

Regulation of Emotions Under Stress

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Abstract

Stressful life events (SLEs) are frequently associated with a range of deleterious mental and physical health outcomes. However, some individuals exhibit resilience, defined as maintained or even improved health in the wake of SLEs. How and why might this be the case? Given that SLEs give rise to negative emotions, which in turn contribute to mental and physical illness, promising answers to questions about resilience lie in research on people's ability to manage their emotions, or, emotion regulation. This essay focuses on emerging empirical evidence that suggests that two seemingly opposite emotion regulation strategies, cognitive reappraisal and emotional acceptance, are particularly effective for managing negative emotions, which, in turn, may confer resilience. By integrating theory with extant empirical evidence, we offer a model that aims to reconcile how these two strategies—one that involves minimizing emotions (cognitive reappraisal) and the other that involves engaging with emotions (emotional acceptance)—are each associated with resilience. Specifically, we propose that these strategies are not contradictory, but rather complementary. We additionally discuss broader implications for the links among stress, emotion regulation, and health, as well as key issues for future research at the intersection of social and clinical psychology, medicine, and public health.

INTRODUCTION

Decades of research have shown that the experience of chronic or unusually high levels of stress leads to deleterious mental and physical health outcomes (McEwen & Steller, 1993). Despite these well-known negative effects of stress, some basic questions remain about the relationship between stress and health. For example, how can we prevent or alleviate stress' negative effects? In addition, why do some people exhibit resilience, defined as maintained or even improved health in the wake of stress?

Stress can be conceptualized as a number of different phenomena, including daily hassles, chronic stress, and stressful life events (SLEs), each of which can affect health differently. We focus here on SLEs because: (i) they are common; (ii) they can have detrimental effects on mental and physical health; and (iii) they frequently have a distinct onset and duration (Kendler,

Karkowski, & Prescott, 1999). SLEs are defined as unexpected, significant, and negative events (Tennant, 2002). Given that SLEs give rise to an array of negative emotional experiences, promising answers to questions about resilience lie in research on how people manage their emotions, or, emotion regulation. Although emotions can serve important functions such as facilitating interpersonal interactions and signaling need for action to be taken (Keltner & Gross, 1999), excessive negative emotions, in particular, may be implicated in many of the ill effects of SLEs (Feldman, Cohen, Lepore, Matthews, Kamarck, & Marsland, 1999). Thus, there may be no greater need for emotion regulation than in the face of SLEs when negative emotions run high.

Broadly, the aim of this essay is to present a model whereby emotion regulation breaks the link between SLEs and negative outcomes by modulating the experience of negative emotions, a key mechanism in the relationship between SLEs and poor health outcomes. Specifically, this review will focus on emerging empirical evidence that suggests that two seemingly opposite emotion regulation strategies, cognitive reappraisal and emotional acceptance, are particularly effective for mitigating the negative effects of SLEs. By integrating theory with extant empirical evidence, we offer a model that aims to reconcile how these two strategies—one that involves minimizing emotions (cognitive reappraisal), and the other that involves engaging with emotions (emotional acceptance)—are both associated with resilience. We additionally discuss broader implications for the links among stress, emotion regulation, and health, as well as key issues for future research at the intersection of social and clinical psychology, medicine, and public health.

FOUNDATIONAL RESEARCH

STRESS

We are all bound to encounter SLEs over a lifetime—from major events such as the death of a loved one or divorce to more minor events such as interpersonal conflicts. SLEs are not only ubiquitous and unpleasant; they also cause a wide range of potentially debilitating mental and physical health outcomes including: anxiety (Finlay-Jones & Brown, 1981), depression (Kendler *et al.*, 1999), obesity (Torres & Nowson, 2007), hypertension (Spruill, 2010), and infectious diseases (Leserman *et al.*, 2000). Despite the alarming negative effects of SLEs, exposure to SLEs does not always lead to poor health outcomes. In fact, recent evidence suggests that a considerable number of individuals exhibit minimal (if any) disruption in normal functioning in the face of SLEs (Bonanno, Brewin, Kaniasty, & La Greca, 2010), a phenomenon

that is referred to as *resilience*. Understanding the factors that govern individual variance in outcomes after exposure to SLEs is important for developing interventions and prevention programs that foster resilience.

What factors, then, predict resilience? Several lines of research suggest that the answer to this question lies in the fact that SLEs give rise to negative emotions (Lazarus, 1999), which in turn contribute to mental and physical illness (Kendler *et al.*, 1999; Tosevski & Milovancevic, 2006). For this reason, people's ability to *regulate* emotions may be a critically important factor in determining resilience. Below, we summarize relevant literatures to support this thesis. We highlight two emotion regulation strategies, cognitive reappraisal and emotional acceptance, which hold particular promise for conferring resilience.

