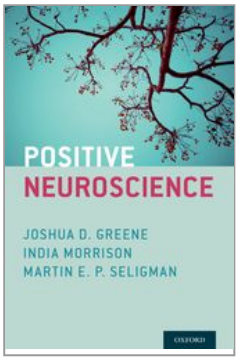

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Increasing Positive Emotion in Negative Contexts

Emotional Consequences, Neural Correlates, and Implications for Resilience

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Abstract and Keywords

Human reactions to adversity can range from severe incapacitation to growth. What explains this vast variation in stress adjustment? Most scientific examinations of this question focus on how individuals can avoid prolonged incapacitation, often through the ability to dampen negative reactions. However, this conceptualization largely ignores the remarkable human capacity to generate positive emotions such as happiness, gratitude, and love, even in the face of adversity. We offer the possibility that it is precisely this ability that allows people to not only recover from adversity but to grow (i.e., be resilient). In this chapter, we argue that cognitive reappraisal, or reevaluating a situation to change its emotional impact, is a particularly promising avenue to generating positive emotion in negative situations (“positive reappraisal”). We start by providing a conceptual framework for positive reappraisal (PR), its short-term effects on emotion, and its role in resilience. We then review literature in support of this framework, focusing, first, on the short-term effects of PR, including its emotional consequences and neural correlates, and, second, on more long-term effects of PR on resilience.

Keywords: cognitive reappraisal, emotion regulation, coping, cognitive control, positive emotion, stress, adjustment, resilience

Responses to stress, while unpleasant, can be useful in that they promote adaptive behavior (Frijda, 1986; Keltner & Gross, 1999; Tamir, 2009). However, when stress responses are overwhelming, inappropriate, or chronically activated, they can cause a wide range of long-term negative consequences (Lupien, McEwen, Gunnar, & Heim, 2009; McEwen, 2000). Stress responses can be triggered by a variety of different types of stressors, including daily hassles, traumatic events, chronic stress, and stressful life events. We focus here on one particularly pervasive type of stressor that can have pernicious effects on psychological health: stressful life events (SLEs; Kendler, Karkowski, & Prescott, 1999; Kessler, 1997; Tamir, 2009; Tennant, 2002). SLEs have been most commonly defined as unexpected, significant, and negative events, and include events such as the death of a loved one, divorce, or serious illness (Kendler et al., 1999; Kessler, 1997; Lin, Simeone, Ensel, & Kuo, 1979). SLEs have been implicated in the onset, maintenance, and escalation of a number of debilitating psychological and physical disorders as well as decreased well-being (Kendler et al., 1999; Kessler, 1997; Pagano et al., 2004; Tennant, 2002; Tosevski & Milovancevic, 2006). However, SLEs are not associated with negative long-term outcomes in *all* individuals.[1] Some individuals exhibit impressive resilience, achieving maintained or even improved mental health and **(p.160)** well-being after SLEs (Bonanno, 2005; Freitas & Downey, 1998; Lucas, Clark, Georgellis, & Diener, 2003; Ryff, Singer, Love, & Essex, 1998).[2]

How can we explain the remarkable human ability to not merely subsist, but to thrive in the face of potential ruin? Two lines of inquiry point to two potent facilitators of resilience. The first is positive emotion, which has been shown to evoke powerful changes in emotional trajectory (Fredrickson & Levenson, 1998). The second is cognitive emotion regulation (the most prominent example of which is reappraisal), which refers to the utilization of cognitive strategies to modulate emotion intensity and duration (Davidson, 2000; Gross, 1998b; Thompson, 1994). In this chapter, we unite these two perspectives, arguing that using reappraisal to self-generate positive emotion (“positive reappraisal”) is a particularly potent path to resilience.

Positive Reappraisal and Resilience: A Conceptual Framework

Individuals can regulate their emotions in a number of different ways (Davidson, 2000; Gross, 1998b; Thompson, 1994). One type of emotion regulation appears to be particularly adaptive, namely, cognitive reappraisal. Reappraisal is an emotion regulation strategy in which the individual cognitively reevaluates an emotional situation to change its emotional impact (Gross, 1998b). Reappraisal has been shown experimentally to be useful even in powerfully negative situations (Gross, 1998a; Mauss, Cook, Cheng, & Gross, 2007; Ochsner, Bunge, Gross, & Gabrieli, 2002) and is strongly implicated in psychological health (Folkman, 1997; Garnefski & Kraaij, 2006; Gross & John, 2003), especially after SLEs (Bryant, Moulds, & Guthrie, 2001; Carrico, Antoni, Weaver, Lechner, &

Schneiderman, 2005; Kraaij, Pruymboom, & Garnefski, 2002; Troy, Wilhelm, Shallcross, & Mauss, 2010; Wrosch, Heckhausen, & Lachman, 2000).

