Emotion Regulation and Psychopathology

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Abstract

Emotional problems figure prominently in many clinical conditions. Recent efforts to explain and treat these conditions have emphasized the role of emotion dysregulation. However, emotional problems are not always the result of emotion dysregulation, and even when emotional problems do arise from emotion dysregulation, it is necessary to specify precisely what type of emotion dysregulation might be operative. In this review, we present an extended process model of emotion regulation, and we use this model to describe key points at which emotion-regulation difficulties can lead to various forms of psychopathology. These difficulties are associated with (*a*) identification of the need to regulate emotions, (*b*) selection among available regulatory options, (*c*) implementation of a selected regulatory tactic, and (*d*) monitoring of implemented emotion regulation across time. Implications and future directions for basic research, assessment, and intervention are discussed.

Contents

INTRODUCTION

> There are things about you that I like. You're smart, you're funny, you're . . . spectacular in bed. . . but you're intolerable! You have very serious emotional problems. Deep seated problems for which you should seek professional help. (*Fight Club*, 1999)

In one of many unforgettable dialogues in the movie *Fight Club*, character Marla Singer tells the narrator (Edward Norton) that she cannot put up with him anymore because of his emotional problems. The phrase "emotional problems" was not invented by Hollywood writers, of course, but instead is widely used both in daily life and in clinical science, where it functions as an umbrella term to describe a diverse array of clinically significant symptoms and syndromes (for reviews, see Kring 2008, Kring & Mote 2014, Tracy et al. 2014).

The centrality of "emotional problems" in clinical conditions has led to an active search for causes, with emotion dysregulation figuring prominently (for reviews, see Gross 2014a, Gross & Jazaieri 2014, Kring & Sloan 2009). To give one recent example, the new clinical category "disruptive mood dysregulation disorder" (Am. Psychiatr. Assoc. 2013) was formed to describe severe and persistent irritability in children, manifested in intense and prolonged temper outbursts and angry mood.

At first glance, the role of emotion dysregulation in emotional problems seems intuitive and straightforward. However, a closer look reveals that the same manifestation of an emotional problem (e.g., a strong rage response) could be the result of a basic impairment in the machinery that generates emotion (e.g., hyperactive fight response) or in the machinery that controls emotion

(e.g., an ineffective regulatory effort to modulate an active—not hyperactive—fight response), or it could be the result of both types of problems. Although the aforementioned label "disruptive mood dysregulation disorder" suggests regulation problems, none of its characteristics necessarily indicate problems that go beyond emotion generation.

Therefore, it remains an open question what portion of emotional problems is the result of emotion dysregulation. Importantly, of the emotional problems that are related to dysregulation, the field has focused almost exclusively on dysregulation that is related to the ability to implement or execute different regulatory strategies (for meta-analyses, see Aldao et al. 2010, Webb et al. 2012b). Although these prior studies have provided important insights, in recent years it has become clear that emotion regulation is a multiprocess phenomenon that involves regulatory stages that precede and follow regulatory implementation (for reviews, see Bonanno & Burton 2013, Gross 2015, Sheppes 2014, Webb et al. 2012a). Despite these conceptual advances, at present there is no conceptual model that systematically describes the different regulatory stages and their potential links to psychopathology.

To address these gaps in the literature on emotion regulation and psychopathology, we begin by defining the key players that can lead to emotional problems: emotion generation and emotion regulation. We then present a novel extended-process model of emotion regulation and use this model to describe key points at which emotion-regulation difficulties can lead to various forms of psychopathology. These include difficulties associated with (*a*) identification of the need to regulate emotions, (*b*) selection among available regulatory options, (*c*) implementation of a selected regulatory tactic, and (*d*) monitoring of implemented regulatory tactics across time. We end by discussing implications for basic processes, clinical assessment, and treatment.

EMOTION AND EMOTION REGULATION

Modern life, which distances us from many of the immediate threats that were encountered by our ancestors, makes it easy to forget that emotions evolved to help us survive. Emotions involve a series of internal changes that result in external actions that have—on balance—proven advantageous for humans over the long sweep of evolutionary history (Damasio 1999). Specifically, emotions are generated in a series of stages that include attending to a situation, giving it a valenced meaning, and producing a loosely coupled set of experiential, behavioral, and physiological responses (Gross 1998b, 2001, 2002). **Figure 1*a*** presents the modal model of emotion generation, which describes in abstract and general terms the stages that constitute the formation of an emotional response.

Although emotions differ in many ways, several features are shared by most emotions. First, emotions are generated when an attended situation is interpreted as being central to one's goals, including personal (e.g., avoid loss), social (e.g., help another individual), and cultural (e.g., support patriotism) goals (see Scherer et al. 2001). Second, emotions involve loosely coupled changes in multiple domains, including subjective experience, behavior, and physiology (Mauss et al. 2005). These multisystem changes can be characterized by describing (*a*) the intensity or the magnitude of the response, (*b*) the duration or the amount of time the response is active, (*c*) the frequency or the number of times the response occurs within a given period, and (*d*) the type or the category of the response (Davidson 1998). Third, emotions are not ballistic entities that must proceed to completion. Instead, they can be adjusted to suit one's needs in a given situation. This feature of emotions allows for their modification or regulation.

Emotion regulation is defined when there is an activation of a goal that recruits one or more processes to influence emotion generation (Gross et al. 2011a,b). The target of this regulatory goal can be to induce a change in the person who experiences the emotion (intrinsic) or to induce a change in someone else (extrinsic), as when parents help their children regulate emotions

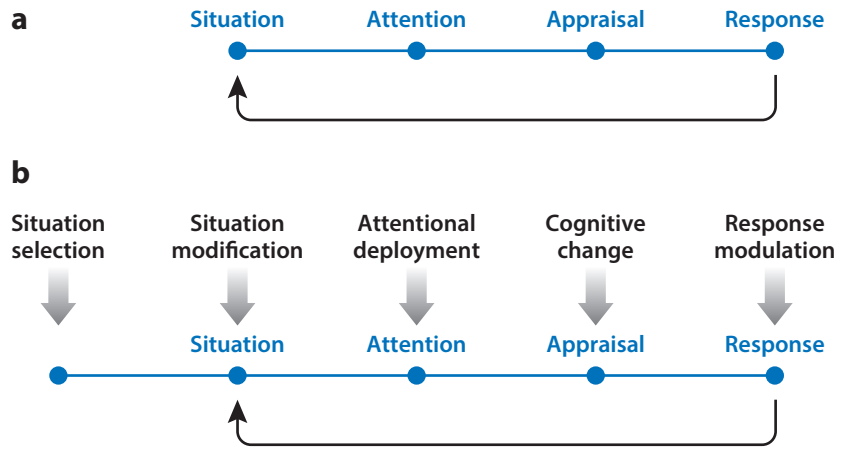

Figure 1

Emotion and emotion regulation. (*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. (*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. Figure adapted with permission from Gross (2014a).

(Macklem 2008). The regulatory goal can promote hedonic motivation to feel less negative or more positive in the short term, or it can promote instrumental motivation such as modifying emotions in ways that promote long-term objectives (Tamir 2009). The regulatory goal can be explicit, involving deliberate and effortful processes, or implicit, involving unconscious and effortless processes (Gyurak et al. 2011). Finally, regulatory goals can aim to decrease (downregulate) or increase (upregulate) facets of emotional responding, such as the intensity, duration, and frequency of a given emotion.

Emotion generation and emotion regulation both operate via systems that share basic features, including the activation of goals. However, the target of these goals differs. The target of emotion generation can be a wide array of internal and/or external outcomes, whereas the target of emotion regulation is always to induce a change in the emotion-generation system (Gross et al. 2011a). In addition, it is assumed that the recruitment of regulatory processes involves, at least to some extent, systems that can be differentiated from emotion generation, and recent technological advances (e.g., connectivity analysis) have begun to show how activated regulatory systems lead to changes in emotional responding (Johnstone & Walter 2014). Although these differences are important, it is often difficult to empirically distinguish between emotion generation and regulation (for a review, see Gross et al. 2011a). This highlights the notion that arguments about emotion regulation—like arguments about all psychological constructs—are inherently probabilistic and contextually defined.

According to the process model of emotion regulation, emotion-regulatory processes can be differentiated by the stage of the emotion-generative process that they primarily target (for reviews, see Gross, 1998, 2001, 2002, 2014a; Gross & Thompson 2007). To make this concept more concrete, in **Figure 1*b*** we highlight five temporal points in the emotion-generative process at which individuals can regulate their emotions; these points correspond to five families of emotion-regulation processes: situation selection, situation modification, attentional deployment, cognitive change, and response modulation.

