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# From Positive Emotions to Health Outcomes: Understanding Mechanisms

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ABSTRACT

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by

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Although positive emotions have been relatively understudied (in comparison to negative emotions), the existing research suggests that positive emotions can have a beneficial effect on health outcomes and health-relevant biomarkers. It is likely that positive emotions benefit health through buffering individuals from the effects of stress; however, more research is needed to uncover the psychosocial processes through which positive emotions exert this stress-buffering effect. Two studies tested the hypothesis that positive emotions can impact coping, rumination, and perceptions of resources, three processes with important implications for health and well-being. In Study 1, participants were assigned to watch film clips designed to induce the emotions of love or amusement (or to watch a neutral film clip), after which they completed measures of coping and rumination (including an implicit measure of coping). In Study 2, participants were assigned to write about experiences of gratitude (or neutral topics), after which they completed measures of coping, social resources, and personal resources. The present studies failed to find support for the hypothesis that positive emotions impact coping, rumination, and perceived resources. The

findings and directions for future research are discussed.

## Introduction

Compared to research on negative experiences and negative emotions, the role of positive experiences and emotions has been relatively understudied (Sheldon & King, 2001). However, in recent years, this has begun to change. For example, research has shown that positive experiences are more common than negative experiences, suggesting that, over the long term, positive experiences may prove to have a significant impact on outcomes (Gable & Haidt, 2005). In particular, research on positive emotions has shown they can have a beneficial effect on health outcomes, such as longevity and the presence of illness (Pressman & Cohen, 2005). Additionally, research has found that positive emotions can have effects on biological processes relevant to health, such as cardiovascular reactivity, cortisol levels, and immune functioning.

However, even though we know that positive emotions are associated with beneficial health outcomes, there are still several important unanswered questions. First, most research on positive emotions and health has studied only one emotion (often happiness) or looked at aggregate levels of positive affect, so it is not yet known how different positive emotions might affect health-relevant processes differently. As positive emotions are a broad category of experiences, it is important for research to compare the effects of different positive emotions on health outcomes and health-relevant processes.

Second, we don't yet know what psychosocial mechanisms might link positive affect to health-relevant biomarkers and health outcomes. While there are likely to be some direct effects of positive emotions on health, it is also likely that positive emotions benefit health through buffering individuals from the effects of stress on health. As stress can have

detrimental effects on health (Sapolsky, 1994), positive emotions may promote health because they serve to buffer individuals from the negative consequences of stress. For example, positive emotions may reduce the impact of stressful events and prevent the development of allostatic load (the damage done to biological systems due to the repeated activation of stress pathways; McEwen, 1998). There is already some support for this stress-buffering hypothesis, as studies have found that positive affect can speed recovery from a stressful event (Fredrickson & Levenson, 1998) and that positive affect is associated with lower levels of stress biomarkers (such as cortisol; Steptoe, Wardle, & Marmot, 2005). However, it is not yet known *how* positive emotions buffer individuals from the effects of stress on health. In the present paper, I will first review evidence suggesting that positive emotions are indeed associated with beneficial health outcomes and biological processes, propose three mechanisms for the stress buffering effect of positive emotions (coping, rumination, and resources), and report on the results of two initial studies examining the causal relationship between two different positive emotions coping, rumination, and perceived resources.

**Positive Emotions and Health Outcomes**

In a recent review, Pressman and Cohen (2005) reported on several studies assessing the association of positive affect with longevity and morbidity. The found that in ten of fifteen studies, positive emotions were indeed associated with increased longevity (three studies found that positive emotions were associated with decreased longevity, and two studies failed to find an effect). For example, in one study, researchers coded the number of positive emotion words in autobiographies written by nuns in their twenties, and the

researchers found that nuns who used more positive emotion words had lower mortality 60 years later (Danner, Snowdon, & Friesen, 2001). In the case of morbidity (the presence of disease), all six studies found that positive emotions were associated with lower morbidity. Additionally, the review found beneficial effects of positive emotions on health outcomes such as self-reported physical symptoms and pain.

Research has also found that, in addition to being associated with lower mortality and morbidity, positive emotions are associated with lower levels of specific diseases. In one recent study, researchers assessed the relationship between positive emotions and heart disease (Kubzansky & Thurston 2007). The researchers assessed emotional vitality (a measurement of energy, satisfaction with life, and emotional stability) in over six thousand adults, none of whom had coronary heart disease at the start of the study. The participants were then followed over time, and it was found that emotional vitality at the beginning of the study was associated with a lower risk of developing coronary heart disease. In another study, Moskowitz (2003) found that positive affect (as measured by a subscale of the Center for Epidemiologic Studies Depression Scale[1]) was associated with lower risk of AIDS mortality in HIV+ men. Notably, this study found that positive affect was associated with lower mortality when controlling for other subscales of the CES-D, and that positive affect was predictive of mortality one year later.

**Positive Emotions and Biological Processes Relevant to Health**

Research suggests that positive emotions have beneficial effects on health by affecting biological parameters. In particular, the "undoing" hypothesis (Fredrickson &

[1] Although this measure is part of a scale of depression, the positive affect subscale does assess positive affect rather than merely the absence of negative affect. (Sample items: "I was happy," "I enjoyed life.")

Levenson, 1998) suggests that positive emotions may benefit health by helping individuals to recover more quickly from stressful events: these emotions can literally "undo" the damage done by negative emotions. For example, in one study, participants were assigned to watch a video designed to be cheerful, to induce feelings of contentment, to induce sadness, or a neutral video. Compared to the anger and neutral conditions, those in the positive emotion conditions had faster cardiovascular recovery from a fear-inducing film (Fredrickson & Levenson, 1998). Slower cardiovascular recovery can have important implications for health—when cardiovascular systems do not return to baseline properly after a stressful event, these systems can eventually lose elasticity and responsiveness (termed allostatic load; McEwen, 1998), increasing the risk of cardiovascular disease. Consequently, Fredrickson and Levenson's study suggests that one way positive emotions may promote health is by preventing the development of allostatic load.

Additional research suggests that positive emotions can have beneficial effects on cortisol and immune parameters. As having prolonged high cortisol levels is associated with autoimmune conditions, diabetes, and hypertension (Steptoe et al., 2005), cortisol is one potential biological parameter linking positive emotions to health outcomes. In their review, Pressman and Cohen (2005) conclude that there is a relationship between trait levels of positive affect and lower cortisol levels. Steptoe and colleagues (2005) asked people to report on how happy they were and to provide cortisol samples at several times on two different days. They found that participants who rated themselves as happier had lower total levels of cortisol: the happiest fifth of participants had cortisol levels that were 32% lower than the cortisol levels in the least happy fifth of the participants.

Research also suggests that positive affect may have beneficial effects on the immune system. Two studies have found associations between positive affect and higher secretory immunoglobulin A (SIgA) antibody responses to a protein (Stone 1987, Stone 1994). As SIgA serves as one of the body's forms of defenses against pathogens, higher levels suggest that an individual's immune system is better able to respond to pathogens (Stone, 1987). Consequently, this research suggests that another pathway through which positive emotions may exert their beneficial effects on health through their effects on the immune system.