EMOTION REGULATION

Emotion regulation refers to "shaping which emotions one has, when one has them, and how one experiences or expresses these emotions" (Gross, 2014, p. 6). Thus, any strategy that involves the goal of modifying of one's experience of emotion is considered emotion regulation.

Cognitive Reappraisal. Cognitive reappraisal, henceforth referred to as *reappraisal*, is defined as reframing an emotional event in order to modulate one's experience of negative or positive emotion (Gross, 1998). For example, in the case of job loss, an individual may perceive the event as a threat to their self-esteem and financial stability, or it could be perceived as an opportunity to transition into a better position. Given that one's subjective evaluation of a stimulus ("appraisal") is key to the generation of emotion (Lazarus & Folkman, 1984), reappraisal, which operates directly on appraisals, should play a primary role in modifying negative emotions.

Several lines of evidence support that reappraisal can lead to the experience of less negative emotion. First, cross-sectional studies have demonstrated that individuals who report frequently using reappraisal tend to experience less negative emotion (Gross and John, 2003). Second, support for the role of reappraisal in the context of stress comes from laboratory studies that have shown that individuals who report frequently using reappraisal experience more positive and fewer negative emotions in response to a laboratory stress induction (Mauss, Cook, Cheng, & Gross, 2007) and in response to daily stressors (Folkman & Moskowitz, 2004; Shiota, 2006). Finally, experimental studies demonstrate a causal link between reappraisal and decreased negative emotion. For example, studies that instruct individuals to use reappraisal during laboratory stress contexts have shown that it leads to a more favorable

physiological response and less negative emotion than other experimental groups (Gross, 1998; Ray, McRae, Ochsner, & Gross, 2010).

These studies suggest that reappraisal is associated with the experience of less negative emotion. However, does reappraisal confer resilience (e.g., protect individuals from experiencing negative health outcomes) in the wake of stress? Several lines of recent research suggest that it does. First, cross-sectional and longitudinal studies have demonstrated a consistent and robust correlation between self-reported use of reappraisal and better psychological and physical health in highly stressed samples (Moskowitz, Hult, Bussolari, & Acree, 2009; Pakenham, 2005). Causal evidence for the role of reappraisal in resilience comes from a longitudinal and experimental investigation by Carrico, Antoni, Weaver, Lechner, and Schneiderman (2005). They found that a cognitive behavioral intervention (compared to a control condition) decreased depressive symptoms in highly stressed males with HIV, and that reappraisal was the active ingredient that led to these salutary outcomes.

A recent study by Troy, Wilhelm, Shallcross, and Mauss (2010) builds on these findings by addressing three key limitations of previous research. First, the authors recruited individuals who had recently experienced a range of SLEs (e.g., divorce and job loss), thus promoting understanding about how reappraisal operates on heterogeneous SLEs (e.g., varied type and intensity). Second, they used a novel laboratory to assess individuals' *ability* to use reappraisal during a sad film clip, thus distinguishing the construct of ability to use reappraisal from self-reported frequency of its use. Third, they measured reappraisal ability using self-report assessments as well as objective physiological indices, which are not confounded by self-report biases. Results indicated that at high levels of stress, individuals who were high in reappraisal ability (whether indexed by self-reports or physiological indices) exhibited lower levels of depressive symptoms than individuals who were low in reappraisal ability. Essentially then, individuals who were high in reappraisal ability were protected from experiencing depression in the wake of SLEs.

Taken together, these studies suggest that reappraisal confers benefits to those who use it in the wake of SLEs. Specifically, reappraisal allows people to modify their emotional responding (i.e., to experience attenuated negative emotions and/or increased positive emotions), which is, in turn, associated with resilience. The role of reappraisal in resilience is depicted in Pathway A in the model in Figure 1.

Emotional Acceptance. Curiously, a parallel line of research suggests that a different and seemingly opposite strategy known as *emotional acceptance* also confers resilience. Acceptance, defined as attending to and nonjudgmentally

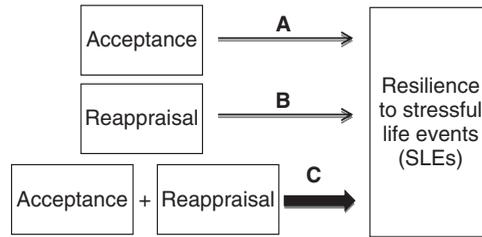


Figure 1 Proposed model of resilience in the wake of stressful life events (SLEs). Each of the pathways in the model is indicated by a letter (A–C). The links are described in detail in the text.

engaging with negative emotions (Segal, Williams, & Teasdale, 2002), has been shown in numerous studies to be inversely associated with the experience of negative emotions.

