the benefits of reappraisal appear to be moderated by context. For example, if reappraisal is applied to stressors that can be controlled, it is less adaptive than if it is applied to stressors that cannot be controlled (Troy, Shallcross, & Mauss, 2013). Reappraisal also can be maladaptive when it is used in ways that lead to heightened risk taking and decreased sensitivity to the probability and magnitude of potential losses (Heilman, Crisan, Houser, Miclea, & Miu, 2010; Panno, Lauriola, & Figner, 2013). One important direction for future research is examining how the adaptive value of different emotion regulation strategies—and their associated tactics—varies by context (Aldao, 2013; Katzir & Eyal, 2013).

A related growth point is considering sequences of emotion regulation strategies. We now know that although reappraisal is often a preferred strategy at low to modest levels of emotion intensity, it seems to "break down" when applied in contexts of very high emotion intensity (Sheppes, Catran, & Meiran, 2009). Under such conditions, other strategies such as distraction may be more effective. These findings suggest the intriguing possibility that skillful emotion regulation may involve not only blends of emotion regulation strategies but also carefully chosen sequences. For example, whether in the context of intrinsic or extrinsic emotion regulation, when managing a highly intense emotional situation, it may be best to first employ distraction to bring the intensity of the emotion down, and only then employ reappraisal. I am not aware of studies testing these possibilities, but this would seem a very promising growth point, and one that fits naturally in the context of the processing dynamics described by the extended process model.

If no one strategy is "best" in any absolute sense—and if skillful emotion regulation involves context-dependent blends and sequences of regulatory efforts—it follows that people may be maximally successful in pursuing their own idiosyncratic goals if they dynamically adjust the emotion regulation strategies they employ across situations. This growing understanding suggests another important avenue for future research, namely, a consideration of *emotion regulation flexibility*, defined as the matching of emotion regulation strategy to environmental circumstance (Bonanno & Burton, 2013). As the extended process model of emotion regulation makes clear, such flexibility is possible only if many different component processes are functioning properly. Much more needs to be learned, however, about the processes that make emotion regulation flexibility possible.

The Neural Bases of Emotion Regulation

Studies of the neural bases of emotion regulation serve two key functions. On one hand, they help to clarify the brain bases of ostensibly similar (or different) forms of emotion regulation. This first function is valuable because these findings sharpen our understanding of underlying mechanisms and provide potential targets for intervention. On the other hand, studies of the neural bases of emotion regulation provide a window onto the emotions that are the target of regulation. As Cabanac and Russek (2000) put it, "The best way to study a system is to perturb it" (p. 142). This second function is valuable because there remains considerable uncertainty about the brain bases of emotion.

The best studied form of emotion regulation from a neuroimaging perspective is reappraisal. Recent meta-analyses (Buhle et al., 2014; Diekhof, Geier, Falkai, & Gruber, 2011; Kalisch, 2009; Kohn et al., 2014) have yielded a fairly consistent set of findings. Whether in the context of pictures, films, or autobiographical prompts, reappraisal engages dorsomedial, dorsolateral, and ventrolateral prefrontal cortex, as well as temporal and parietal cortex. Depending on the context, this network either up- or down-regulates the activity of emotion-generative systems including the amygdala and ventral striatum.

It is not yet clear, however, precisely how these brain regions flexibly configure themselves over time to enable reappraisal. It is also not clear how different reappraisal tactics make use of different resources, and how the underlying brain systems are differentially recruited over time (A. Harris et al., 2013). One

growth point in this area includes the use of converging methods to identify the causal role played by particular regions of this network. For example, in one study, Feeser and colleagues (Feeser, Prehn, Kazzer, Mungee, & Bajbouj, 2014) found that transcranial direct current stimulation to the dorsolateral prefrontal cortex enhanced participants' ability to engage in reappraisal. Other studies have examined the impact of brain damage on emotion regulation (Anderson, Barrash, Bechara, & Tranel, 2006; Salas, Gross, Rafal, Vinas-Guasch, & Turnbull, 2013). Further studies are required to better understand how different brain systems are engaged in the course of successful reappraisal and what goes wrong when regulation fails.