**The Role of Specific Positive Emotions**

Although the existing research provides evidence that there is a link between positive emotions and health, it is currently not known how different types of positive emotions might relate to health outcomes differently. Although there are a few exceptions, most research on positive affect and health has focused on only one aspect of positive affect (often happiness) or used positive affect scales that aggregate across different categories of positive emotions (such as the PANAS). However, positive emotion is a heterogenous category; different positive emotions involve different antecedents, appraisal processes, and behaviors. For example, in his conceptual analysis of emotion, Richard Lazarus describes the emotions of happiness/joy, pride, love/affection, and relief, each of which has a different core relational theme (a description of the key features involved in a particular emotion). Additionally, Lazarus specifies the primary appraisal processes (goal relevance, goal congruence, and ego involvement) and secondary appraisal processes (blame/credit, coping potential, and future expectations) involved in each of these emotions. Although the emotions share two features of primary appraisal in common (they all involve goal relevance and goal congruence), the

emotions differ with respect to ego involvement, blame/credit, and future expectations. Consequently, Lazarus' analysis suggests that positive emotions differ in key ways. Additionally, it has been argued that distinctions between different emotions are likely to have important consequences: "Because such distinctions [between different positive emotions] have important consequences for personal well-being, social relationships, cognitive processing, and our understanding of emotion, it seems important to attempt to explicate how positive affect may be differentiated" (de Rivera, Possell, Verette, & Weiner, 1989, quoted in Lazarus, 1991).

In Barbara Fredrickson's broaden and build theory (1998), it is argued that positive emotions serve to broaden thought action-repertoires and build resources; however, Fredrickson's argument does not assume that all positive emotions necessarily broaden and build in the same way. For example, joy is hypothesized to cause individuals to engage in play (whether physical or intellectual), while contentment "creates the urge to savor and integrate recent events and experiences creating a new sense of self and a new world view" (p. 306). Because different positive emotions broaden cognition and action in different ways, it is reasonable to expect that they will have different effects on health (and health-relevant processes such as coping).

Some empirical support for the idea that different positive emotions have different consequences comes from research by Philip Gable and Eddie Harmon-Jones (2008), which examines the effects of approach motivated positive emotions. Past research (e.g. Fredrickson, 1998) has demonstrated that positive emotions broaden emotional focus. However, Gable and Harmon-Jones (2008) studied a specific category of positive emotions:

those that are approach motivated (i.e. characterized by a desire to approach an object or achieve a goal). They found that approach-motivated positive emotions actually encouraged local (as opposed to more global) processing, suggesting that different types of positive emotions can have different effects on cognition.

Finally, an additional reason to expect that different positive emotions will affect health differently comes from research on the effects of specific negative emotions. Research on negative emotions has found that different types of negative emotions predict biological outcomes differently: for example, shame predicts immune and endocrine outcomes that general distress does not (Dickerson, Gruenewald, & Kemeny, 2004). Consequently, by aggregating across different aspects of positive emotion (or only asking about certain categories of positive emotion), we could be losing important information about how specific emotions affect health.

**Psychosocial Factors Linking Positive Emotions to Health**

The existing research suggests that positive emotions exert significant effects on health outcomes and health-relevant biomarkers. Additionally, as positive emotions can speed recovery from stressful events and are associated with lower levels of cortisol, it is likely that positive emotions benefit health by buffering individuals from the negative effects of stress. However, it is not yet known how positive emotions exert this stress-buffering effect. Uncovering the mechanisms behind this effect is critical, as it has both theoretical importance (allowing us to better understand how emotions affect biology) and practical importance (helping us to make more educated hypotheses about the types of interventions that will promote health).

## Coping

One potential process involved in the stress buffering effect is coping; specifically, I hypothesize that positive emotions will promote health because they lead to more effective coping. Numerous studies have shown that how individuals cope with stressful events is important: coping with stressful events in adaptive and appropriate ways is associated with improved outcomes, while maladaptive coping can lead to poor outcomes. In particular, research has suggested that engaging in reappraisal, seeking social support, and actively working to solve the problem can predict beneficial outcomes, while avoiding a problem is associated with worse outcomes. Positive emotions broaden cognition and lead to more creative thought, which should allow people to think of adaptive ways of coping with a situation. Additionally, positive emotions should make a stressful event less threatening, which will make individuals less likely to cope with stressors through avoidance.

Research by James Gross (2002) suggests that reappraisal (changing the meaning assigned to a potentially emotional event, in order to think about the event in a less emotional way) is associated with beneficial outcomes. Being instructed to reappraise an event decreases the experience of negative emotions, and is associated with lower physiological responses to stressors than an alternate emotion regulation strategy (suppression; Gross, 2002). Similarly, research by Lazarus (1993) shows that positive reappraisals are associated with beneficial outcomes. Consequently, if positive emotions increase reappraisal, they should also decrease physiological responses to stressful events.

Research also suggests that seeking social support may be another adaptive way of responding to stressful events. Seeking social support is an example of approach coping, a

coping style associated with beneficial outcomes (Taylor, 2011). Additionally, seeking social support is likely to be beneficial if it causes individuals to receive responsive support from others (Maisel & Gable, 2009). Research has demonstrated that supportive social relationships have a significant effect on health outcomes; in fact, a recent meta-analysis suggests that the benefit to health from supportive social relationships is the same magnitude as the benefit from quitting smoking (Holt-Lunstad, Smith, & Layton, 2010). Consequently, positive emotions may promote health if they cause individuals to seek out support during stressful events (assuming that individuals receive responsive support when they seek it out).

Research also suggests that coping that involves engaging with the problem (problem solving) is generally adaptive, while coping by avoidance is generally maladaptive. For example, approach coping (engaging with the stressful event) can help people modify the stressor and lead to improved well-being over time, while avoidance coping is associated with worse outcomes (Taylor, 2011). Additionally, research by Lazarus (1993) has found that planful problem solving is associated with positive outcomes.

According to Fredrickson's broaden-and-build theory, positive affect broadens individuals' attentional focus, so it should lead to types of coping that require novel problem-solving (Fredrickson & Joiner, 2002). In a recent study, positive affect at one time point has been found to predict "broad-minded coping" (thinking of novel ways to deal with a stressor) five weeks later (Fredrickson & Joiner, 2002), and a replication of this study found that positive affect predicted positive coping (Burns et al., 2008). Steptoe, O'Donnell, Marmot, and Wardle (2008) found that ecological momentary assessments of positive affect (the aggregate of many positive emotion ratings over the course of one day) were associated with

beneficial coping strategies such as engaging with the problem and seeking social support. Although coping has been proposed as a way that positive affect may affect health (Fredrickson & Joiner, 2002), the prior studies have employed longitudinal designs, which leave unanswered the question of whether experimental manipulations of positive affect could improve coping processes. As it is plausible that other third variables (such as social support and integration within social networks) could be associated with both positive affect and adaptive coping, it is crucial to conduct research assessing the causal relationship between positive affect and coping.

**Rumination**

Another potential mediator of the link between positive affect and health is rumination. Rumination refers to the tendency to have repetitive thoughts about negative emotions, and involves both focusing on one's distress and worrying about the fact that one is distressed (Nolen-Hoeksema, 2000). Research has suggested that rumination can have negative effects on mental health (Nolen-Hoeksema, 2000) and recent studies suggest that rumination may have effects on physical health as well: for example, one study found that ruminating about a stressful event (a laboratory speech task) was associated with prolonged cortisol responses (Zoccola et al., 2008). Because positive emotions may be able to refocus attention away from the stressful event, they should reduce rumination. Consequently, if positive affect decreases rumination, it could promote health by speeding recovery from stressors. As a prior study has shown that watching a cheerful film decreased rumination in response to an anxiety-provoking event (Bahrami et al., 2012), rumination appears to be another promising mechanism explaining the link between positive affect and health.