For example, correlational studies on young adults have shown that individuals high in self-reported trait acceptance experienced fewer symptoms of physiological arousal and negative emotions during an acute state of stress induced by a carbon dioxide (CO₂) challenge (Feldner, Zvolensky, Eifert, & Spira, 2003; Karekla, Forsyth, & Kelly, 2004) and after viewing a negative film clip (Shallcross, Troy, Boland, & Mauss, 2010). In a heterogeneous community sample, Shallcross, Ford, Floerke, and Mauss (2013) additionally found that trait acceptance was correlated with decreased negative emotion, indexed via trait measures, daily diary assessments, and experiential reactivity to a laboratory stress induction.

Causal evidence supporting the correlational results above comes from two experimental studies. For example, participants instructed to “experience [their] feelings fully and to not try to control or change them in any way” experienced fewer negative emotions after viewing an anxiety provoking film (Campbell-Sills, Barlow, Brown, & Hofmann, 2006) and lower heart rate after delivering an impromptu speech (Hofmann, Heering, Sawyer, & Asnaani, 2009) compared to participants instructed to suppress their feelings.

Despite this compelling evidence, the relationship between acceptance and decreased negative emotion may appear puzzling at first glance: How is a strategy that involves *engaging with negative emotions* associated with the *experience of less negative emotion*? Acceptance is thought to decrease negative affect via two related processes: (i) presenting opportunities to acknowledge and understand negative emotions, which promotes self-compassion as well as psychological and behavioral flexibility (Hayes & Wilson, 2003; Kashdan, Barrios, Forsyth, & Steger, 2006) and (ii) reducing rumination and meta-emotions, defined as emotional reactions to one’s own emotions

(Segal *et al.*, 2002; Simons & Gaher, 2005). Although engaging with negative emotions may increase one's experience of these emotions in the initial stages (Campbell-Sills *et al.*, 2006; Hofmann *et al.*, 2009), approaching negative emotions in a nonevaluative way may diffuse these emotions relatively quickly (Campbell-Sills *et al.*, 2006) via the mechanisms described above, and ultimately lead to less "net" negative emotion (Segal *et al.*, 2002).

Thus, acceptance appears to reduce individuals' experience of negative emotion. Does acceptance confer resilience? A longitudinal study by Shallcross and colleagues (2010) offers evidence in support of the notion that acceptance may break the link between SLEs and negative outcomes. Results from this study indicated that participants high in trait acceptance and who had recently experienced an SLE were buffered from experiencing elevated depressive symptoms at a 4-month follow up assessment.

Causal support for acceptance as a strategy that confers longer-term resilience is evidenced by randomized controlled trials that assign participants with elevated psychopathology to interventions involving acceptance (e.g., acceptance and commitment therapy and mindfulness-based cognitive therapy). These studies suggest that acceptance-based interventions contribute to improvements in psychological health in individuals at greatest risk for experiencing the deleterious effects of SLEs (Ma & Teasdale, 2004; Twohig, Hayes, Plumb, Pruitt, Collins, Hazlett-Stevens, & Woidneck, 2010).

Overall, correlational, experimental, and intervention studies suggest a robust—and perhaps causal—association between acceptance and reductions in negative emotions and point to acceptance as a strategy that confers resilience in the wake of stress. The role of acceptance in resilience is depicted in Pathway B in the model in Figure 1.

REAPPRAISAL AND ACCEPTANCE—CONTRADICTORY OR COMPLEMENTARY STRATEGIES?

The research on emotion regulation and resilience suggests that on the one hand, reappraisal, a process that involves minimizing negative emotions is related to resilience. On the other hand, acceptance, a process that involves engaging with negative emotions, is related to resilience as well. How can both be true? Several considerations support the idea that these strategies, although seemingly opposites, can work in complement to one another.

More specifically, acceptance, when used before reappraisal, might facilitate reappraisal's success. Acceptance involves two sub-processes, attention to one's present state and nonjudgment, each of which may facilitate successful reappraisal. First, attending to one's present state leads to broadened awareness of a wide range of stimuli (e.g., thoughts, feelings, and physical sensations). It may be easier for individuals to successfully reinterpret their thoughts if they are first aware of what they are thinking and feeling.