Far more remains to be done to understand the neural bases of other forms of emotion regulation (Berkman & Lieberman, 2009). More broadly, the extended process model of emotion regulation makes clear contact with a set of broader concerns related to the brain bases of value and value regulation that are currently being explored in neuroeconomics (Ochsner & Gross, 2014; Rangel et al., 2008). Linking work on emotion and emotion regulation with the broader literature on value and value regulation represents an important and exciting growth point for the field.

Emotion Regulation Across the Life Span

It is now abundantly clear that emotion regulation processes change across the life span (Kopp, 1989; Saarni, 1990; Thompson, 1991). Infants are initially capable of only relatively simple forms of emotion regulation (such as gaze shifting) and must rely heavily on caregivers to meet their emotional needs (Bowlby, 1969). As the young child's ability to control his or her mind and body matures, new forms of emotion regulation become possible, including simple forms of situation modification and response modulation. Growing language abilities usher in a new set of emotion regulation possibilities; language both allows the child to better control the immediate environment and permits caregivers to explain, forecast, and issue direct emotion regulation instructions (e.g., "Stop this temper tantrum right now!"). Interactions with family members and—increasingly—peers bring new emotion regulation challenges and opportunities. Children learn social rules for managing negative and positive emotions and begin to appreciate the power that changing thinking has to shape their own (and others') emotions (P. L. Harris, 1989).

Adolescence and early adulthood is a particularly interesting period for emotion regulation. New capabilities permit increasingly sophisticated forms of cognitive emotion regulation. These capabilities are often severely tested by new roles and expectations, heightened levels of emotion, and—at least for some adolescents—decreased reliance on caregivers for help in regulating emotions (Riediger & Klipker, 2014). In adulthood, emotion regulation skills continue to develop, as adults learn the emotional practices and engage in the "emotional labor" associated with their workplace (Grandey, 2000). Emotion regulation changes continue throughout adulthood, as emotion regulation motives increase (Carstensen et al., 1999) and as a lifetime of experience with emotion regulation enables high levels of socioemotional functioning for many people in later adulthood.

These tentative outlines are now clear, but virtually every point in this developmental trajectory continues to present puzzles and questions. For example, it is not yet known what sorts of early life experiences build resilience and what factors moderate the child's responses to different levels of environmental challenge (Dienstbier, 1989). What is the developmental trajectory of brain systems that support the valuation processes described by the extended process model of emotion regulation? How plastic is the typical developmental sequence for learning different forms of emotion regulation (McRae et al., 2012)? Can this developmental trajectory be accelerated through early support by caregivers and at school (Gottman, Katz, & Hooven, 1997)? What cultural practices most powerfully support skillful and flexible emotion regulation (Mesquita et al., 2014)? To answer these and myriad related questions, it will be necessary to develop more sophisticated techniques for modeling change in emotion generation and emotion regulation processes over differing time intervals (Grimm, Ram, & Hamagami, 2011). It will also be necessary to further develop theoretical frameworks such as the extended process model of emotion regulation in order to understand how individuals at any life stage use the processes of selection, optimization, and compensation to flexibly tailor their emotion regulation capabilities to present challenges (Urry & Gross, 2010).

Individual Differences in Emotion Regulation

At every life stage, individual differences in emotion regulation are evident. These include early-appearing differences in self-soothing (Rothbart & Derryberry, 1981) and effortful self-control (Eisenberg, Hofer, Sulik, & Spinrad, 2014). Individual differences also are evident throughout childhood, adolescence, and adulthood, and may be assessed by a seemingly endless array of measures (John & Eng, 2014). When considering individual differences in emotion regulation, it is useful to draw distinctions among (a) *emotion regulation frequency* (how often a particular form of emotion regulation is used: e.g., Gross & John, 2003), (b) *emotion regulation self-efficacy* (how capable a person believes himself or herself to be in using a particular regulation strategy: e.g., Goldin et al., 2012), and (c) *emotion regulation ability* (how successful a person actually is in

using a particular form of emotion regulation; e.g., Troy, Wilhelm, Shallcross, & Mauss, 2010). Much remains to be learned, however, about these and other dimensions of individual difference and how they shape each of the emotion regulation stages described by the extended process model.