**Perceived Resources**

A large field of research has suggested that resources exert an enormous stress-buffering effect, and that *perceived* resources are especially important for stress buffering. Social resources are one especially important type of resource: social support has tremendous effects on health outcomes (Holt-Lunstead et al., 2010), and one pathway through which social support exerts its beneficial effects is through stress buffering (e.g. Cohen & Wills, 1985). Perceived resources can also include personal resources as well. According to Fredrickson's (1998) broaden and build theory, the broadened cognitions caused by positive emotions should help individuals to cultivate both their personal and social resources. For example, the positive emotion of interest can lead individuals to learn new information and skills, thus building intellectual resources (Fredrickson, 1998). Similarly, the emotion of love can encourage individuals to spend time with close others, which builds social resources (Fredrickson, 1998). Some empirical research has tested this idea that positive emotions can help individuals to build personal resources. In one study, Fredrickson and colleagues (Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008) randomly assigned participants to engage in loving-kindness meditation or to a waitlist control group. It was found that meditation increased positive emotions, which in turn lead to increased personal and social resources (such as self-acceptance and relationships with others). Additionally, increases in resources mediated the relationship between positive emotions and increased life satisfaction. In another study (Wang, Lv, Du, & Wang, 2011), perceived resources fully mediated the link between positive affect and mental health. Consequently, one way that positive emotions

may promote health and well-being is through increasing the resources that individuals have available to them.

Importantly, positive emotions may also have effects on health and well-being by increasing individuals' *perceptions* of resources, rather than actual levels of resources. We know from past research that typically, it is the perceived (rather than actual) level of resources that matter for health (e.g. Wethington & Kessler, 1986). Consequently, something that promotes the *perception* that people have more resources should benefit health, even without changing actual levels of resources people have. Positive emotions could change perceptions of resources for several reasons. First, they may serve to refocus attention toward resources people have available to them. For example, experiencing gratitude or love should remind them of social resources they can draw upon. Additionally, positive emotions could remind people of times they have successfully used resources in the past. For example, gratitude should remind people of times when they have been able to successfully use social resources, and pride should remind people of times when they have successfully used personal resources. Consequently, I expect that when individuals are under stress, a brief positive emotion induction should refocus attention and increase one's momentary perceptions of available resources. Additionally, mood-consistent memory (Bower, 1981) may also play a role in perceptions of resources: since successfully using resources is a positive thing, people should be better able to remember times when they have successfully used resources when they are in a positive mood.

**Specific Positive Emotions, Coping, Rumination, and Resources**

## POSITIVE EMOTIONS AND COPING

The existing research on positive emotions and health has typically looked at just one positive emotion (e.g., cheerfulness) or looked at an aggregate level of positive affect. However, because different positive emotions involve different action tendencies (Fredrickson, 1998), studying the role of *specific* positive emotions is likely to lead to somewhat different predictions than if positive emotions are studied in aggregate.

**Amusement.** According to Fredrickson's theory, joy and the related emotion of amusement lead to a relatively nonspecific thought-action tendency: to engage in play (including intellectual play). Consequently, the emotion of amusement would be likely to lead people to engage in creative thought, and to generate coping responses that involve thinking about an existing problem in a new light (ie, reappraisal), or in generating a novel and creative way of responding to an existing problem (ie, problem-solving). Additionally, thinking in novel ways could potentially distract people from repetitive thoughts, and thus prevent rumination from occurring.

**Love.** In Fredrickson's theory, the emotion of love also serves to broaden thought-action repertoires (since love can include related emotions such as interest and joy), but love also encourages interactions with loved ones. According to this theory, over time, feelings of love should lead to more social interactions with loved ones and serve as the basis for development of social support networks. Consequently, it is likely that feeling love would lead to increased interest in seeking out social support, a coping style less likely to occur as a result of non-social emotions such as amusement. Additionally, it is possible that the thoughts of close others produced by feeling love could also serve to distract individuals from negative thoughts that individuals would otherwise ruminate about.

**Gratitude.** An additional positive emotion associated with beneficial outcomes is gratitude. Gratitude can involve either recognizing a responsive or thoughtful action by another person (termed "benefit-triggered gratitude"), or, more generally, can involve appreciating that one has valuable and meaningful things in one's life (termed "generalized gratitude") (Lambert, Graham, & Fincham, 2009a) [2]. Numerous studies have found that gratitude is linked to well-being, though less research has been conducted on gratitude and physical health (see Wood, Froh, & Geraghty, 2010 for a review). In one study, a gratitude intervention was associated with reduced physical health symptoms; however, this result was not replicated in a second study (Emmons & McCullough, 2003).

Based on the existing research on gratitude, I identified two ways in which gratitude could impact health. First, gratitude could lead to more adaptive coping. One study (Wood, Joseph, & Linley, 2007) found that grateful people use more adaptive coping styles, which mediates the effect of gratitude on self-reported stress. However, this study didn't experimentally induce gratitude, so experimental research is needed to test the causal link between gratitude and coping. Another series of studies assessed the relationship between gratitude, positive reframing (a type of coping), positive emotion, and depressive symptoms (Lambert, Fincham, & Stillman, 2012). A longitudinal study in this paper found that gratitude was associated with reduced depressive symptoms and that this was mediated by positive reframing. An experimental study in this paper found that a gratitude intervention led to reduced levels of depressive symptoms and increased positive emotions. However, this paper did not test whether experimentally induced gratitude led to increased positive

[2] See Discussion as well as Lambert et al. (2009) for an additional consideration of how these different types of gratitude may impact health and well-being differenty.

reframing (though it did find that positive reframing caused increased gratitude), and it did not measure physical health outcomes or stress biomarkers. In addition to improving coping, gratitude may also build personal resources. One study found that gratitude is associated with a greater sense of coherence (a personal resource) and this effect is mediated by positive reframing (a type of coping) (Lambert, Graham, Fincham, & Stillman, 2009b).

Secondly, gratitude could also lead to better social relationships and build perceptions of social resources. According to Sara Algoe's Find-remind-bind theory (Algoe, 2012), gratitude is hypothesized to strengthen social relationships. Some empirical support for this idea comes from Algoe, Haidt, and Gable's (2008) study, in which participants who reported greater levels of gratitude for a benefit had a closer relationship with the benefactor one month later. In another study (Lambert, Clark, Durtschi, Fincham, & Graham, 2010), people randomly assigned to express gratitude towards a close relationship partner perceived that this relationship had greater communal strength. As social relationships and perceptions of social resources are so beneficial for health, this may be one mechanism through which gratitude could lead to improved health outcomes.

There is some evidence to suggest that the relationship between gratitude and health is mediated by psychosocial variables. One recent study (Hill, Allemand, & Roberts, 2013) found that gratitude was associated with lower physical symptoms, and this was mediated by psychological health; however, this was a non-experimental study looking at the relationship of a grateful disposition to health variables, so more research is needed to assess the direction of causality.