Situation selection includes efforts to change the complete course of an emotional situation at the earliest stage, such as avoiding situations that may induce emotions upon encounter (Beck & Clark 2009). Situation modification refers to attempting to change external features of a situation, such as shortening the exposure time to emotional situations (Foa & Kozak 1986). Attentional deployment moves from trying to modify external features of the situation to modifying early information processing, such as distracting oneself from the attention-grabbing features of an emotional situation (Sheppes & Gross 2011, 2012; van Dillen & Koole 2007). Cognitive change modifies late semantic-meaning processing, such as reappraising the emotional meaning of a situation in nonemotional terms (Gross 2014a). Finally, response modulation refers to targeting the latest emotional stage with a modification of the experiential, behavioral, and/or physiological components of an activated emotion response, such as expressive suppression that involves inhibiting the behavioral manifestations of an active emotional response tendency (Richards & Gross 1999).

As the field of emotion regulation matures (Gross 2014b, Tamir 2011), conceptual models also need to evolve in order to account for new findings. In the case of emotion regulation, an updated model seems especially needed, given that the field has shown an exponential increase in the number of publications since the formulation of the original process model in 1998 (Gross 1998a, 2014a).

Although the contribution of the process model is clear, it (and most empirical studies that followed) concentrates only on one particular regulation stage—strategy implementation. By implementation we mean the short-term execution of a particular regulation strategy. Recently, it has become clear that it is crucial to identify other important regulatory stages in order to understand the adaptive and maladaptive profiles of emotion regulation (for reviews, see Bonanno & Burton 2013, Gross 2015, Kalisch 2009, Sheppes 2014, Sheppes & Levin 2013, Webb et al. 2012a). However, to date there is no conceptual model that describes central regulatory stages and links them to psychopathology.

To address these and other related issues, in the present review we describe the extended process model of emotion regulation (Gross 2015). We begin by providing the conceptual background, general logic, and basic elements of this model. We then define emotion and several central stages that constitute the extended emotion-regulation process (see also Ochsner & Gross 2014). As we elaborate below, at the heart of each stage is a central emotion-regulation-related decision that needs to be made, and failure points related to these decisions are associated with various forms of psychopathologies. Specifically, regulatory decisions and potential failure points may be related to an initial decision on (*a*) whether or not to regulate (identification), (*b*) which general regulatory category to use (selection), (*c*) which specific regulatory tactic to actively implement (implementation), or (*d*) whether to stop regulating or to switch regulation type following initial implementation (monitoring).

THE EXTENDED PROCESS MODEL OF EMOTION REGULATION: CONCEPTUAL BACKGROUND AND BASIC ELEMENTS

It is widely agreed that the subjective value that organisms give to objects strongly determines their responses to these objects. Accordingly, several influential accounts have offered taxonomies of Valuation systems (Ochsner & Gross 2014, Rangel et al. 2008). Although different types of Valuation systems exist, there is considerable agreement on the core elements that are present in all of them (Gross 2015).

In **Figure 2*a***, "W" refers to the aspect of the World, whether internal or external, that starts a cascade of processes that constitute the Valuation system. "P" refers to Perception, or input of

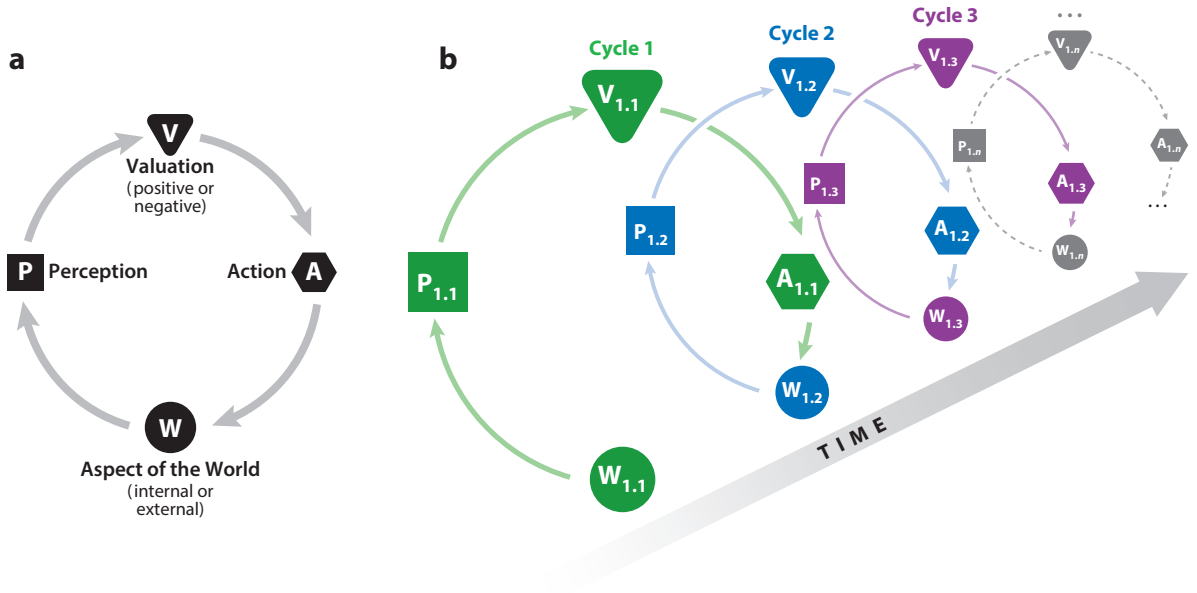

Figure 2

The Valuation process. (*a*) The World (W) gives rise to Perception (P). When valued as either negative or positive, these Valuations (V) give rise to Actions (A) that can alter the state of the World. Emotion is one type of Valuation. (*b*) Valuation takes place over time (see cycles 1, 2, 3, etc.), as shown in this spiral depiction of the Valuation process. See text for a more detailed discussion. Figure adapted with permission from Ochsner & Gross (2014).

the Valuation system, defined as representation of a current state and of a desired goal state in working memory. "V" refers to Valuation, where each state receives a value or weight that is based on the perceived benefits and costs that were formed via past experience and learning mechanisms. Congruent with cybernetic models (for reviews, see Ashford & Cummings 1983, Carver & Scheier 2012), Valuation entails computation of the size of a discrepancy between the current and desired states. If this discrepancy passes a certain threshold, it leads to Action ("A"), or the output unit, that involves translating the product of the Valuation process into an executed Action.

As can be seen in **Figure 2*b***, Valuation systems can be active for an extended period of time, which is manifested in series of World-Perception-Valuation-Action (W-PVA) cycles of a particular Valuation system (Ochsner & Gross 2014). The first cycle triggers the Valuation system with an event in the (internal or external) World that is being perceived, valued, and acted upon. The target of the Action process is the World, and its change (or lack of change) sets a second cycle that is being perceived, valued, and acted upon in subsequent cycles. In **Figure 2*b***, each element has two subscripts, with the latter representing the cycle number.

A related process from repeated cycles of a single Valuation system occurs when the target of one Valuation system is a different Valuation system. In this case, a Valuation system represents a different Valuation system as its input, values it, and forms an Action whose target is to change the initial Valuation system.

This conception of Valuation provides a framework for understanding emotion generation and emotion regulation (Gross 2015, Ochsner & Gross 2014). Starting with emotion generation, the appraisal perspective places a strong emphasis on the construal or Valuation of objects as

meaningful in the formation of emotion (Frijda 1986, Lazarus 1991, Scherer 1984; for a review of other perspectives, see Gross & Barrett 2011). According to this approach, emotion involves a good versus bad (for the organism) Valuation (for a review, see Ochsner & Gross 2014). Additionally, central models of emotion such as the modal model (Gross 1998a) are largely congruent with the aforementioned core elements of Valuation systems. The World refers to an emotion-eliciting situation. Perception refers to selective attention mechanisms that represent the emotional problem space. Valuation refers to appraisal or semantic meaning that is given to the represented emotional situation. Finally, the output refers to the activation of a coordinated set of experiential, behavioral, and physiological processes that constitute an emotional response.

From a Valuation perspective, the relationship between emotion generation and emotion regulation is captured in the interaction between different Valuation systems (see **Figure 3*a*,*b***). Specifically, the output of the first-order (emotion-generation) Valuation system (i.e., the experiential, behavioral, and physiological emotional response tendencies) activates a second-order (emotion-regulation) Valuation system. The emotion-regulation Valuation system perceives, values, and then acts on the emotion-generation Valuation system in an effort to change it. In other words, in emotion regulation, the object of Valuation (i.e., the World) is another Valuation system (i.e., the emotion-generation Valuation system). **Figure 3*b*** illustrates that the interaction between the emotion-generation and emotion-regulation Valuation systems is dynamic and extends over time.