Together, these considerations motivate a conceptual framework that suggests reappraisal as a key factor in adjustment after SLEs. Importantly, as illustrated in Figure 10.1, reappraisal can target two different emotional states: One could either decrease negative emotion or increase positive emotion (Mauss & Tamir, in press). For example, if we have an argument with a good friend, we can reappraise the conflict as a natural part of friendship that will soon resolve (and thereby decrease our negative emotions), or we can remind ourselves how lucky we are to have our perspectives on the issue broadened by passionate, articulate company (and thereby increase our positive emotions). Because positive emotions are distinct from, and not the mere antithesis to, negative emotions (Watson, Wiese, Vaidya, & Tellegen, 1999), these two types of reappraisal might have different effects on emotions in the short term. Specifically, **(p.161)** using reappraisal to increase positive emotion (positive reappraisal, PR) might in the short term increase positive emotions without necessarily decreasing negative emotions.

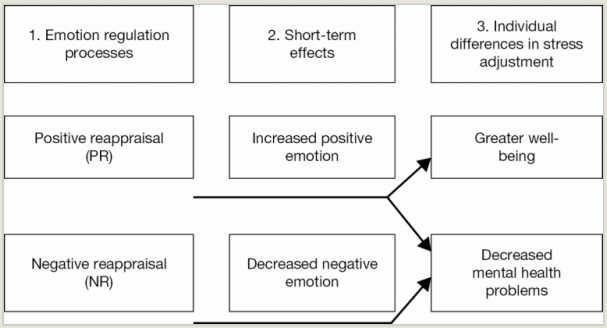

Figure 10.1 Short-term and long-term effects of positive and negative reappraisal.

Positive emotion has pervasive beneficial effects on psychological health and well-being (Fredrickson, 1998; Lyubomirsky, King, & Diener, 2005). For example, positive emotion can speed recovery from negative emotional events (Fredrickson & Levenson, 1998). Thus, the short-term effects of PR might over time translate into decreased mental health problems and greater well-being (resilience).

Increasing positive emotion without removing negative emotion might present a particularly feasible and adaptive way to cope with stressors, because some negative emotion is important to experience in the context of SLEs. In the following sections, we examine the idea that PR has distinct short-term emotional consequences, discuss the neural correlates that might accompany it, and predict that it will lead to increased resilience. While negative reappraisal (NR) likely plays an important role in resilience, it is our hypothesis that PR has the potential to lead to even greater resilience, above and beyond NR.

Short-Term Effects: Emotional Consequences and Neural Correlates of Positive Reappraisal

Our framework leads to the prediction that PR increases positive emotion, even in the context of negative stimuli. Although most studies of reappraisal **(p.162)** focus on manipulating the negative emotion elicited by a negative stimulus (NR), these studies can give some insight into the potential consequences of PR (Gross, 1998a; Jackson, Malmstadt, Larson, & Davidson, 2000; Ochsner et al., 2002).

Short-Term Emotional Consequences of Positive Reappraisal

Studies on reappraisal often involve the presentation of negative images or films, paired with instructions to either respond naturally or to use reappraisal. Using this method, NR has been shown to successfully decrease several aspects of emotional responding, including self-reported negative emotion (Gross, 1998a), startle eyeblink magnitude (Dillon & LaBar, 2005; Jackson et al., 2000), and corrugator response (Jackson et al., 2000; Ray, McRae, Ochsner, & Gross, 2010). Neuroimaging studies have replicated and extended the effects of NR by demonstrating that NR decreases the event-related potentials associated with emotional arousal (Deveney & Pizzagalli, 2008; Foti & Hajcak, 2008; Hajcak & Nieuwenhuis, 2006) as well as amygdala activation (Kim & Hamann, 2007; Ochsner et al., 2002; Schaefer et al., 2002), which is thought to process emotionally salient information and organize peripheral physiological responding and behavioral emotional responses. Therefore, NR can be an effective way to curtail negative affective responding at many levels.