**Overview of Studies**

The present research aims to test the hypotheses that positive emotions can have consequences on health through its effects on coping, rumination, and perceived resources, and that different types of positive emotions can affect health-relevant processes in different ways. In Study 1, I investigated the effects of experimentally-induced positive emotions on two potential stress buffering mechanisms, coping and rumination. In Study 2, I investigated the effects of experimentally induced gratitude on measures of coping, social resources, and personal resources. I hypothesized that positive emotions would be associated with improvements in coping, rumination, and perceived resources; however the specific predictions differed for specific positive emotions.

## Study 1

In Study 1, I experimentally manipulated two types of positive affect, amusement and love. These two emotions were chosen because, based on Shaver's (1987) prototype analysis, social and non-social positive emotions (specifically, love and joy) are the two broadest categories of positive emotion.

I then measured both coping and rumination in response to an imagined stressor in the lab, and included an implicit measure of coping (a lexical decision task). In the lexical decision task, participants were shown a neutral word or a word relating to failure, and were then asked to indicate as quickly as possible whether a string of letters (some of which were words related to coping) formed a word. Prior research has suggested that priming a stressor in this way affects the accessibility of thoughts related to that stressor. In a study on attachment style, Mikulincer, Birnbaum, Woddis, and Nachmias (2000) showed participants a neutral or failure prime, and participants were then asked to indicate whether a string of

letters (some of which were related to proximity-seeking) formed a word. Mikulincer and colleagues found that, after being primed with the word "failure," participants were faster to recognize proximity-seeking words (consistent with the theoretical prediction from attachment theory that individuals should seek proximity to close others in times of stress). Other research has suggested that lexical decision tasks may reflect "if-then contingencies:" participants primed with sentences responded fastest to target words that related to their expectations for close relationships (Baldwin, Fehr, Keedian, Seidel, & Thomson, 1993). Based on this prior work, I expect that faster reaction times for a coping-relevant word when primed with failure (compared to a neutral prime) will indicate a greater association between failure and that coping style. In other words, applying the logic of "if-then" contingencies to this lexical decision task, it would be assumed that participants who respond relatively quickly to the word "reappraise" when primed with "failure" would have the if-then contingency of, "If failure, then reappraise."

In this study, I tested two main hypotheses about the relationship between positive emotions, coping, and rumination:

- *Hypothesis 1:* Experimentally induced positive affect (amusement and love) will lead to greater use of adaptive coping styles (reappraisal, seeking social support, and problem solving) and lower use of a maladaptive coping style (avoidance), compared to a control condition. These effects will be found for both self-reported and implicit coping.

  - *Hypothesis 1a:* Experimentally-induced amusement will lead to greater implicit and self-reported reappraisal and active coping compared to the love condition.
  - *Hypothesis 1b:* Experimentally-induced love will lead to greater implicit and self-reported support-seeking compared to the amusement condition.
- *Hypothesis 2:* Both amusement and love will lead to decreases in rumination compared to a control condition.

## Methods

### Participants

Participants ($N$ = 143, 55 males) were undergraduates at the University of California, Santa Barbara, who received course credit for participation in this study. The mean age of the sample was 18.82 years ($SD$ = 2.477 years). Ethnic breakdown of the sample was 25.2% Asian/Asian American, 3.5% Black/African American, 22.4% Hispanic/Latino, 43.4% White/European American, and 5.5% other. 28 participants were excluded from the final sample (6 participants guessed the purpose of the study, 3 participants saw the subliminal prime word "failure," 18 participants experienced technical difficulties while watching the video, and 1 participant noticed that the words in the lexical decision task were related to coping), leaving a final sample of 115 participants. All analyses reported below were conducted after these 28 participants were excluded.

### Materials/Measures

**Film clips.** Positive emotions were induced by watching film clips. Specifically, participants were randomly assigned to one of three conditions: 1) Love, 2) Amusement, and

3) Neutral/Control. In each condition, participants watched a film clip of approximately 1-2 minutes. In the love condition, participants watched a scene from the film *The Princess Bride*, in which one character realizes that another character is in love with her, and that she loves him too. In the amusement condition, participants watched a scene from *Saturday Night Live* in which a man shows up to a business meeting wearing very short shorts with an American flag design (Season 27, Episode 2, "Patriotic Shorts"). In the neutral condition, participants watched a video consisting of colorful lines on a black background. The love and amusement film clips were pre-tested by Dr. Belinda Campos and Dr. Shelly Gable on a similar sample of undergraduate students at the University of California, Los Angeles, and the neutral film clip has previously been used by Dr. James Gross at Stanford University.

**Emotion rating task.** Participants completed a brief emotion rating task that served as a manipulation check. Specifically, participants were asked to rate, on a scale of 1-7, how strongly they felt each of the following emotions: *amused*, *loved*, *relaxed*, *sad*, *connected to others*, *distressed*, and *entertained*. To serve as a manipulation check, two composite scales were created, amusement (mean of "amused" and "entertained") and love (mean of "love" and "connected to others"). The amusement scale had a mean of 4.16 (SD=1.39), and the love scale had a mean of 4.27 (SD=1.47). Both scales had acceptable internal consistency ($\alpha$=.74 for amusement, $\alpha$=.73 for love).

**Lexical decision task.** Participants completed a lexical decision task, which served as an implicit measure of coping. This task was modeled after Mikulincer and colleagues' (2000) lexical decision task to measure attachment processes. In the current task, participants were primed with a word for 33.33 milliseconds, one of which was neutral (i.e.,

"kitchen"), and one of which was related to a stressor (i.e., "failure"). Participants were then shown a "mask" (a string of X's to prevent participants from viewing the after-image of the prime) for 100 milliseconds, and then shown a blank screen for 500 milliseconds. Participants were then shown a string of letters and were asked to indicate as quickly as possible if the letters formed a word. Twenty of the words were related to coping styles[3] (for example, "reappraise" for reappraisal, "confide" for support-seeking, "tackle" for problem-solving, and "avoid" for avoidance), ten of the words were neutral (e.g., "paint"), and thirty of the words were non-words (e.g., "blimb"). Shorter response times for words relating to a particular coping style after being shown the stressor prime (compared to the reaction time after being shown the neutral prime) indicate that participants have an automatic association between stressors and that particular coping style. For example, participants who are faster to recognize "confide" as a word after being shown the prime "failure" (compared to the prime "kitchen") would be expected to automatically have the response of "seek support" activated when the concept of "stressor" is activated.

Of the 115 participants, lexical decision task data was available for 82 participants (the data was not recorded properly for 33 of these 115 participants).

**Imagining a hypothetical academic stressor.** Participants were asked to imagine failing an exam that was of high importance to them. Specifically, participants were asked to imagine that they were taking a class that they were very interested in, and had failed the midterm because they had not had enough time to study. Participants were asked to imagine

[3] The words related to coping styles were chosen by providing a list of potential coping words to graduate students and professors in social psychology; the graduate students and professors were asked to indicate which coping style each word represented, and how well the word represented that coping style.

their emotions, thoughts, and behaviors in such a situation, and were then given three minutes to write about this hypothetical experience.