To make this discussion more concrete, consider the following example of a man who is being cut off by another vehicle while driving. A first-order emotion-generation Valuation system is activated when the car that cut him off (i.e., World) is represented in working memory (i.e., Perception) as a current state of threatened self-honor (Cohen et al. 1996, Krahé & Fenske 2002) together with the representation of a conflicting desired state of a restored self-honor. During Valuation, the current state is negatively valued, the desired state is positively valued, and the size of the discrepancy between these two states is calculated. When the magnitude of the discrepancy passes a threshold, a coordinated set of experiential, behavioral, and physiological responses that constitute a road rage response is executed (i.e., Action).

Emotion regulation begins when the evoked emotional response tendencies (i.e., World) activate a second-order emotion-regulation Valuation system (see **Figure 3*a***). Perception involves representing in working memory the current emotional state together with a conflicting desired state of controlling or regulating the rage (e.g., reappraising the other person as having a bad day). Weighting (Valuation) of the current emotional state, the desired regulated state, and their discrepancy is computed. Given the large discrepancy, a regulatory response that involves cognitively changing the emotional appraisal is formed (Action). Importantly, in this case the target of the regulatory Action is the Valuation process of the emotional first-order Valuation system. That is, the reappraisal (e.g., that the other driver had a bad day) is competing with the original appraisal that the other person was being disrespectful.

As can be seen in **Figure 3*b***, the emotional and regulatory Valuation systems are active over time as long as the discrepancy between the current and desired states passes a threshold. In our case, the emotional Valuation system is active as long as the discrepancy between the (usually negative) value given to the threatened self-honor current state and the (usually positive) value given to the restored self-honor desired state passes a threshold. In a similar vein, the regulatory Valuation system is active as long as the discrepancy between the negative value given to the threatened self-honor current state and the positive value given to the desired state to regulate the rage passes a threshold. In the following sections, we further elaborate on the long-term dynamics of these two interacting Valuation systems.

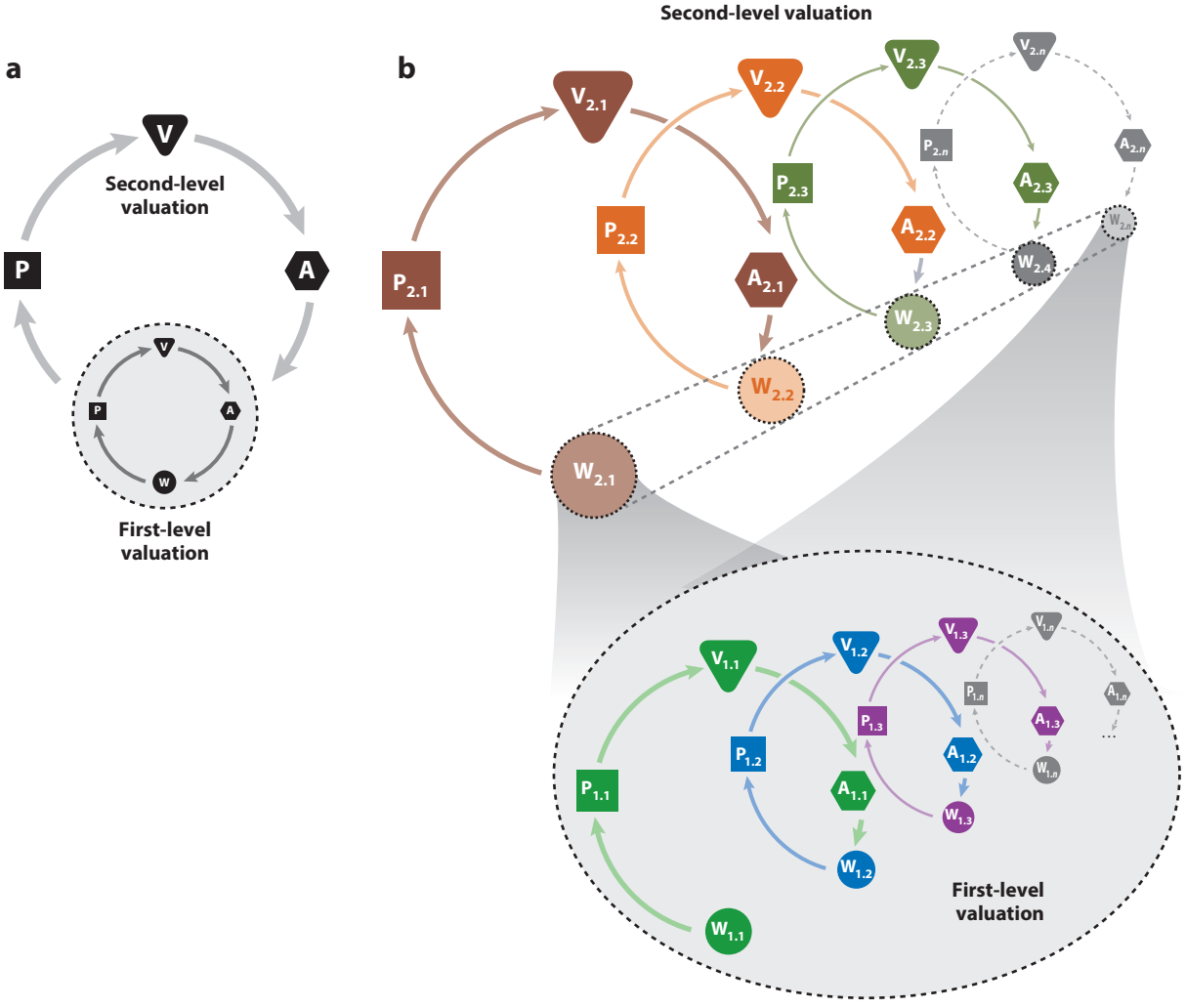

Figure 3

A Valuation perspective on emotion regulation. (*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 World-Perception-Valuation-Action (W-PVA) cycle is itself a Valuation. (*b*) These interacting first- and second-level Valuation systems extend over time. Valuation is indicated by subscripts that begin with the digit "1" (e.g., $W_{1.1}$, $P_{1.1}$) for the emotional Valuation system and with the digit "2" (e.g., $W_{2.1}$, $P_{2.1}$) for the emotion-regulation system. Figure adapted with permission from Gross (2015).

THE EXTENDED PROCESS MODEL OF EMOTION REGULATION: EMOTION-REGULATION STAGES

Up to this point, we have defined in very general terms the emotion-generation and emotion-regulation Valuation systems. We now focus on different stages that constitute emotion regulation. The extended process model of emotion regulation includes three interacting Valuation systems that constitute three regulatory stages (see discussion below and **Figure 4***a*) that entail key regulatory decisions. In addition, the model takes into account different outcomes of the regulatory and emotional Valuation systems iterating across time (see **Figure 5**).