In addition, PR can be used to increase several aspects of emotional responding, including self-reported positive emotion, and sympathetic nervous system activation (Giuliani, McRae, & Gross, 2008), as well as activation in the amygdala and ventral striatum (a region associated with positive emotion and reward; Kim & Hamann, 2007). It is important to note that using PR in a positive context results in *greater* levels of amygdala activation (Kim & Hamann, 2007). Although amygdala activation is often associated with negative emotion, it also responds to positive emotion, novelty, and arousal (Anderson et al., 2003; Cunningham, Van Bavel, & Johnsen, 2008; Whalen, 1998). Together, these studies suggest that people can use reappraisal not just to manipulate negative emotional responses in negative contexts but also positive emotional responses in positive contexts.

Our central interest, however, is whether reappraisal can be used to increase positive emotion even in the context of negative emotional stimuli. And if so, how do the effects of PR compare to the effects of NR? A small number of studies have established that positive emotional experience is increased by PR in a negative context, to a greater extent than NR (McRae, Ciesielski, & Gross, 2012; Shiota & Levenson, 2012). One such study compared PR to a distancing NR tactic in the context of negative film clips. Relative to distancing, PR **(p.163)** resulted in shortened cardiac interbeat interval paired with reduced blood pressure (Shiota & Levenson, 2012). This cardiovascular response profile has

been previously associated with a “challenge” rather than a “threat” mindset (Tomaka, Blascovich, Kibler, & Ernst, 1997). A separate investigation measured skin conductance level (SCL) while using PR or NR in response to negative pictures. Based on the elevated amygdala activation observed when using PR in a positive context (Kim & Hamann, 2007), we predicted that PR would involve greater physiological activation than NR. In line with these predictions, this study reports smaller decreases in SCL when participants used PR compared to NR (McRae, Ciesielski, & Gross, 2012). Therefore, it is clear that PR and NR have different emotional and psychophysiological consequences.

To date, no neuroimaging studies we are aware of have directly compared NR and PR in a negative context. However, because typically participants are not restricted from increasing positive emotion while reappraising, some participants might make use of PR when asked to use NR. In fact, we have found that some individuals engage the ventral striatum, which is associated with positive emotion, to a greater extent than others while reappraising (McRae, Ochsner, Mauss, Gabrieli, & Gross, 2008). In addition, the relationship between control-related ventral PFC activation and reappraisal success is mediated by two separate neural pathways (Wager, Davidson, Hughes, Lindquist, & Ochsner, 2008). The first pathway involves decreases in amygdala activation, which may reflect NR, and the second involves increases in ventral striatum activation, which may reflect PR. If these two pathways represent NR and PR, respectively, it is reasonable to predict that PR engages the amygdala and the ventral striatum more strongly than does NR. Together with the self-report and psychophysiological findings, these studies support the conclusion that there are unique emotional effects of PR compared to NR. More specifically, they indicate that PR, compared with NR, might have an activating effect.

Control Regions Engaged by Positive Reappraisal

In addition to studying the emotional consequences of PR and NR, neuroimaging studies allow for the identification of the neural regions associated with implementing reappraisal, which implicate specific cognitive processes. Again, most research to date has examined NR. This research suggests that several prefrontal and parietal regions are recruited consistently during NR, which are thought to be implicated in cognitive control (Miller & Cohen, 2001; Ochsner, Silvers, & Buhle, 2012; Smith & Jonides, 1999; Wager et al., 2008). Importantly, some studies have identified the regions engaged to a greater degree during reappraisal used to down-regulate negative emotion compared with the regions engaged to up-regulate negative emotion. These studies demonstrate that down-regulation of negative emotion recruits right lateral **(p.164)** prefrontal cortex and lateral orbitofrontal cortex regions to a greater extent than up-regulation. These regions are thought to be involved in inhibiting prepotent responses and tracking changing emotional values (Eippert et al., 2007; Kim & Hamann, 2007; Mak, Hu, Zhang, Xiao, & Lee, 2009).

Although PR might have distinct emotional consequences from NR, it is unclear whether it engages similar control regions. Very few studies have examined this directly. Some insight, however, can be derived from studies examining PR in positive contexts. Compared with increasing negative emotion, increasing positive emotion in a positive context uniquely recruits left lateral prefrontal regions as well as dorsal medial prefrontal cortex (Kim & Hamann, 2007). Therefore, PR compared to NR might involve greater recruitment of the typical left-sided control regions associated with reappraisal and medial prefrontal regions thought to represent self-referential processing (Kelley et al., 2002). By and large, however, it is important to recognize that studies examining PR demonstrate that there seems to be far more overlap than distinction in the control-related regions engaged during PR compared with NR (Kim & Hamann, 2007).