**Coping questionnaire.** Participants completed Charles Carver's Brief COPE (Carver, 1997), a 28-item self-report measure of coping. This measure was chosen because it is widely used in research and captures a broad variety of coping styles. For the hypothetical academic failure that participants had previously written about, they were asked to indicate to what extent they would use each of the coping styles listed (on a scale from 1-4, 1 = "I wouldn't do this at all", 4 = "I would do this a lot"). The measure included 14 subscales, including positive reframing, a construct conceptually analogous to reappraisal ("*I would try to see it in a different light, to make it seem more positive.*"), seeking emotional support ("*I would get emotional support from others.*"), seeking instrumental support ("*I would get help and advice from other people.*"), active coping ("*I would take action to try to make the situation better.*"), and denial ("*I would refuse to believe that it has happened*."). For the present study, I used the subscales of positive reframing, seeking emotional support, seeking instrumental support, and active coping. In addition to the original 2-item subscales developed by Carver, two composites were created: general social support (including both the "instrumental support" and "emotional support" items) and avoidance (including the items for self-distraction, denial, and behavioral disengagement). Of the subscales used in the analyses, three scales (positive reframing, active coping, and avoidance) had α values of at least .60; for the remaining scales used, α=.870 or greater.

**Rumination measure.** Participants were asked to spend two minutes sitting quietly, and then two minutes writing about their current thoughts and feelings. Participants then

responded to several questions assessing rumination. Participants were asked to respond to four items: "*While completing the memory test, how much did you end up thinking back to the writing task and questionnaires you completed about an academic failure?*," "*It was hard for me to shut off thoughts about the task I completed on academic failure*," "*I played back over in my mind how I felt during the task about academic failure*," and "*I spent time thinking back over the task about academic failure*." (The first item was rated on a 1-7 scale from "Not at all" to "A great deal," while the last three items were rated on a 1-5 scale, from "Strongly agree" to "Strongly agree."). Each item was converted to standardized Z-scores, and a composite rumination scale was formed from the mean of these items. This scale had excellent internal consistency ($\alpha$=.93).

**Procedure**

In order to avoid demand characteristics, the study was presented as a study of the factors affecting memory. Participants were told that they would watch a film clip, complete several computer tasks and questionnaires, and respond to questions about the film clips at several time points. After the study was described to them, participants then watched one of the three film clips. After viewing the film clip, participants completed the emotion rating task and then the lexical decision task. Participants were then asked to list three things that they remembered from the film clip (this was done in order to bolster the cover story, to encourage participants to think about the film clip, and to assess whether the participant had attended to the film clip).

Next, participants were asked to imagine and write about a hypothetical academic stressor and complete the Brief COPE. After completing the COPE, participants were then

asked to list five things about the film clip they had previously seen. Next, participants were given two minutes to wait quietly (in order to give participants a time in which to potentially ruminate about the academic stressor), after which they completed the measures of rumination.

After completing these tasks, the participants completed demographic measures and a questionnaire to test participants' suspicion about the study design. Following this, the experimenter debriefed participants and obtained informed consent for participants' use of their data.

## Results

### Manipulation Check

**Amusement.** A one-way ANOVA was conducted to assess whether feelings of amusement (as measured by the composite scale) differed by condition. It was found that feelings of amusement differed significantly by condition, $F(2,112)=15.562$, $p<.001$. Tukey post-hoc tests revealed that participants in both the love ($M=4.86$) and amusement ($M=4.46$) conditions reported significantly higher feelings of amusement than participants in the control condition ($M=3.36$); however, love and amusement did not differ significantly from each other. A contrast analysis was also conducted to test whether love and amusement differed significantly from neutral. The analysis demonstrated that love and amusement differed significantly from neutral, $t(112)=5.424$, $p<.001$. Consequently, the manipulation check suggests that the positive emotion film clips successfully induced feelings of amusement; however, the love and amusement clip were not distinguishable from each other.

**Love.** A one-way ANOVA was conducted to assess whether feelings of love (as measured by the composite scale) differed by condition. It was found that feelings of love differed marginally by condition, $F(2,112)=2.403$, $p=.095$. Tukey post-hoc tests revealed that participants revealed that participants in the amusement condition ($M=3.88$) reported marginally lower feelings of love than participants in the control condition ($M=4.58$); the love condition ($M=4.29$) did not differ significantly from the amusement or control conditions. A contrast analysis was also conducted to test whether love and amusement differed significantly from neutral. The analysis demonstrated that love and amusement differed marginally from neutral, $t(112)=-1.818$, $p<.072$, such that participants reported lower feelings of love in the positive emotion conditions. Consequently, the manipulation check suggests that the film clips used in the present study failed to induce feelings of love in participants; in fact, there was a marginally significant trend for the positive emotion film clips to induce *lower* feelings of love than the neutral film clip.

**Self-Reported Coping**

One-way ANOVAs were conducted to assess whether self-reported coping differed significantly by condition. There were no significant effects of condition on positive reframing/reappraisal, emotional support-seeking, general support-seeking, active coping, or avoidance (all p values > .270). A contrast analysis was also conducted to test whether love and amusement differed significantly from neutral. The analysis demonstrated that love and amusement did not differ significantly from neutral for positive reframing/reappraisal, emotional support-seeking, instrumental support-seeking, general support-seeking, active

coping, or avoidance (all p values > .330). The mean values for each condition are reported in Table 1.

There was a trend towards significance of the effect of condition on instrumental support-seeking, $F(2,112)=2.072$, $p=.131$. Tukey post-hoc tests revealed that participants reported slightly lower levels of seeking instrumental support in the love condition ($M=2.59$) than in the amusement condition ($M=3.03$) ($p=.118$); the control condition ($M=2.74$) did not differ significantly from amusement or love (p values > .350). Additionally, the contrast analysis comparing love and amusement to neutral found that the positive emotion conditions did not differ significantly from neutral ($p=.704$).

**Implicit Coping**

**Overview of data analysis.** Incorrect responses, responses faster than 300 milliseconds, and outliers (responses more than three standard deviations from the mean; 2.104 seconds or greater) were excluded. For each category of words (reappraisal, support-seeking, problem solving, avoidance, neutral, and non-words), two scores were computed: the average reaction time when presented with the neutral prime, and the average reaction time when presented with the failure prime. For each coping style, I conducted a repeated measures ANOVA to test for the effects of prime, condition, and an interaction of prime X condition. I hypothesized that there would be significant prime X condition interactions, such that, when primed with failure, participants would be faster to recognize adaptive coping words in the positive emotion conditions and would be slower to recognize maladaptive coping words in these conditions.

Additionally, to test the hypothesis that love and amusement differed significantly from neutral, I conducted a one-way ANOVA with a contrast analysis. In this analysis, the dependent variable was the average reaction time to coping words after seeing the failure prime.

**Reappraisal.** There were no significant effects of condition ($F(2,79)=1.166$, $p=.317$), prime ($F(1,79)=1.201$, $p=.277$), or prime X condition ($F(2,79)=.287$, $p=.752$) (See Table 2 for estimated marginal means.) When reaction time to nonwords (the participant's average reaction time to nonwords after both fail and neutral primes) was entered as a covariate, the effects of condition and prime X condition remained nonsignificant (all p values > .150). When controlling for nonword reaction time, there was a trend towards significance for the effect of prime, $F(1,78)=2.634$, $p=.109$, such that reaction times were slower when participants were primed with failure.