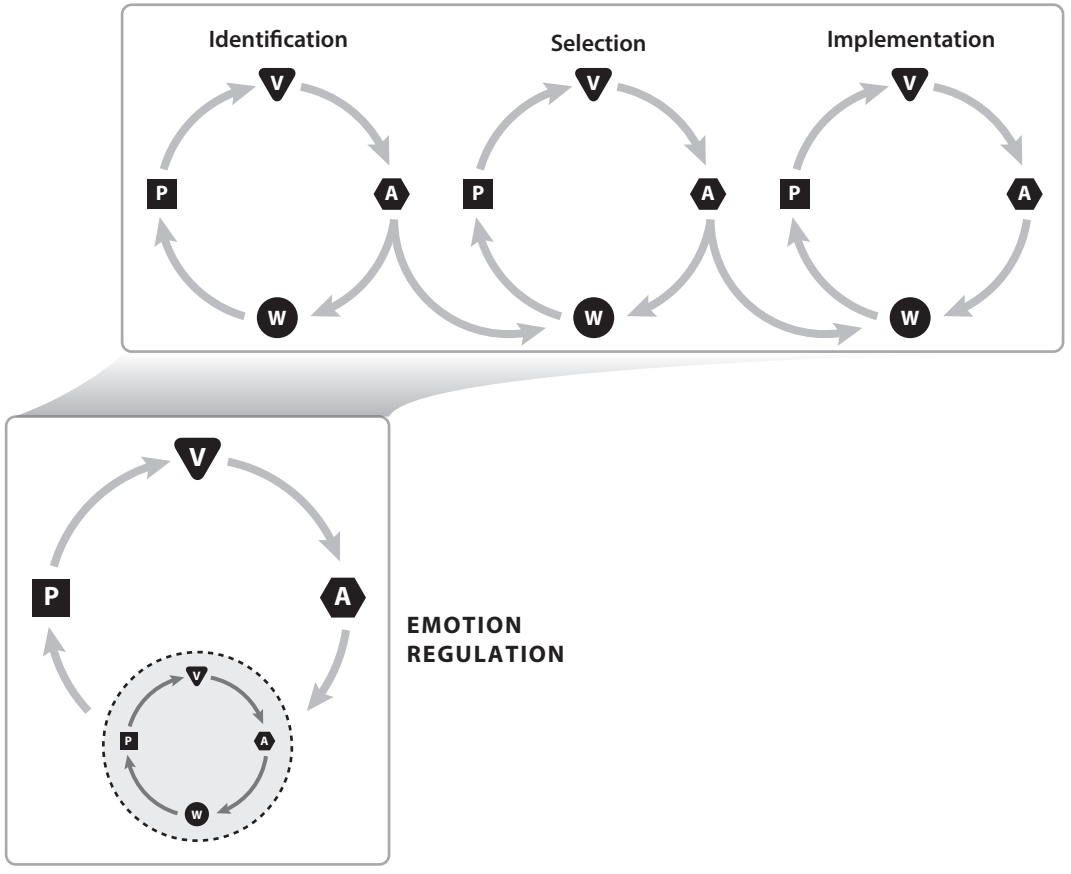

Figure 4

The extended process model of emotion regulation. The model distinguishes three stages of emotion regulation: identification (which entails deciding whether to regulate or not), selection (which entails deciding which strategy to select), and implementation (which entails implementing a tactic). This may change the first-level Valuation system. Figure adapted with permission from Gross (2015).

The regulatory stages include identification, which involves making the very general decision whether to regulate or not; a selection Valuation system, which decides which of currently available general regulatory categories (e.g., attentional deployment, cognitive change) to use; and an implementation Valuation system, which involves deciding which specific regulatory tactic (e.g., distraction within attentional deployment) to activate.

The segmentation of the emotion-regulation process into three major regulatory stages is congruent with two other recent accounts (Bonanno & Burton 2013, Webb et al. 2012a). Specifically, in their thorough review on regulatory flexibility, Bonanno & Burton (2013) highlight central individual-difference variables that relate to three sequential components that broadly correspond with the three regulatory stages. Webb and colleagues (2012a) adopt an Action control perspective to discuss efficient emotion regulation by broadly concentrating on regulatory stages that similarly fit the segmentation of the emotion-regulation process.

Although it is generally congruent, our extended process account is also unique in several important ways. First, the Valuation system perspective allows for unity across regulatory stages, as each of the different stages involves the same basic elements. Second, the basic elements provide

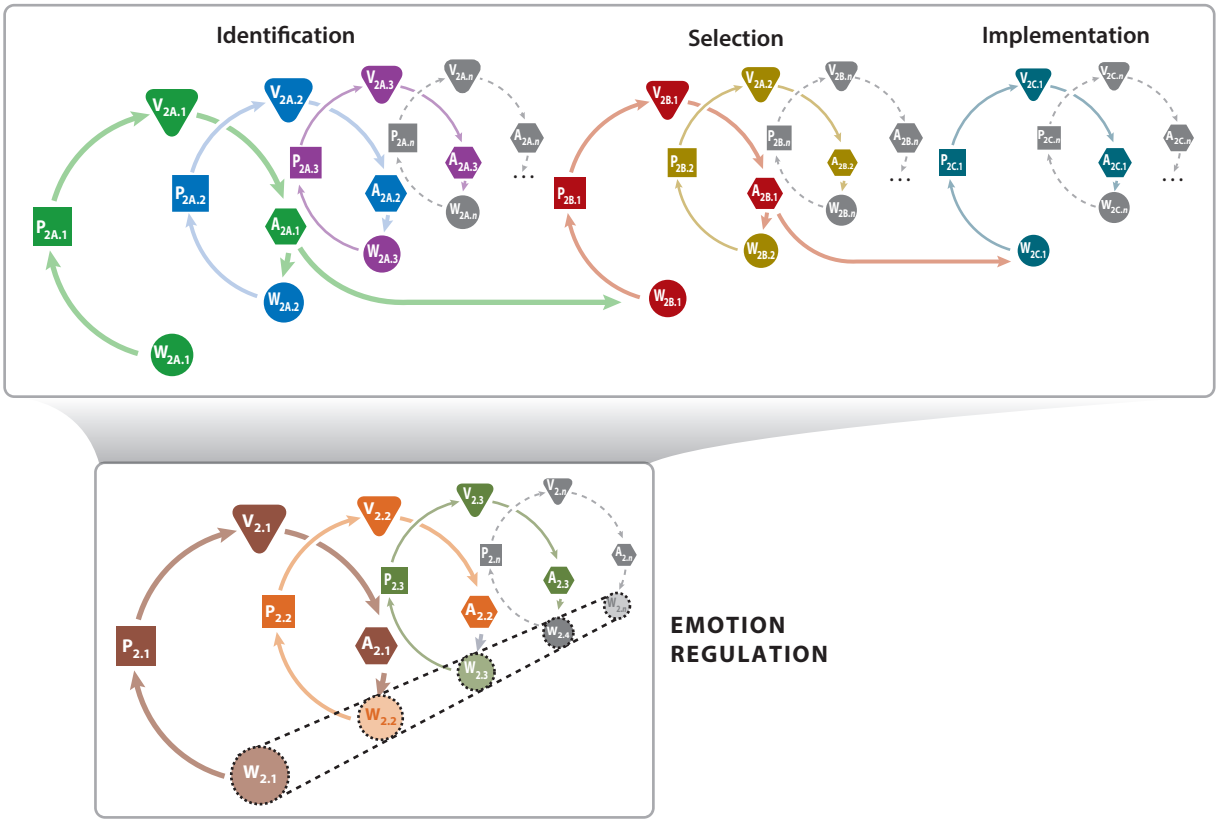

Figure 5

Multiple cycles of the extended process model. These three emotion-regulation stages—identification, selection, and implementation—extend over time and are functionally linked. (See text for details.) Figure adapted with permission from Ochsner (2014a).

more process specificity because they go beyond focusing on general regulatory categories. Third, the framework explains emotion and emotion regulation as well as how these two kinds of Valuation systems interact over time. Most importantly, the framework is the only one that uses this understanding to directly refer to different psychopathologies.

Below, we describe each regulatory stage, providing a detailed explanation of what each stage entails, suggesting a profile of healthy functioning that will later be contrasted with impairments that manifest in psychopathology, and reviewing relevant empirical work. As noted above, the vast majority of studies to date have concentrated on a particular element in implementation, which makes providing a balanced literature review challenging.

The Identification Stage

The identification Valuation system determines whether emotion regulation will occur. The starting point of the identification Valuation system is the activation of the emotion-generation Valuation system (see **Figure 4**). In the Perception step, the active emotional response and the general goal of a regulated emotional response (e.g., intrinsic or extrinsic regulation) are represented. During the Valuation step, the emotional and regulated states receive a value or weight based on perceived benefits and costs that were acquired through past experience. If

regulation is sufficiently positively valued relative to the active emotional response, the general regulation signal is activated and moves to the selection stage, which is elaborated below.

An adaptive identification profile involves adequate W-PVA functioning, which leads to accurate determination of when emotion regulation is required. Specifically, during Perception, the emotional and regulated states should not be over- or underattended, which would bias their representation. Examples of prototypical abilities that relate to adequate representation of one's emotional state and the regulatory state include the attention to the emotion component in emotional awareness (Coffey et al. 2003, Gohm & Clore 2000, Salovey & Meyer 1990), interoceptive awareness of bodily changes related to emotion and regulation (Füstös et al. 2013), differentiation between emotions (Barrett et al. 2001, Kashdan et al. 2014, Lindquist & Barrett 2008), and acquisition of emotional clarity (Gratz & Roemer 2004).

Adaptive Valuation involves assigning accurate values to the emotional and regulated states based on an adequate analysis of the costs and benefits associated with maintaining an emotion versus regulating an emotion. Studies of implicit beliefs of emotion suggest that some individuals view emotions as fixed entities that cannot be changed (Mauss & Tamir 2014, Romero et al. 2014, Tamir et al. 2007). This belief, which was related to the use of fewer regulatory strategies, may be the result of not activating regulation due to negatively valuing a regulated state. Similarly, it has been shown that attitudes (a type of Valuation) toward particular emotions were related to whether people actively regulated these emotions (Harmon-Jones et al. 2011). Negatively valuing particular emotions was related to the use of more regulatory efforts.