Individual differences in generally adaptive forms of emotion regulation (such as reappraisal) have cumulative benefits for affective functioning, social interactions, and well-being, whereas individual differences in generally maladaptive forms of emotion regulation (such as expressive suppression) have cumulative costs for affective, social, and well-being domains (Gross & John, 2003; Nezlek & Kuppens, 2008). There is now even evidence that higher levels of reappraisal use may be protective against cardiovascular disease, whereas higher levels of suppression may place a person at higher risk for various cardiovascular diseases (Appleton & Kubzansky, 2014; Gianaros et al., 2014). It is not yet clear, however, what the boundary conditions are for these psychological and physical effects, nor is it clear what mechanisms underlie these diverse consequences of regulation.

In the domain of mental illness, emotion regulation difficulties are thought to be common in many forms of psychopathology. It is important, however, to distinguish between "emotional problems" and "emotion regulation problems" (Gross & Jazaieri, 2014). We know that people differ in emotional reactivity, and these differences—such as those evident in neuroticism (Barlow, Sauer-Zavala, Carl, Bullis, & Ellard, 2014)—may explain some of the emotional problems evident in psychopathology, without any need to invoke emotion regulation difficulties. However, in many cases, emotional problems do arise from emotion regulation difficulties (Ford, Mauss, Troy, Smolen, & Hankin, 2014; Miu, Vulturar, Chis, Ungureanu, & Gross, 2013). In describing the extended process model of emotion regulation, I have tentatively illustrated some of the ways in which emotion regulation problems might arise from difficulties in each of the emotion regulation stages (or substeps) and from difficulties in the dynamics of emotion regulation. One pressing growth point is to translate this perspective into testable predictions regarding both (a) specific forms of psychopathology (such as major depressive disorder and social anxiety disorder) and (b) general risk factors for diverse forms of psychopathology.

Emotion Regulation Interventions

Given that individual differences in emotion regulation are linked to a wide range of consequential outcomes, there is a compelling need to formulate and test interventions designed to selectively shape emotion regulation processes in helpful directions.

The most obvious type of emotion regulation intervention involves teaching individuals healthier patterns of emotion regulation. Some of these interventions target the general population, either via high-level interventions, such as those designed to alter construals of stress (Crum, Salovey, & Achor, 2013) or anxiety (Brooks, 2014), or via low-level interventions, such as those designed to enhance emotion regulation by improving working memory (Schweizer, Grahn, Hampshire, Mobbs, & Dalgleish, 2013). Other interventions target individuals at heightened risk of adverse outcomes, such as children whose parents are depressed or who live in abusive families, patients who have neurological disorders such as dementia, or individuals with high levels of negative emotion. Other interventions still target individuals with clinical diagnoses. These are the inventions that come to mind most easily, as many of our pharmacologic and psychosocial interventions for mental disorders have an emotion regulation component. Surprisingly little is actually known, however, about the precise mechanisms by which these ostensibly emotion-regulation related interventions have their effects. Indeed, it is not even clear to what extent various treatments differentially impact emotion generation versus emotion regulation (DeRubeis, Siegle, & Hollon, 2008). Clarifying the precise mechanisms of action of each of these interventions represents an important future challenge; it is my hope that the extended process model of emotion regulation may serve as a useful framework.