The contrast analysis showed that reaction times to reappraisal words (when primed with failure) did not differ when the positive emotion conditions were compared to the neutral conditions, $t(79)=.872$, $p=.386$.

**Support-seeking.** There was a significant effect of condition ($F(2,79)=3.288$, $p=.042$). There were no significant effects of prime ($F(1,79)=.406$, $p=.526$) or prime X condition ($F(2,79)=.262$, $p=.770$). (See Table 3 for estimated marginal means.) However, when controlling for average reaction times, there were no significant effects of prime, condition, or prime X condition (all p values > .180).

The contrast analysis showed that there was a trend towards significance for the effect of condition on reaction times to social support words (when primed with failure),

t(79)=1.472, p=.145. However, this trend was not in the hypothesized direction (participants were faster to recognize support words in the neutral condition).

**Problem-solving.** There was a trend towards significance for the effect of condition (F(2,79)=2.094, p=.130). There were no significant effects of prime (F(1,79)=1.387, p=.243) or prime X condition (F(2,79)=1.378, p=.258). (See Table 4 for estimated marginal means.) When controlling for average reaction times, there were no significant effects of prime, condition, or prime X condition (all p values > .250).

The contrast analysis showed that there was a trend towards significance for the effect of condition on reaction times to problem-solving words (when primed with failure), t(79)=1.527, p=.131. However, this trend was not in the hypothesized direction (participants were faster to recognize problem-solving words in the neutral condition).

**Avoidance.** There was a trend towards significance for the effect of condition (F(2,79)=2.224, p=.115). There were no significant effects of prime (F(1,79)=1.977, p=.164) or prime X condition (F(2,79)=1.430, p=.245). (See Table 5 for estimated marginal means.) When controlling for average reaction times, there were no significant effects of prime, condition, or prime X condition (all p values > .190).

The contrast analysis showed that reaction times to avoidance words (when primed with failure) did not differ when the positive emotion conditions were compared to the neutral conditions, t(79)=.026, p=.979.

**Rumination**

A one-way ANOVA was conducted to assess whether self-reported rumination differed significantly by condition. There was no significant effects of condition on

rumination, F(2,112)=.226, p=.798. A contrast analysis was also conducted to test whether love and amusement differed significantly from neutral. The analysis demonstrated that love and amusement did not differ significantly from neutral, t(112)=-.638, p=.525. The mean values for each condition are reported in Table 6.

**Correlational Analysis**

Because I failed to find the expected effects of condition, I conducted a correlational analysis to look at the correlations between participants' self-reported emotions (as measured in the manipulation check) and their responses on the self-report variables. In other words, I assessed whether participants' self-reported levels of amusement and love (regardless of the condition they were assigned to) were correlated with their self-reported coping style and rumination. For amusement, there were no significant effects. For love, there were significant effects for emotional support, instrumental support, and active coping, such that participants reporting higher feelings of love also reported greater use of emotional support, instrumental support, and active coping. (See Table 7 for the correlation table.)

## Discussion of Study 1

Study 1 sought to test the hypothesis that positive emotions are associated with more adaptive coping responses and reduced rumination. I hypothesized that positive emotions would lead to higher levels of adaptive coping and lower levels of maladaptive coping. Additionally, two hypotheses about the effects of specific positive emotions were tested. First, I hypothesized that amusement would lead to greater implicit and self-reported reappraisal and active coping, and that love would lead to greater implicit and self-reported

support-seeking. Finally, I hypothesized that both amusement and love would lead to decreases in rumination compared to the control condition.

**Self-report data: Coping.** I found no effect of condition on reappraisal, emotional support-seeking, active coping, or avoidance. For instrumental support-seeking, I found that participants were somewhat less likely to report seeking instrumental support in the love condition than in the amusement condition (although this effect was not significant).

The effect of love on instrumental support was surprising, as it was contradictory to our hypothesis. One possible reason for this effect is due to the nature of the film clip that participants viewed. In the beginning of the film clip, the female protagonist (Buttercup) repeatedly asks the male protagonist (Westley) to complete chores for her around the farm. It is possible that participants may have perceived Buttercup as being demanding or as taking Westley's assistance for granted, and reported seeking less instrumental support in order to dis-identify with Buttercup's behavior. In order to assess this possibility, I conducted ANOVAs assessing the effect of condition on support seeking separately for men and women (since women might be especially likely to try to distance themselves from Buttercup, as Buttercup is a female character). After conducting the analysis separately for men and women[4], it was found that the effect of condition on support-seeking was found for women, but not for men, further strengthening the explanation that female participants did not want their behaviors to be perceived as similar to another female's negative behaviors.

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[4] It was found that, for men, there was no significant effect of condition on instrumental support-seeking, $F(2,45)=.944$, $p>.397$. For women, there was a significant effect of condition on instrumental support seeking, $F(2,64)=4.696$, $p=.012$. Tukey post-hoc tests revealed that female participants in the love condition ($M=2.58$) reported significantly lower instrumental support-seeking than participants in the amusement condition ($M=3.45$); the control condition did not differ significantly from amusement or love ($M=3.02$).

**Implicit data.** I tested the hypothesis that, in the positive emotion conditions, participants would be faster to recognize adaptive coping words when primed with failure (as opposed to neutral primes); in other words, I expected an interaction of prime by condition. However, I found that there was no significant interaction of prime by condition for any of the coping variables measured.

**Self-report data: Rumination.** There were no significant effects of condition on rumination.

**Correlational Analysis.** There were three significant effects: participants who reported greater feelings of love during the manipulation check also reported greater use of emotional support, instrumental support, and active coping. These correlations will be discussed in greater detail in the General Discussion.

There are several reasons why the current study may have failed to produce significant effects. First, our manipulation check failed to show the predicted effects. Although the positive emotion film clips produced greater feelings of amusement than the neutral video, the amusement and love clips produced roughly equal levels of amusement. As *The Princess Bride* is a comedy film, this particular film clip may have produced greater feelings of amusement than film clips from dramatic films. Although it was not intended that participants would find this particular scene from the film to be funny, participants may have seen *The Princess Bride* previously, and may have remembered other humorous scenes from the film. Importantly, the positive emotion film clips did not induce feelings of love; if anything, participants in the positive emotion conditions reported marginally lower feelings of love compared to the neutral condition.

POSITIVE EMOTIONS AND COPING

One reason that the film clips may have failed to produce the emotion of love concerns the fact that love is a broad emotion. The emotion of love actually encompasses several different emotions: for example, feeling romantic love versus feeling companionate love (e.g. Lazarus, 1991) or feeling love towards another person versus feeling loved by another person. Because the emotion of love is so broad, it may have been difficult to induce in a film clip, or the task may have induced different types of love in different participants. It is also quite possible that watching other people who are in love (as was the case in the present study) does not actually produce the emotion of love per se[5]: one may experience more general feelings of warmth and tenderness (rather than love for a specific other person), or one may even feel sadness (if seeing others in love reminds one of a recent loss of a relationship). As our manipulation check failed to show increased feelings of love in the love condition, it is likely that one of the issues listed above affected the success of the experimental manipulation. For future research, tasks that seek to induce more specific emotions (rather than a broad emotion such as love) may be more successful.