Adaptive Action involves being able to transform the Valuation process to an output signal that determines whether or not to regulate. Two recent studies show the strong effect a default option (i.e., a state that occurs if no Action is taken) can have on the persistence of undesired emotion (Suri et al. 2013) and on the lack regulation efforts (Suri et al. 2014). Specifically, an experimental context that involved creating a default option of getting a strong aversive electric shock resulted in few attempts to change the situation, and the creation of a default state of watching intensely negative pictures resulted in very few choices to actively regulate. In addition, more habitual characteristics such as self-efficacy in one's ability to engage in emotion regulation (e.g., Goldin et al. 2009) are important in activating the desire to regulate.

The Selection Stage

The selection Valuation system determines which general regulatory category will be used. The selection Valuation system is activated when the Action unit of the identification Valuation system activates the general need to regulate (see **Figure 4**). During Perception, available general regulatory categories that can be instantiated are represented, such as attentional deployment or other regulatory categories that constitute the five families of emotion regulation (Gross 2014b). During Valuation, the available regulatory categories receive weights based on their perceived benefits and costs that were acquired through past experience. If a particular regulatory category is sufficiently positively valued, the activation of that general regulatory category moves to the implementation stage (elaborated below).

An adaptive Selection profile involves adequate W-PVA functioning that leads to accurate determination of which general regulatory category to use. Specifically, during Perception, a sufficient number of available regulatory categories should be represented. By sufficient we mean that there are not too few regulatory categories or that particular regulatory categories are not overly attended, both of which would result in a rigid representation regarding which regulatory category to use. In their thoughtful review, Bonanno & Burton (2013) describe the adaptive role of repertoire size or the number of strategies individuals report using (see also Aldao &

Nolen-Hoeksema 2013). Although usage does not directly correspond to the Perception stage of selection, we argue that the adequate representation of available strategies is a precondition for the use of strategies. More directly, it was found that the ability to access different regulatory strategies was related to an adaptive response to aversive events (Orcutt et al. 2014).

Adaptive Valuation involves assigning to the different available regulatory categories accurate values that are sensitive to the costs and benefits of each category. Some of our recent work on emotion-regulation choice involves investigating how individuals value and select between different regulation categories when facing differing emotional, cognitive, and motivational contextual variables (Sheppes et al. 2011, 2014). For example, we have shown that an adaptive Valuation profile involves selecting cognitive reappraisal when emotional intensity is low, when cognitive generation is simple, and when long-term relief is sought. By contrast, attentional distraction is preferred when emotional intensity is high, when cognitive generation is complex, and when short-term relief is preferred.

Adaptive Action involves being able to trigger the general regulatory category that was selected. In order to successfully trigger general regulatory categories, intact functioning of its core elements is needed. For example, triggering cognitive regulatory categories (i.e., attentional deployment and cognitive change) requires that basic underlying executive functions such as working memory capacity (Schmeichel et al. 2008), verbal fluency (Gyurak et al. 2009, 2012), and set shifting (McRae et al. 2012) are intact (Hofmann et al. 2012b).

The Implementation Stage

The implementation Valuation system determines which specific regulatory tactic will be used, and its output involves executing the concrete regulatory tactic whose target is to change the emotion-generation Valuation system. The implementation Valuation system is activated when the Action unit of the selection-regulatory Valuation system has triggered a general regulatory category (e.g., cognitive change; see **Figure 4**). During Perception, available regulatory tactics that can be instantiated are represented, such as positive reappraisal, within the selected cognitive change regulatory category. During Valuation, the available regulatory tactics receive weights based on their perceived benefits and costs that were acquired through past experience. If a particular regulatory tactic is sufficiently positively valued, that specific regulatory tactic is activated. Given that this is the last stage of the regulation process, the Action output involves executing a specific regulatory tactic whose target is the emotion-generation Valuation system. For example, an activated positive reappraisal tactic targets change and thus competes with the affective appraisal that was formed in the Valuation step of the emotion-generation Valuation system.

An adaptive implementation profile involves adequate W-PVA functioning, leading to accurate determination of which regulatory tactic to use as well as an ability to execute a regulatory tactic in an effort to change emotion generation. During Perception, a sufficient number of available regulatory tactics should be represented. As with selection, by sufficient we mean that there are not too few (and also not too many) regulatory tactics; an insufficient number would result in a rigid representation of the problem space. A recent study shows that participants report using, and thus by definition are representing, several specific regulatory tactics to control their emotions (McRae et al. 2012).

Adaptive Valuation involves assigning to the different available regulatory tactics accurate values that are sensitive to the costs and benefits associated with each. Empirical findings from the emotion-regulation choice paradigm have shown that healthy individuals value specific regulatory tactics based on central elements such as the degree of emotional processing and cognitive effort

(Sheppes et al. 2014). Specifically, it has been shown that under high emotional intensity, individuals favorably value specific regulatory tactics that do not allow emotional processing even when these tactics require substantial cognitive effort to operate.

Adaptive Action involves being able to trigger the specific regulatory tactic to change the emotion-generation Valuation system. To date, the experimental design of most studies does not allow isolating the activation of specific tactics because the regulatory instructions remain at the general regulatory category level (for a discussion, see McRae et al. 2012). Nevertheless, some studies (e.g., McRae et al. 2012) have isolated the execution of specific regulatory tactics and have shown differential basic operation in terms of neural profile (e.g., Koenigsberg et al. 2009, 2010; Moser et al. 2014; Ochsner et al. 2004) and differential adaptive outcome (for a review, see Kross & Ayduk 2011) for tactics such as distancing relative to self-immersion.

THE EXTENDED PROCESS MODEL OF EMOTION REGULATION: PROCESSING DYNAMICS

Up to this point, we have described the stages that bring emotion regulation into being. Although it is important to understand how emotion regulation emerges, Valuation systems often need to operate over an extended period. The logic of an extended operation of emotion generation and emotion regulation suggests that as long as a certain threshold is passed in the Valuation step, Valuation systems will be actively maintained.

In **Figure 5**, the extended operation of Valuation systems is illustrated in multiple cycles of continued activation. More specifically, sufficient positive Valuation of a general need to regulate will result in continued operation of the identification system. Sufficient positive Valuation of a general regulatory category will result in continued operation of the selection system. Sufficient positive Valuation of a specific regulatory tactic will result in continued operation of the implementation system and continued execution of a specific regulatory tactic. To date, only a few papers have empirically isolated the extended operation of emotion regulation from its initial activation (e.g., Paret et al. 2011; for a review and meta-analysis, see Kalisch 2009).

Besides continued activation over an extended period of time, regulatory Valuation systems may also need to be adjusted or stopped. A need for adjustment or emotion-regulation switching refers to a situation in which an initial implementation of a specific regulatory tactic in the first cycle is followed in subsequent cycles by a Valuation change in the selection or implementation systems. Implementation of an initial regulatory tactic does not sufficiently change the discrepancy between the current and desired states of an emotion Valuation system, which maintains the emotion. In addition, the discrepancy in identification is maintained, which passes the general goal to continue regulating. By contrast, either in selection or in implementation the positive value of the original regulatory category or tactic is changed in such a way that a different regulatory category or tactic receives a higher value. For example, if during the first cycle, cognitive change received the highest value, in a subsequent cycle a different regulatory category, such as attentional deployment, might receive a higher value. Note that the new regulatory category needs to receive a sufficiently positive value in order to pass a threshold for continued regulatory effort in subsequent cycles.

A need for stopping the operation of regulatory Valuation systems is also important. Emotion-regulation stopping refers to a situation in which an initial implementation of a specific regulatory tactic in the first cycle is followed in subsequent cycles by a Valuation change in the emotion-generation or identification Valuation systems. Implementation of an initial regulatory tactic may be successful at changing the discrepancy between the current and desired states of an emotion-generation Valuation system. For example, launching a reappraisal (e.g., the person who cut me

off on the road had a bad day) might successfully change the value given to a desired state (e.g., restored self-honor) of the emotion-generation system (e.g., anger) in a way that reduces the basic discrepancy of the emotion system.