Other emotion regulation interventions go well beyond the individual to couples (Finkel, Slotter, Luchies, Walton, & Gross, 2013; Levenson et al., 2014), families (Sanders, 1999), or even communities. One example of the last approach is work that targets intractable global conflicts (Halperin, 2014). In such conflicts, negative intergroup emotions—emotions that arise as a result of belonging to a certain group—can create and maintain hostilities and then block progress toward a peaceful solution. To create more favorable conditions for conflict resolution, both direct and indirect emotion regulation approaches have been employed (Halperin, Cohen-Chen, & Goldenberg, 2014).

Using the direct approach to emotion regulation, Israeli participants were randomly assigned either to a reappraisal training condition or to a control condition just before the Palestinian United Nations bid in 2011 (Halperin, Porat, Tamir, & Gross, 2013). Findings indicated that a week following the training, participants who had been trained to use reappraisal showed greater support for conciliatory policies and less support for aggressive policies toward Palestinians. These effects persisted when assessed 5 months following training, and at each time point, negative emotion mediated the effects of reappraisal

on conflict-related attitudes. Although promising, one limitation of the direct approach is that people involved in intractable conflict often lack the motivation to engage in conflict-related emotion regulation efforts. For this reason, it is frequently useful to employ more indirect methods. More specifically, in the indirect approach, it is possible to target an "upstream" belief that one hypothesizes might be giving rise to negative intergroup emotions, such as the belief that the outgroup cannot change. Findings from these studies have demonstrated that shifting Israeli participants toward a more incremental perspective on groups led to lesser feelings of hatred toward Palestinians, which in turn led to a greater willingness to compromise for peace (Halperin, Russell, Trzesniewski, Gross, & Dweck, 2011).

These findings from emotion regulation interventions hint at the broader real-world relevance of emotion regulation processes. One important direction for future research is clarifying the mechanisms of action underlying existing individual, couple, family, and group-level interventions. To what extent do these interventions operate via changes in emotion regulation? Can the extended process model of emotion regulation be used to motivate and direct research on mechanisms underlying empirically validated interventions? A second exciting growth point for the field of emotion regulation is developing creative new ways to translate our understanding of emotion regulation processes into interventions. So far, emotion regulation interventions have focused on a narrow range of emotion regulation processes, such as reappraisal. In the future, it will be important to broaden to other strategies. Some of these interventions will be targeted at individuals who have difficulties with emotion regulation. Other interventions will be designed to create broader changes in the communities and societies in which we live.

Concluding Comment

Emotions powerfully shape how we interact with the material and social world around us. Sometimes our emotions serve us very well. At other times, however, our emotions lead us astray. Emotion regulation refers to our efforts to influence emotions in ways we think will increase the chance that they will be helpful rather than harmful.

The past two decades have seen exciting new developments in the field of emotion regulation, as well as in the larger domain of affective science in which this field is embedded (Gross & Barrett, 2013). In this review, I have introduced the extended process model of emotion regulation and shown how this model can be used both to organize accumulating findings and to make novel predictions. According to this model, both emotion generation and emotion regulation have at their core valuation systems that consist of coupled perception–valuation–action cycles. From this vantage point, emotion regulation may be conceived of in terms of interactions among valuation systems, some of which are instantiating emotion and others of which are seeking to influence the unfolding emotional response. The extended process model of emotion regulation helps to clarify how emotion regulation strategies are selected and implemented and points to ways that emotion regulation difficulties may emerge.

Surveying the vast and rapidly expanding emotion regulation landscape, I am encouraged by the energy and creativity that are being applied to these deeply challenging problems. I am also impressed by the collaborative and mutually supportive nature of research efforts in this area, as researchers from a wide variety of backgrounds share methods, findings, and data with one other in order to move the larger field forward, asking successively better questions, and using successively more refined empirical and theoretical approaches. At the same time, it is obvious that much remains to be done. I have sketched five directions for future research that I consider promising and suggested ways in which the extended process model of emotion regulation may be useful. There are of course many more questions that must be addressed than these, and I look forward to seeing how the field of emotion regulation develops within psychology and beyond.

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