In sum, although few studies have examined PR in negative contexts, the existing research allows us some understanding of its short-term effects on emotion and its neural correlates. First, PR appears to allow people to activate positive emotions even in intensely negative contexts. Second, PR appears to rely on control-related regions mostly similar to those engaged during NR. Therefore, one working hypothesis is that PR and NR use the same cognitive "fuel" but result in the production of different emotional responses. In other words, when people utilize these shared cognitive processes for the purpose of PR, they might reap many of the unique benefits associated with positive emotion. This activated positive emotion might then be garnered to engage with and improve negative situations, rather than merely "riding out the storm." We next turn to the implications these short-term emotional benefits might have for longer term resilience.

Longer Term Effects: Positive Reappraisal and Resilience

Several lines of research provide initial support for the idea that PR plays a crucial role in psychological adjustment to SLEs. As the previous section shows, PR is associated with increased positive emotion. In turn, multiple lines of evidence support that increased frequency and intensity of positive emotion are positively associated with resilience (Fredrickson, 2001; Harker & Keltner, 2001; King, Hicks, Krull, & Del Gaiso, 2006) and a wide range of positive **(p.165)** outcomes (Fredrickson, 1998, 2001; Lyubomirsky et al., 2005). For example, interventions that increase positive emotion increase well-being and decrease psychological health problems (Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008; Lyubomirsky & Layous, 2013). Importantly, some evidence supports the notion that these beneficial effects of increased positive emotions are independent of the effects of reduced negative emotions (Diener, 1994; Folkman & Moskowitz, 2000; Lyubomirsky et al., 2005). For example, well-being is characterized by high levels of positive emotion, not merely the absence of negative emotion

(Brown, Chorpita, & Barlow, 1998; Bylsma, Morris, & Rottenberg, 2008; Clark & Watson, 1991; McMakin, Santiago, & Shirk, 2009).

Given these positive effects of positive emotions in general, it stands to reason that positive emotions are also beneficial in the context of SLEs (c.f. Folkman & Moskowitz, 2000; Lechner, Tennen, Affleck, Lopez, & Snyder, 2009). In fact, given that times of stress are characterized by a dearth of positive emotions, positive emotions may be especially useful during such times. Indeed, increased positive emotions have been shown to predict better outcomes after SLEs (Bonanno & Keltner, 1997; Burns et al., 2008; Cohn, Fredrickson, Brown, Mikels, & Conway, 2009; Fredrickson, Tugade, Waugh, & Larkin, 2003; Keltner & Bonanno, 1997; Moskowitz, Folkman, & Acree, 2003). Importantly, there is evidence to suggest that positive emotions are not just a correlate of successful coping but also a cause of it. For instance, interventions that increase positive emotion improve recovery from depression (Dichter et al., 2009; Dimidjian et al., 2006; Seligman, Rashid, & Parks, 2006; Sin & Lyubomirsky, 2009) and appear to enhance successful coping with stress (Moskowitz et al., 2012). Some studies have further shown that the effects of positive emotions on coping are distinct from those of negative emotion (Fredrickson & Joiner, 2002; Moskowitz, Epel, & Acree, 2008; Moskowitz et al., 2003). For example, Fredrickson and Joiner (2002) found that positive but not negative emotion was associated with broad-minded coping (a form of adaptive coping). It may be that increasing positive emotions is adaptive precisely because it does not necessarily involve decreasing negative emotions. After all, negative emotions can serve important functions such as keeping us and others motivated to address issues (Frijda, 1986; Tamir, 2009). Increasing positive emotion without removing negative emotion might thus yield particularly adaptive ways to cope with stressors.

Given these emerging beneficial effects of positive emotions in the context of SLEs, individuals' ability to *self-generate* positive emotion via emotion regulation might be a particularly powerful resilience factor for at least two reasons. First, during times of stress there are relatively few situational cues to positive emotion, and thus self-generation of positive emotion is especially useful. Second, the good feelings that accompany positive emotions, as **(p.166)** well as their downstream effects such as cognitive broadening and enhanced social connection, might be particularly useful in times of stress, because they are most needed then (Folkman & Moskowitz, 2000; Tugade & Fredrickson, 2007). Thus, someone who can self-generate positive emotion when faced with a negative situation might be at a distinct advantage.

What evidence supports the notion that self-generating positive emotions via PR supports resilience? While few studies have directly examined PR and coping with SLEs, several pieces of converging evidence support that PR may contribute to resilience. In a correlational study, for example, Shiota (2006) found that participants who self-reported using PR in response to daily stressful

events experienced greater positive mood. Some research suggests that such effects can be observed under highly stressful conditions and that they are prospective. In their research on partners of men with AIDS before and after their partner died, Moskowitz, Folkman, Collette, and Vittinghoff (1996) found that use of PR was associated with greater experience of positive mood. Importantly, PR was the only one of eight assessed coping strategies that showed these positive effects before and after bereavement, as well as when controlling for the previous month's mood and for the seven other types of coping.