Emotion-regulation stopping is also an option when an initial regulatory tactic that was implemented does not change the discrepancy of an emotion-generation Valuation system, but the discrepancy of the identification stage changes. In this case, the unchanged emotion-generation system activates the identification system, but during identification the negative Valuation of the current emotional state or the positive Valuation of the regulated desired state is no longer sufficiently high, and the goal to regulate is no longer supported. For example, an implemented reappraisal tactic (e.g., the driver who cut me off is having a bad day) does not change the negative Valuation of the current state (e.g., threatened self-honor) or the positive Valuation of the desired state (e.g., restored self-honor) of the emotion Valuation system. Anger is therefore maintained, which activates identification. However, during identification the value for the desired regulated state (e.g., engaging in intrinsic self-regulation) is less positively valued, and, given that it no longer passes a threshold, the goal to regulate is not passed to selection.

An adaptive monitoring profile requires processing dynamics that correctly identify when active operating regulation systems need to be switched or stopped. Switching and stopping of emotion-regulation efforts should occur when existing regulatory Actions have operated for an adequate number of cycles (i.e., amount of time), and yet this has not been found to yield an intended change in the emotion-generation system. For example, if three cycles are needed for evaluating whether a particular regulatory tactic can change the basic discrepancy of the emotion-generation system, then three cycles should occur without a change in any of the regulation stages (i.e., identification, selection, and implementation). Accordingly, switching or stopping existing regulatory efforts before three cycles have been completed, or not switching or stopping existing regulatory efforts after three cycles have passed, would be considered nonadaptive in this case, as is elaborated below. To date, we are aware of only one study that investigated the consequences of adaptive strategy switching (Kato 2012). This study developed a questionnaire to measure the willingness to implement a different regulatory strategy when an existing implementation of regulation fails. This ability in strategy switching was related to healthy functioning.

EMOTION REGULATION AND PSYCHOPATHOLOGY

In the following sections, we describe potential emotion-regulation failure points that can occur in each of the three basic elements (i.e., Perception, Valuation, and Action) that constitute the three major regulatory stages (i.e., identification, selection, and implementation). We also identify potential failure points that relate to processing dynamics (see **Table 1**).

Our review of potential regulatory failure points is not meant to be exhaustive. Instead, our goal is to broaden the field's current focus on just one specific element (i.e., Action) of one regulatory stage (i.e., implementation). To achieve this goal, we describe clinical conditions that are associated with each regulatory stage. We acknowledge that our analysis in many cases rests on theoretical considerations rather than empirical findings. Also, we use the term clinical condition in a general way to refer to clinical symptoms, syndromes, or disorders. Importantly, clinical conditions are not necessarily characterized by difficulties at a single emotion-regulation stage. Rather, a clinical condition may involve failures at multiple stages. At the same time, a clinical condition that is associated with difficulties in one emotion-regulation stage may not be related to difficulties in another regulation stage.

Table 1 The extended process model of emotion regulation and psychopathology[1]

Regulatory stages and dynamics	Regulatory element	Clinical condition and description
Identification	Perception	**Panic attacks:** overrepresenting subtle signs of current emotional states **Disengagement bias in anxiety:** overrepresenting threatening information for an extended time **Alexithymia:** underrepresenting emotional states
	Valuation	**Experiential avoidance:** overvaluating the costs of emotional states **Clinging behavior in dependent personality disorder:** undervaluating the benefits of intrinsic regulation
	Action	**Learned helplessness in depression:** failing to translate a general regulatory goal into action
Selection	Perception	**Escape from self in binge eating and suicide behavior:** overrepresenting maladaptive regulatory options
	Valuation	**Nonsuicidal self-injury and substance abuse:** positively valuing general maladaptive regulatory categories
	Action	**Cognitive change in autism:** impaired ability to activate general adaptive regulatory categories
Implementation	Perception	**Long-term tactics in ADHD:** underrepresenting adaptive regulatory tactics
	Valuation	**Worry in GAD:** positively valuing maladaptive regulatory tactics
	Action	**Positive distraction in major depression:** impaired ability to activate adaptive regulatory tactics
Monitoring	Stopping	**Rumination in depression:** stopping a maladaptive regulatory tactic too late **Low regulatory self-efficacy in SAD:** stopping an adaptive regulatory tactic too early
	Switching	**Depression, anxiety, and OCPD:** switching from an inefficient implemented tactic too late **Manic states in bipolar disorder:** switching between regulatory categories too early

[1]A summary of clinical conditions that represent potential impairments in specific elements of regulatory stages according to the extended process model of emotion regulation. Examples of clinical conditions are not necessarily characterized by difficulties at a single emotion-regulation stage. Rather, each clinical condition may involve failures at multiple stages (see text for details). Abbreviations: ADHD, attention-deficit/hyperactivity disorder; GAD, generalized anxiety disorder; OCPD, obsessive-compulsive personality disorder; SAD, social anxiety disorder.

Identification-Stage Difficulties

Because the identification Valuation system is a second-order system that perceives, values, and acts on an active first-order emotion-generation Valuation system, clinical conditions associated with identification are not related to failures at generating emotions. Instead, a failure at one or more of the identification steps leads to problems in initiating emotion regulation (for a general neural framework that is congruent with the emotion-regulation choice account, see Auppperle & Paulus 2010).

A failure in the Perception step involves misrepresenting the current state of an active emotional response or misrepresenting the desired state of a regulated emotion. In general, representation failures could be of two types: overrepresentation or underrepresentation. An example of overrepresentation of emotional events is featured in panic attacks that, when unexpected and recurrent, develop into a panic disorder (Am. Psychiatr. Assoc. 2013). Panic attacks involve several interrelated elements, but one prominent feature involves overrepresenting subtle signs (usually cognitive or bodily) of a current emotional state (McNally 2002, Olatunji et al. 2007, Schmidt et al. 1997; for

a critique, see De Berardis et al. 2007). This overrepresentation element of the current emotional state can yield increased regulatory efforts that may be unnecessary, costly, and maladaptive. A second example of overrepresentation is attentional disengagement biases in anxiety disorders (for a review, see Bar Haim et al. 2007). Although there is debate as to which specific type of attentional bias is impaired in anxiety (Sheppes et al. 2013), there is a general agreement that two central attentional biases exist. An engagement bias refers to a rapid process of orientating attention toward threat, which can be seen as a manifestation of emotion generation. By contrast, the disengagement bias refers to a delayed withdrawal of attention from threat following initial engagement, and it has been linked to emotion regulation. Specifically, the disengagement bias has been associated with failing to control attention, resulting in sustained engagement with threat. This sustained engagement involves, among other things, overly representing threatening information associated with the current emotional state (for a review, see Cisler & Koster 2010). A possible example of underrepresentation impairment is apparent in alexithymia. As characterized by Vorst & Bermond (2000), the cognitive dimension of alexithymia, which starts with difficulties in identifying emotions, is likely to result in underattending the current emotional state. Indeed, recent evidence has convincingly showed that alexithymia is associated with lower activation in neural networks that are associated with emotional attention and recognition (van der Velde et al. 2014).

A failure in the Valuation element involves erroneous analysis of the costs and benefits associated with maintaining an emotion (i.e., the current state) versus regulating an emotion (i.e., the desired state). An example of overly valuing the costs of the emotional current state is evident in experiential avoidance (Hayes 1994). Experiential avoidance involves several interrelated elements, including disproportionate negative Valuations of negative emotions, that, together with positive Valuation of particular efforts to escape emotions, can lead to passing the threshold to activate regulation when it is not warranted (Kashdan et al. 2006). An example of insufficiently valuing the benefits of general regulatory states that may be adaptive is evident in dependent personality disorder (Am. Psychiatr. Assoc. 2013). Specifically, the "clinging behavior profile" in this disorder, which involves excessive need to be taken care of (Livesley et al. 1990), may be seen as insufficiently valuing the general need for intrinsic regulation. More generally, the concept of ego-syntonic personality disorder (Hirschfeld 1993), which involves maladaptive behaviors and feelings that are congruent with one's ideal self-image, may be viewed as positively valuing an emotional state (e.g., goal-directed instrumental aggression in antisocial personality disorder; Blair 2001) that may lead to reduced tendencies to alter these behaviors via regulation.

Difficulties in the Action step lead to problems with transforming the size of the sufficiently negative value of an emotional state or of the sufficiently positive value of a regulated state to an output signal. One example of an Action failure is learned helplessness in depression (Abramson et al. 1978). Although the impairment in learned helplessness is not exclusively related to Action (i.e., it has a strong attribution/valuation component), the depressive episode can be maintained and prolonged by not transforming into an Action the sufficiently high negative value given to the depressed current state or the sufficiently high positive value given to the desired regulated state.