Thus, the heightened attention to one's present experience that is inherent in acceptance may help catalyze successful reappraisal. Second, nonjudgment is characterized by appraising one's emotions (including negative ones) as non-threatening experiences that are passing events rather than reflections of permanent reality (Hayes & Wilson, 2003). This nonjudgmental appraisal, often referred to as *decentered* or *metacognitive*, promotes three processes thought to facilitate reappraisal (Garland, Gaylord, & Park, 2009; Malooly, Genet, & Siemer, 2013): (i) the ability to disengage from negative thoughts and feelings; (ii) broadened attention to the event that led to the emotions; and (iii) reinterpretation of the event.

Two models converge on the idea that acceptance, when utilized before reappraisal, may enhance reappraisal's success. First, Garland and colleagues' mindful coping model (2009) suggests that mindfulness, which is defined as nonjudgmental awareness of present moment experiences and thus overlaps with acceptance (Hayes & Wilson, 2003) may catalyze successful reappraisal. This model indicates that mindfulness may promote decentering and cognitive flexibility, which, in turn, may help promote reappraisal.

Second, Sheppes and Gross' process-specific timing model (2011) suggests that: (i) reappraisal can be difficult to achieve because it is associated with a cognitive burden that may diminish its success when used in intensely emotional situations and (ii) emotion regulatory processes that decrease negative emotion, require minimal cognitive resources, and are used before reappraisal may reduce this burden, thus enhancing reappraisal's success (Sheppes & Gross, 2011; Thiruchselvam, Blechert, Sheppes, Rydstrom, & Gross, 2011). Acceptance, which reduces negative emotions (Shallcross *et al.*, 2010), has been shown to be unrelated to working memory in correlational studies (Schloss and Haaga, 2011), and is associated with a lower cognitive burden than reappraisal in experimental studies (Keng, Robins, Smoski, Dagenbach, & Leary, 2013), may be the ideal emotion regulatory precursor that can enhance the effects of reappraisal.

In sum, then, rather than being irreconcilable opposites, acceptance may be a complementary strategy to reappraisal that when used before it may augment reappraisal's success and lead to greater resilience than when either of these strategies is used in isolation. This is illustrated in Figure 1 (Pathway C) by the thickest directional arrow stemming from the combination of the two strategies in Figure 1. Specifically, Pathway C proposes that the greatest resilience is conferred when acceptance is used before reappraisal because processes such as attention and nonjudgment, which are intrinsic to acceptance, may help facilitate successful reappraisal.

Empirical support for the idea that acceptance may facilitate reappraisal comes from three lines of evidence from the literature on mindfulness. First,

Troy, Shallcross, and Mauss (2013) found that individuals with a history of mindfulness therapy demonstrated higher reappraisal ability in the context of a laboratory reappraisal task, compared to individuals with a history of Cognitive Behavioral Therapy and a no-therapy control group. These results support that mindfulness treatments, in particular, may lay the foundation for enhanced reappraisal ability. Second, Garland, Hanley, Farb, and Froeliger (2013) found that: (i) individuals randomized to a brief mindfulness meditation induction experienced greater state mindfulness (assessed immediately after the induction) compared to a thought suppression and mind wandering condition and (ii) state mindfulness was prospectively associated with increases in self-reported reappraisal 1 week later. Finally, a neuroimaging study showed that self-reported dispositional mindfulness was associated with activity in neural regions elicited during a functional magnetic resonance imaging task whereby participants were asked to reappraise negative stimuli (Modinos, Ormel, & Aleman, 2010). This study suggests that individual differences in the tendency to be mindful may help support cortical regions involved in reappraisal.

It is important to note that while mindfulness encompasses emotional acceptance, it is not identical because it also operates on nonemotional stimuli (e.g., awareness of the breath) and behavior (e.g., acting with awareness). Therefore, while this evidence is broadly consistent with the idea that acceptance facilitates reappraisal, more research is needed that specifically measures and manipulates acceptance and its effects on reappraisal.

Two important points should be noted about the model. First, we and others conceptualize reappraisal and acceptance as distinct and independent strategies. Thus, although acceptance may facilitate successful reappraisal, reappraisal does not depend on acceptance and acceptance does not necessarily lead to reappraisal. Second, it is possible that reappraisal, when used before acceptance, may also confer greater resilience than when either strategy is used in isolation. However, an explanation for how this may be the case is less clear. The theoretical considerations and empirical evidence above favor that acceptance may help lay the groundwork for successful reappraisal (thus leading to greater resilience) rather than the other way around.