Additionally, the use of film clips may have limited the effectiveness of the present study, as film clips may have been too impersonal. Some research has suggested that film clips do induce positive emotions (Westermann, Spies, Stahl, & Hesse, 1996), however, this research did not specifically address which emotion inductions are best for specific types of positive emotions. It may be that for interpersonal emotions, such as love, positive emotion inductions that include personalized information (such as asking participants to write about events from their own lives) produce stronger effects than more impersonal emotion

[5] I would like to thank the members of Nancy Collins' lab for bringing this issue to my attention.

inductions. Tasks that have greater personal involvement (such as writing about a time when one has previously felt an emotion) may prove to induce stronger emotions in participants.

Another reason the study may have failed to yield significant results concerns the nature of the academic stressor task that participants completed. Participants may have found the stressor task (writing about a hypothetical academic failure) more salient than the positive emotion task, and this stressor task may have consequently overshadowed the effects of the film clips. During debriefing, some participants guessed that the study was about academic failure, rather than about positive emotions. This suggests that our academic failure task may have been more salient to this population (college undergraduates, many of whom presumably had upcoming midterms and finals) than the film clips were. Finally, another possible explanation for the present results is that different theoretical models might be more appropriate to understand the relationship between positive emotions and health (a possibility that will be elaborated on in the General Discussion).

In order to address these limitations, Study 2 was conducted. Study 2 sought to induce a more specific emotion (gratitude) and used a more personally relevant emotion induction (a writing prompt). Additionally, we used a task that involved just briefly imagining an academic stressor (rather than a longer writing task about the stressor), in order to prevent the failure task from overshadowing any effects of condition.

## Study 2

In Study 2, I experimentally manipulated feelings of gratitude and measured coping and perceived resources as outcomes. Participants were randomly assigned to write about events from their life that they were grateful for or neutral topics. Participants who wrote

about things they were grateful were randomly assigned to write about these things using either an immersed perspective (focusing on their emotions) or a distanced perspective (writing about the event the way a dispassionate observer would). This was done in order to be able to show that it was the emotion of gratitude, rather than just cognitive awareness that others have done something for the self, that influences outcomes. After writing about things that they were grateful for, participants completed the implicit coping measure (as in Study 1), and then filled out self-report measures of coping, perceived social support availability, and perceived resource availability.

In this study, I tested three main hypotheses:

- *Hypothesis 1:* Experimentally induced gratitude will lead to greater use of adaptive coping styles (reappraisal, seeking social support, and problem solving) and lower use of a maladaptive coping style (avoidance), compared to a control condition. These effects will be found for both self-reported and implicit coping. This effect will be stronger for participants assigned to take an immersed perspective when writing about events they are grateful for.
- *Hypothesis 2:* Gratitude will lead to increased perceptions of social support availability, and this effect will be stronger for participants assigned to take an immersed perspective when writing about events they are grateful for.
- *Hypothesis 2:* Gratitude will lead to increased perceptions of resource availability, and this effect will be stronger for participants assigned to take an immersed perspective when writing about events they are grateful for.

## Methods

**Participants**

Participants ($N$ = 123, 38 males) were undergraduates at the University of California, Santa Barbara, who received course credit for participation in this study. The mean age of the sample was 19.40 years ($SD$ = 2.04 years). Ethnic breakdown of the sample was 23.6% Asian/Asian American, 5.7% Black/African American, 28.5% Hispanic/Latino, 33.3% White/European American, 6.5% multiple ethnicities, and 2.4% other.

**Materials/Measures**

**Writing task.** Participants were randomly assigned to one of three conditions: two gratitude conditions (one that required taking an immersed perspective and one that required taking a distanced perspective) and one control condition. In each condition, participants were either asked to write about three things that they were grateful for or three things that happened yesterday. In the gratitude-immersed condition, participants were given the instructions, *"Please think about a situation when you felt grateful. This may be something that happened before but continues to make you grateful, or something recent. We'd like you to pick something good that has been on your mind recently, no matter how big or small. Once you have decided on this situation, follow the instructions below. Relive the situation as if it were happening to you all over again . . . Reexperience the situation as it progresses in your mind's eye. As you continue to reexperience this situation, try to focus on the emotions you felt, and on reexperiencing the way you felt at the time. Please do your best to maintain this perspective as you complete the writing task."* In the gratitude-distanced condition, participants were instructed, *"Please think about a situation when you felt grateful. This may be something that happened before but continues to make you grateful, or*

*something recent. We'd like you to pick something good that has been on your mind recently, no matter how big or small. Once you have decided on this situation, follow the instructions below. Take a few steps back . . . Move away from the situation to a point where you can now watch the situation from a distance. . . . Watch the situation unfold as an observer, as if you were watching it happening to someone else. Replay the interaction as it progresses in your mind's eye, while trying to keep a distance from the situation. In particular, try to think about this situation in a detached, unemotional way. Please do your best to maintain this perspective as you complete the writing task."* Participants in the control condition were instructed, *"Please think of something that you did yesterday."* (participants in this condition were not given any manipulation of mindset, because we were not interested in the effects of a mindset manipulation in a neutral task). For each item participants wrote about, they were given as much time as they needed to think of an item to write about (and to adopt the requested perspective, if they were assigned to the gratitude condition), and once they had chosen a topic, they were given three minutes to write.

**Emotion rating task.** Participants completed a brief emotion rating task that served as a manipulation check. Specifically, participants were asked to rate, on a scale of 1-7, how strongly they felt each of the following emotions: *amused, appreciative, bored, calm, distressed, entertained, excited, grateful, happy, interested, joyful, nervous, proud, relaxed,* and *sad*. To serve as a manipulation check, two composite scales were created, gratitude (mean of "grateful" and "appreciative") and positive affect (mean of *amused, appreciative, calm, entertained, excited, grateful, happy, interested, joyful, proud,* and *relaxed*). The gratitude scale had a mean of 5.23 (SD=1.40), and the positive affect scale had a mean of

4.41 (SD=0.99). Both scales had good internal consistency (α=.81 for gratitude, α=.86 for positive affect).

**Lexical decision task.** Participants completed a lexical decision task, which was identical to the task used in Study 1, with the exception that one of the words measuring support-seeking was replaced (in order to use a word that I believe better represents support-seeking, the word "assistance" was removed and replaced with "disclose").

**Coping questionnaire.** Participants completed 5 4-item subscales of Charles Carver's COPE (Carver, Scheier, & Weintraub; 1989): positive reinterpretation and growth (reappraisal), use of instrumental social support, use of emotional social support, active coping, and denial, and as well as one subscale of the brief COPE (self-blame). Instrumental and emotional support-seeking were combined to form one composite scale, and the self-blame scale was not used in the present analysis. Participants were asked to imagine doing poorly on a test they cared about, and then indicate how they would cope with this situation (unlike in Study 1, participants were not asked to write about how they would experience this event). The subscales were similar in content to the brief COPE, but the extended version of the COPE was used since it contained more items for each subscale. All subscales used had Cronbach's alpha > .60 and all but two (reappraisal and self-blame) had Cronbach's alpha >.70).