Selection-Stage Difficulties

Once the general goal to regulate has been activated, the three central elements (i.e., Perception, Valuation, and Action) that constitute the selection Valuation system determine which general regulatory category will be used. Accordingly, failures in each element can be associated with clinical conditions.

A Perception failure involves misrepresenting available general regulatory categories. One such failure involves underrepresentation of available regulatory categories that need to be selected. An

influential account that has direct bearings on underrepresentation of general regulatory mechanisms is escape theory, which has been utilized to explain suicidal behavior (Baumeister 1990) and binge eating (Heatherton & Baumeister 1991). Specifically, the starting point of escape theory is aversive states of self-awareness that are unbearable. Importantly for our focus, this aversive state results in attentional narrowing or limited representation of extreme regulatory options (i.e., suicide and binge eating) that maximize immediate proximal goals of escaping self-awareness (Watkins 2011).

A Valuation problem involves erroneous analysis of the costs and benefits associated with different regulatory categories. One example that is a "cousin" of the aforementioned suicide concept is nonsuicidal self-injury. Seminal work by Matthew Nock (2009, 2010) provides insights regarding the characteristics and functions of self-harm. Central to our presentation, one reason why nonsuicidal self-injury occurs is that some people identify with it (Nock & Banaji 2007) and positively value self-injury as an effective way to regulate aversive emotions and social situations (see also McKenzie & Gross 2014). A strong positive Valuation can pass the threshold needed for its selection. Somewhat similarly, high explicit positive expected value of alcohol drinking and a decrease in negative emotions is related to its selection for regulation (for a review, see Cooper et al. 1995, Kober 2014).

An Action problem refers to impairments in triggering the general regulatory category that was selected. Autism (like most other disorders) involves multiple interrelated emotion-generative and emotion-regulatory impairments; however, autism spectrum disorders are an example of a generally impaired underlying ability to activate forms of cognitive change regulation. Specifically, cognitive change regulation strategies involve adopting an alternative point of view on emotional appraisals (Gross 2014b), and these strategies require abilities such as perspective taking and theory of mind, which are impaired in autism spectrum disorders. Recent studies have shown that relative to healthy controls, autistic adolescents less spontaneously select, and show difficulties with triggering, cognitive reappraisal strategies, even when prompted (Samson et al. 2012, 2014).

Implementation-Stage Difficulties

Once the general regulatory category has been selected, the three central elements (Perception, Valuation, and Action) that constitute the implementation Valuation system determine which specific regulatory tactic will be used. The selected tactic is then executed, with the aim of changing the emotion-generation Valuation system.

A Perception failure involves misrepresenting available specific regulatory tactics. One type of underrepresentation of regulatory tactics is apparent in attention-deficit/hyperactivity disorder (ADHD) (Barkley 1997, Musser et al. 2011). The core attentional deficits of this disorder involve, among other things, an impaired ability to focus on courses of action that offer long-term benefits relative to courses of actions that offer immediate return (Barkley et al. 2001). Interestingly, this temporal discounting element has been also described within the context of emotion regulation (for a review, see Barkley 1997). Specifically, individuals with ADHD show impairments that may involve misrepresenting regulatory tactics whose profile features long-term benefits despite short-term costs.

A Valuation problem refers to erroneous analyses of the costs and benefits associated with specific regulatory tactics. One example relates to worry, which is an attentional deployment tactic that involves repetitive negative thinking that aims to temporarily avoid negative experiences (Borkovec & Roemer 1995) in generalized anxiety disorder. Studies indicate that people with generalized anxiety disorder show positive and negative values for worry that strongly relate to applying worry (Penney et al. 2013). Positive values include viewing worry as productive, beneficial,

and indicative of good character (Dugas & Koerner 2005), and negative values include the notion that worry is uncontrollable (Wells 2005). It appears that both of these types of values can result in actively (due to positive values) or passively (due to negative values) implementing worry as a regulatory tactic.

An Action problem refers to impairments in triggering a specific regulatory tactic that was selected. As mentioned above, most of the studies in the field of emotion regulation have examined impairments in specific regulatory tactics in various clinical populations (for reviews, see Aldao et al. 2010, Berking & Wupperman 2012, Gross & Jazaieri 2014, Kring & Sloan 2009, Taylor & Liberzon 2007). In contrast to these studies, which concentrated on showing that numerous regulatory tactics are impaired in psychopathologies, we direct attention to a more diverse and balanced profile that involves islands of intact regulatory tactics in seas of impairments. Specifically, we take major depression as a test case for demonstrating a complex regulatory tactic profile (for a review, see Joormann & Vanderlind 2014). Two studies have shown that the execution of the tactic of recalling happy memories to repair sad mood is impaired in depressed individuals and this impairment persists even after recovery (Joormann & Siemer 2004, Joormann et al. 2007). The same two studies have also shown that depressed individuals and healthy controls were equally effective in activating a different tactic that involves distraction via neutral thoughts. Relatedly, although numerous studies have shown that analyzing negative emotions via the regulatory tactic of rumination is highly associated with depressive symptoms (Nolen-Hoeksema et al. 2008), a recent study showed that a slightly different regulatory tactic that involves analyzing negative emotions from a third-person perspective is intact in depressed individuals (Kross et al. 2012).

Processing-Dynamics Difficulties

Valuation systems often need to be active for extended periods of time, and at some point, modifications of two kinds may need to occur. Switching emotion regulation involves changing an implemented regulatory tactic with a different regulatory category or tactic. Stopping emotion regulation involves ending the operation of an implemented regulatory tactic. Switching and stopping emotion-regulation efforts should occur when existing implemented regulatory Actions have operated for an adequate number of cycles (i.e., amount of time), either yielding desired alterations in the emotion-generation Valuation system or without yielding an intended change in the emotion-generation system. Accordingly, failure points can be related to switching and stopping that occur too early or too late.

The first type of failure point in processing dynamics is emotion-regulation switching. Switching regulation too late means that although an implemented regulatory tactic is ineffective in changing emotion generation, the tactic is not altered. Accordingly, a recent study by Kato (2012) has developed a self-report scale that measures the ability to discontinue an ineffective regulation tactic and produce and implement an alternative regulation strategy. This ability was related negatively to several forms of psychopathology including depression, anxiety, and general distress. In addition, rigidity in thinking—as seen in obsessive-compulsive personality disorder (Mancebo et al. 2005)—can also be related to impairments in switching from strategies that do not seem to work.

Switching regulation too early means that although an implemented regulatory tactic might have been effective had it been active longer, the tactic was altered. In general, any clinical condition that revolves around instability or inconsistency in thinking and behaving may involve premature regulation switching. For example, manic states in bipolar disorder have been consistently linked with emotion-regulation impairments (Gruber 2011a,b). Mania involves having racing thoughts, jumping from topic to topic, and being easily distracted, all of which are symptoms that can interfere with actively maintaining an existing regulatory strategy without constantly changing it.

The second type of failure point in processing dynamics is emotion-regulation stopping. Stopping regulation too late means that despite the fact that an implemented tactic has operated for a sufficient time without effecting a change in emotion generation, the tactic is not ended. A useful example is that of rumination, which is highly correlated with dysphoria and depression (Nolen-Hoeksema et al. 2008). Rumination starts when individuals try to make sense of negative events that have happened to them. In many cases, rumination proves to be ineffective in reducing negative emotions, not to mention also being very cognitively demanding and draining (Watkins 2008). The situation of an implemented tactic that does not work together with a condition of depleted resources (that may not allow switching to a different tactic) may dictate the need to stop rumination. If rumination does not stop, it is even more likely to continue ineffectively. Indeed, a recent study showed that initial implemented rumination can be dissociated from persistent rumination (i.e., rumination that was not stopped), with each rumination type explaining a unique variance in dysphoria (Grafton & MacLeod 2013).

Stopping regulation too early means that despite the fact that an implemented tactic can potentially make a change in emotion generation if given more time, regulation is ended. One condition that can lead to premature stopping is the low emotion-regulation self-efficacy in social anxiety (Goldin et al. 2013a). In general, it has been shown that low-regulation self-efficacy—that is, the belief that one is not able to successfully employ an emotion-regulatory strategy or tactic when necessary—is associated with social anxiety symptoms, including poor performance in evaluative and social contexts (Rodebaugh 2006), greater symptom severity, and dysfunctional coping (Thomasson & Psouni 2010). Cognitive reappraisal self-efficacy is important for our present focus because it has been shown to be reduced in socially anxious individuals (Goldin et al. 2009) and to mediate the effects of treatment on symptom reduction (Goldin et al. 2013b). Although it has not been directly shown, low emotion-regulation self-efficacy may lead individuals to believe that strategies such as reappraisal cannot bring change, which may result in premature stopping of emotion-regulation efforts.