In sum, theoretical considerations and preliminary studies support the model in Figure 1, which: (i) includes acceptance and reappraisal as central emotion strategies that lead to resilience; (ii) accommodates findings from the literature that indicate that each of these are separable strategies that are beneficial in their own right (Pathways A and B); and (iii) reconciles how reappraisal and acceptance, seemingly opposite strategies, may be used synergistically to confer resilience (Pathway C). While the evidence in support of Pathways A and B is relatively strong, evidence in support of Pathway C is more tenuous.

KEY ISSUES FOR FUTURE RESEARCH

In this entry, we have reviewed studies that suggest that reappraisal and acceptance are effective emotion regulatory strategies that individuals can rely on in the face of SLEs. We have additionally proposed a theoretically and empirically supported model aimed at reconciling how these seemingly opposite strategies both promote resilience, and how acceptance might facilitate reappraisal. Although the extant literature and model we present hold promise for understanding emotion regulation and resilience, work is needed to: (i) develop the specific concepts articulated in this entry and (ii) promote the translation of the proposed model into clinical medicine and public health.

Two areas of investigation appear to be logical next steps toward advancing the ideas discussed above. First, although Pathway C in the proposed model has the potential for enhancing our understanding of how these two emotion regulation strategies could be used synergistically to enhance resilience, this pathway has not been empirically tested. Future investigations where reappraisal and acceptance are experimentally manipulated in the same study would advance our understanding of how these strategies may interact with one another in shaping risk and resilience.

Second, studies are needed that investigate contextual factors that might influence the effects of reappraisal and acceptance, used in combination or independently. For example, are there certain individual differences or circumstances that affect for whom and when these strategies are particularly effective? Several recent studies have begun to address this important question of context. For example, some investigations indicate that diagnosis of psychopathology (Arch & Ayers, 2013; Vilardaga, Hayes, Atkins, Bresee, & Kambiz, 2013); the intensity of negative emotions (Aldao & Nolen-Hoeksema, 2012; Sheppes & Gross, 2011); and types of stress (e.g., controllable vs uncontrollable) (Troy *et al.*, 2013) moderate the effects of emotion regulation on outcomes (see Aldao, 2013 for review). In other words, reappraisal and acceptance may not be universally adaptive; it may be the context in which these strategies are used that predicts whether they lead to resilience. Collectively, these studies support an initiative backed by The National Institute of Mental Health, which calls for advancing personalized medicine (PM). PM is an innovative approach to health care that aims to identify the conditions under which behavioral health interventions are most effective. Thus, basic science investigations that examine the contexts in which emotion regulation strategies are effective, ineffective, or potentially harmful are at the forefront of informing ways to maximize the effectiveness of clinical interventions aimed at imparting emotion regulation skills.

Finally, work is needed to integrate theoretical frameworks across relevant fields to promote a translational and nonreductionist model of resilience. For example, stress and coping researchers in the field of health psychology have examined a number of constructs (e.g., emotion-focused coping) that overlap with key concepts applied by emotion regulation researchers in the fields of personality and social psychology (Folkman & Moskowitz, 2004). However, owing, in part, to differences in methodological approaches and conceptualizations of stress and emotion (John & Eng, 2014), there has been surprisingly little cross-talk between these fields. Bridging related but currently disparate theoretical frameworks within and across the fields of psychology, medicine, and public health will help synthesize converging perspectives, approaches, and evidence supporting the link between stress and health.

We have attempted to integrate various theoretical frameworks from the fields of social, cognitive, and clinical psychology to inform our model of resilience. Broadly, this model could be used as a platform upon which three different types of interdisciplinary collaborations may be launched, each of which hold promise for translating basic science into effective clinical interventions. First, collaborations between social psychologists, who can test active ingredients (e.g., emotion regulation), and clinical psychologists, who can implement interventions and test reductions in psychopathology, would be helpful to advance innovative interventions, with known mechanisms of action, for stress-related mental and physical disorders.

Second, because standard of care protocols for physical disease infrequently include psychological treatments, research collaborations between psychologists and health care practitioners may help promote the use of emotion-regulation-based interventions for patients suffering from stress-related conditions.

Finally, collaborations between psychologists and public health experts who can facilitate population-level interventions aimed at improving emotion regulation may help alleviate stress-related suffering on a wide scale. Examples of such interventions may include: (i) harnessing smart phone technologies (e.g., apps) to develop programs that promote basic emotion regulation skills (e.g., awareness) by prompting users to identify and label their emotional experiences throughout the day; (ii) large-scale campaigns that promote stress education and behavioral modification, such as relaxation techniques, to captive audiences (e.g., public transit users).

In sum, future investigations should focus on integrating converging theoretical frameworks that support a nonreductionist model of human functioning. This approach holds promise for translating basic science into clinical and population-level interventions aimed at promoting resilience in the wake of SLEs.

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