In summary, research makes a strong case in support of the notion that the positive emotions that are enhanced by PR play a crucial positive role in resilience, and that they do so above and beyond decreases in negative emotion associated with NR. Moreover, the emerging research on PR suggests that people naturally use PR, that they apply it to ordinary as well as stressful events, and that PR is associated with positive psychological health outcomes, even under extreme stress. Thus, PR may be an important resilience factor.

Current and Future Research

We reviewed emerging evidence in support of the ideas that PR has unique effects on positive emotion and that it constitutes a crucial resilience factor beyond other factors, including NR. Important next steps are to advance our understanding of, first, the nature of PR and, second, its role in resilience. To address these directions, we are currently conducting a set of studies funded by the Positive Neuroscience Project.

In one study, we instruct participants to use PR or to use NR while viewing negative emotional pictures. By doing this in a neuroimaging context, we aim to confirm predictions made by our framework, including that PR compared to NR will have different effects on brain regions associated with emotion (e.g., amygdala and ventral striatum), but that they will largely engage overlapping regions involved in cognitive control (e.g., dorsal and ventral lateral prefrontal cortex).

(p.167) In terms of PR's role in resilience, one important goal is to elucidate the causal contributions of PR on resilience. To this end, we have designed an intervention that enhances PR in samples exposed to recent SLEs. We compare this intervention to an active control group to help us rule out important confounds, such as expectation for change or positive social contact. One important corollary of our argument is that PR may be especially useful because it allows people to completely *self-generate* positive emotion rather than relying on positive experiences. Thus, it may be particularly useful to people experiencing high levels of adversity, while other types of positive emotion interventions (e.g., counting blessings, gratitude, savoring; Emmons & McCullough, 2003; Sheldon & Lyubomirsky, 2006) might be most useful at lower

levels of adversity. We plan to test this hypothesis by comparing the effects of our PR intervention in participants exposed to varying degrees of stressor severity.

Once the causal effects of PR on resilience have been more firmly established, it will be important to examine potential mediators (e.g., the ability to utilize PR, levels of positive and negative emotion; Kok & Fredrickson, 2010; Lyubomirsky & Layous, 2013). For example, we argued that PR might be beneficial because it enhances positive emotion without necessarily diminishing the experience of justified—and potentially useful—negative emotions. Mediation analyses will examine this type of hypothesis. Research should also take into consideration potential moderators and boundary conditions of PR interventions, including initial levels of well-being and PR, to help us understand for whom PR might be most useful. Lastly, to test the hypothesis that PR has unique effects on resilience, it will be important in future research to compare the effects of PR interventions to those of other interventions (Gruber, 2011; Mauss, Tamir, Anderson, & Savino, 2011).

Conclusion

Everyone experiences stressful life events (SLEs) at some point of another in their lives. While the experience of SLEs is an unavoidable part of human life, human reactions to SLEs can range from severe incapacitation to growth. What explains this vast variation in stress adjustment? Much prior research has focused on people's ability to dampen negative emotions as a linchpin process in stress adjustment. We argued here that, in addition, people's ability to self-generate positive emotions such as happiness, gratitude, and love, and to do so even in adverse situations, should be considered. One particularly powerful way to generate positive emotion is to transform the very meaning of the stressful situation one finds oneself in (positive reappraisal, or PR). Emerging research supports the idea that PR makes an important contribution, and that it does so over that of negative reappraisal. This is evident in its short-term **(p.168)** emotional consequences as well as its long-term effects on resilience. Thus, PR may be uniquely poised to not merely side-step negative emotion but to use emotional engagement as fuel for resilience and growth.

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Notes:

(1.) We use the term *adjustment* to refer to the full range of possible psychological health outcomes (negative to positive) after a stressor and the term *resilience* to refer to maintained or enhanced psychological health outcomes after a stressor (i.e., greater well-being and decreased mental health problems).

(2.) Although stress and emotion regulation have implications for physical as well as psychological health (Kubzansky & Kawachi, 2000; Marsland, Bachen, & Cohen, 2012; Mauss & Gross, 2004), we focus here on psychological health in the interest of space and because mechanisms underlying effects on physical health may at times differ from those on psychological health.