IMPLICATIONS AND DIRECTIONS FOR FUTURE RESEARCH

The process model of emotion regulation (Gross 2014b) focuses attention on five families of emotion-regulatory processes. This emphasis on implementation has provided insights about underlying processes, about clinical assessment of emotion-regulation impairments in psychopathologies, and about clinical interventions that target the improvement of emotion-regulation skills (for systematic coverage, see Gross 2014b).

However, an exclusive focus on the implementation stage obscures the central role of other important regulatory stages. To fill this gap, the extended process model of emotion regulation broadens the focus by describing other important regulatory stages and their core underlying elements. In this section, we delineate key implications of the model and directions for future research in basic processes, assessment, and intervention.

Basic Processes

At present, there is relatively modest empirical support for the extended process model of emotion regulation. In general, the empirical evaluation of basic processes of the model requires assessing the three basic elements (Perception, Valuation, and Action) as they process different types of information in the three regulatory stages.

The basic elements of the Valuation xsystem are cognitive functions that are well researched within theories of information processing (Hübner et al. 2010). This research makes it possible

to utilize insights from neighboring cognitive fields for the study of emotion regulation. For example, Perception, which involves representation of the problem space, is carried out with processes including sensory and short-term storage as well as early, selective attention-filtering mechanisms that dictate which stimuli will remain in an active state. Valuation, which includes assigning weights to courses of actions, is carried out with processes that rely on more advanced semantic processing as well as on response selection. Action, which involves executing a selected course of action, depends on translating the product of the Valuation process using processes such as response execution. In addition, the fact that the three different regulatory stages depend upon the same three basic elements makes it possible to examine commonalities of problems across stages as well as core underlying mechanisms associated with functioning and malfunctioning.

Although the different information that is being processed varies between regulatory stages, it is well defined by the decision context of regulatory stages. For example, in the identification regulatory stage, the information that is being processed by Perception, Valuation, and Action relates to whether regulation should or should not occur; in the selection regulatory stage, the information processed relates to which of available regulatory options to choose.

Accordingly, paradigms that take into account the combined evaluation of basic elements that process information that is relevant for a particular regulatory stage can provide direct empirical tests of the extended process model of emotion regulation. To give one example, the emotion-regulation choice paradigm tested emotional, cognitive, and motivational factors that influence how individuals select between two major cognitive regulatory categories (Sheppes et al. 2011, 2014). This paradigm isolates the Valuation element in the selection regulatory stage by examining how differential weights to different regulatory categories are assigned, based on information about strategies' costs and benefits.

Because the empirical translation of all stages of the framework seems straightforward, future studies should transcend the exclusive focus on one element (e.g., Action) of one regulatory stage (e.g., implementation) by examining various elements of different regulatory stages.

Clinical Assessment

The extended process model has important implications for clinical assessment because it moves from a categorical description of mental disorders to a transdiagnostic approach (Insel et al. 2010). Specifically, the process conception is largely congruent with the three major objectives of the Research Domain Criteria (RDoC) project (Insel et al. 2010). First, each of the three basic elements that constitute the different Valuation systems can be viewed as a dimension or construct, whose operation can be impaired to different degrees. Second, the model does not attempt to isolate emotion-regulatory impairments at the level of entire clinical disorders; rather, it explains how impairment in basic functioning of different regulatory systems links to different clinical conditions. Third, the well-defined elements of Valuation systems have already been investigated via multiple units of analysis that cut across different experimental methods (for proceedings of RDoC workshops, see NIMH 2010).

Accordingly, future studies should consider enhancing assessment procedures. In addition to focusing on emotion-regulation impairments in categorical clinical disorders (e.g., dysregulation in anxiety disorders, Campbell-Sills et al. 2014; dysregulation in mood disorders, Joormann & Siemer 2014; dysregulation in substance use disorders, Kober 2014), studies should also examine how an impairment in a basic element of a specific regulatory stage (e.g., impairments in the Perception element of the identification stage) is associated with clinically relevant phenomena. It is our hope that the accumulating empirical findings that bear on the extended process model will make it possible for the concept of emotion regulation to have a formal row in the RDoC.

Clinical Intervention

It has already been suggested that in classical treatments, such as cognitive-behavioral therapy (Butler et al. 2006), a central mechanism of change is emotion regulation (for reviews, see Campbell-Sills & Barlow 2007, Hofmann et al. 2012a). However, as was mentioned above, classical treatments have mainly focused on interventions that improve the execution (i.e., activation) of regulatory tactic implementation.

Application of the extended process model to intervention involves forming treatment protocols that focus on improving the functioning of basic elements associated with various regulatory stages. Fortunately, recent interventions seem to have moved a step in a direction that is congruent with the conceptual logic of the extended process model. Consider first the novel attentional bias modification (ABM) treatment (for reviews, see Grafton & MacLeod 2014, Hakamata et al. 2010). In this intervention, patients with various anxiety disorders undergo a general computerized training protocol that modifies their attentional biases to threat, a modification that has been associated with a decrease in clinical symptoms. In the language of the extended process model, ABM has a very specific target, namely the Perception step of the identification stage, with the goal of reducing the overrepresentation of threatening information associated with the current emotional state. In addition, this intervention, which targets a very basic element in a regulatory stage, has been proven to be effective in the treatment of several different anxiety disorders that likely share an underlying regulatory impairment.

A number of other interventions, such as emotion regulation therapy (Mennin & Fresco 2014) and dialectical behavioral therapy (Neacsiu et al. 2014), involve improving basic regulatory elements in specific clinical disorders. Here we focus on affect regulation training (ART) (for a review, see Berking & Schwartz 2014), which systematically targets basic elements of several regulatory stages across various clinical conditions. In brief, ART involves multiple skills including the analysis of one's emotions, which is strongly related to the identification regulatory stage. Emotion analysis includes attending emotions as well as needs, goals, and desires (i.e., Perception) and listing the advantages and disadvantages of emotions (i.e., Valuation), which may lead to another skill, termed emotion modification (i.e., Action). Modifying emotions involves a mixture of skills that tap into the selection and implementation stages as well as processing dynamics. Specifically, selection targets involve brainstorming ways to modify emotions (i.e., Perception), selecting the most promising option (i.e., Valuation), and then putting a chosen strategy into practice (i.e., Implementation). Interestingly, the protocol also involves working on ways to deal with unsuccessful modification attempts (i.e., processing dynamics), which include "try other strategies" (i.e., strategy switching) and "change the target of regulation or accept and tolerate" (i.e., strategy stopping).

Despite the preliminary support for the effectiveness of interventions that target different regulatory stages, future studies should further examine at least two concrete avenues. First, future studies should evaluate the pros and cons of using single-mechanism interventions such as ABM versus multimechanism interventions such as ART. Single-mechanism interventions allow for better isolation of underlying mechanisms of change, and they may be easier to implement. However, it is possible that single-mechanism interventions will prove inferior to multimechanism treatments for psychopathologies that include multiple regulatory impairments. In that respect, isolating better regulatory impairments in psychopathologies may help to better tailor multimechanism interventions and to increase their efficacy.

Second, although there are novel interventions that target improving regulatory skills among individuals with psychopathologies, future studies can apply a preventive approach that improves regulatory skills prior to the onset of clinical symptoms. For example, a recent study showed that among middle school adolescents, implicit beliefs in the ability to change emotions (i.e., the

Valuation element of identification) predicted subsequent depressive levels (Romero et al. 2014). Given impressive evidence for the efficacy of early interventions that target a change in implicit beliefs in domains other than emotions, future studies should examine the efficacy of a preventive intervention in the domain of emotion regulation.

CONCLUDING COMMENTS

Emotional problems receive a great deal of attention because of their high prevalence in various clinical conditions. Recent efforts to explain their cause have focused on impairments in the ability to implement strategies to control or regulate emotions. These efforts are clearly important, but they tend to overlook two main issues. First, emotional problems may be the result of impairments associated with how emotions are generated rather than impairments associated with how emotions are regulated. Second, of the emotional problems that are associated with regulatory impairments, only a subset are due to implementation. To address these shortcomings, in this review we adopted a Valuation approach that includes basic and well-defined elements in order to describe emotion generation and its relations to emotion-regulatory stages. These regulatory stages include identification of the need to regulate, selection among available regulatory options, implementation of a specific selected regulatory tactic, and monitoring of implemented regulatory tactics across time. This extended process model of emotion regulation illuminates specific regulatory impairments and also suggests future directions for basic research, assessment, and intervention.

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