**Interpersonal support evaluation list.** Participants completed a 12-item version of the Interpersonal Support Evaluation List (ISEL; Cohen, 2008), a widely used measure of perceived social support availability (see Appendix 1 for the items used; we replaced one item from the traditional 12-item version because we believed this item was less relevant to

our college student population). Each item was measured on 4-point response scale *(1 = definitely false, 2 = probably false, 3= probably true, 4 = definitely true)*. The ISEL had good reliability, α = .86.

**Perceptions of Resources.** Participants filled out an 8-item scale developed for the present study. In this questionnaire, participants were presented with brief (one-sentence) scenarios of challenging situations that college students sometimes face, such as having financial difficulties or having an argument with a close friend (see Appendix 2 for a list of the scenarios). For each scenario, participants were asked to rate on a scale from 1-9 how well they would be able to cope with the event (*1= definitely WOULD NOT be able to cope with this event successfully, 9=definitely WOULD be able to cope with this event successfully*). The scale had a mean of 5.59 (SD=1.43) and good reliability, Cronbach's alpha = .81.

**Procedure**

To reduce demand characteristics, participants were told that they would be participating in a study about writing style and academic skills. Participants were told that they would be providing a writing sample (in actuality, this task was the gratitude induction) and completing a cognitive task (in actuality, the lexical decision task measuring coping). Pilot testing suggested that many participants were suspicious of this cover story, so in order to bolster the cover story, participants were given questions about writing and academic skills (e.g. amount of time spent in writing-related activities, number of English classes taken, grade point average, study habits). Participants were then told that they would answer several questions about themselves in order to choose the best topic for them to write about

for their writing sample. Participants answered several questions unrelated to the present study (taken from existing personality questionnaires), and then the computer appeared to "calculate" the best topic for them to write about. After the computer showed a "Calculating…" screen for several seconds, the writing task appeared.

Next, participants completed the gratitude writing task (which was randomly assigned and not related to responses on the prior questionnaire). After the writing task, participants completed the emotion rating task and then the lexical decision task. Participants were then asked to rank each of the three things they had written about before in terms of their importance (this was done in order to increase the strength of the experimental manipulation). Next, participants completed the questionnaires measuring coping, social support, and resources. After completing these tasks, the participants completed demographic measures and a questionnaire to test participants' suspicion about the study design. Following this, the experimenter debriefed participants and obtained informed consent for participants' use of their data.

## Results

### Manipulation Check

**Gratitude.** A one-way ANOVA was conducted to assess whether feelings of gratitude differed by condition. It was found that feelings of gratitude differed significantly by condition, $F(2,119) = 4.04$, $p = .02$. Tukey post-hoc tests revealed that both the immersed ($M=5.48$) and distanced ($M=5.50$) conditions differed significantly from neutral ($M=4.75$), but the two gratitude conditions did not differ significantly from each other. Consequently, the manipulation check suggests that the gratitude task successfully induced feelings of

gratitude; however, the immersed and distanced conditions were not distinguishable from each other.

**Positive Affect.** A one-way ANOVA was conducted to assess whether feelings of positive affect (as measured by the composite scale) differed by condition. It was found that feelings of positive affect did not differ significantly by condition, $F(2,120) = 0.29$, $p > .7$. Consequently, this suggests that the gratitude writing task was specific to gratitude, rather than increasing more generalized positive feelings.

**Self-Reported Coping**

One-way ANOVAs were conducted to assess whether self-reported coping differed significantly by condition. There were no significant effects of condition on positive reframing/reappraisal, support-seeking, active coping, or avoidance (all p values > .40). The mean values for each condition are reported in Table 8.

**Implicit Coping**

**Overview of data analysis.** Incorrect responses, responses faster than 300 milliseconds, and outliers (responses more than three standard deviations from the mean; 2.121 seconds or greater) were excluded. As in Study 1, I created scores for the average reaction time for each type of coping words when presented with the neutral prime, and the average reaction time when presented with the failure prime. Because there were differences in how quickly participants responded to neutral words as a function of prime and condition, I created a difference score to adjust for differences in reaction times to neutral words[6]. As in

[6] For neutral words, there was a tendency for participants in the gratitude-immersed condition to respond more quickly when primed with failure (compared to neutral primes) and for participants in the gratitude-distanced condition to respond more slowly when primed with failure (compared to neutral primes). Although not statistically significant, this tendency was unexpected since reaction times to neutral words

Study 1, I hypothesized that there would be significant prime X condition interactions, such that, when primed with failure, participants would be faster to recognize adaptive coping words in the gratitude conditions and would be slower to recognize maladaptive coping words in these conditions.

**Reappraisal.** There were no significant effects of condition ($F(2,120)=.176$, $p=.839$), prime ($F(1,120)=1.508$, $p=.222$), or prime X condition ($F(2,120)=.681$, $p=.508$) When creating a difference score to adjust for neutral word reaction times, the effects of condition ($F(2,120)=.492$, $p=.613$), prime ($F(1,120)=1.646$, $p=.202$), and prime X condition ($F(2,120)=1.541$, $p=.218$) were still not significant. (See Tables 9a and 9b for estimated marginal means).

**Support-seeking.** There were no significant effects of condition ($F(2,120)=.510$, $p=.602$) or prime ($F(1,120)=.149$, $p=.700$). There was a significant effect of prime X condition ($F(2,120)=3.389$, $p=.037$). However, when creating a difference score to adjust for neutral word reaction times, the effects of condition ($F(2,120)=.675$, $p=.511$), prime ($F(1,120)=.214$, $p=.645$), and prime X condition ($F(2,120)=.979$, $p=.379$) were not significant. (See Tables 10a and 10b for estimated marginal means).

**Problem-solving.** There was no significant effect of condition, $F(2,120=1.094$, $p=.338$). There were significant effects of prime ($F(1,120)=8.009$, $p=.005$) and prime X condition ($F(2,120)=3.476$, $p=.034$). However, after adjusting for neutral word reaction times, only the effect of prime was significant ($F(1,120=6.766$, $p=.010$): participants were slower to respond to words related to problem-solving after seeing the failure prime. The effects of condition ($F(2,120)=.180$, $p=.836$) and prime X condition ($F(2,120)=.794$, $p=.454$)

should not differ as a function of prime X condition.

were not significant. (See Tables 11a and 11b for estimated marginal means).

**Avoidance.** There were no significant effects of condition ($F(2,120)=.287$, $p=.751$) or prime ($F(1,120)=.458$, $p=.500$). There was a marginally significant effect of prime X condition, $F(2,120)=2.436$, $p=.092$. After adjusting for neutral word reaction time, there were no significant effects of condition ($F(2,120)=.968$, $p=.383$), prime ($F(1,120)=.458$, $p=.500$), or prime X condition ($F(2,120)=1.245$, $p=.292$). (See Table 12a and 12b for estimated marginal means.)

**Perceived Social Support**

A one-way ANOVA was conducted to assess whether perceptions of social support differed significantly by condition. There was no significant effects of condition on ISEL scores, $F(2,119) = 1.28$, $p = .28$ (M for immersed condition = 3.27, M for distanced condition = 3.44, M for neutral = 3.31).

**Perceived Resources**

A one-way ANOVA was conducted to assess whether perceptions of resources differed significantly by condition. There was no significant effects of condition on perceptions of resources, $F(2,119) = .84$, $p = .44$ (M for immersed condition = 5.79, M for distanced condition = 5.37, M for neutral = 5.61).

**Correlational Analysis**

I conducted a correlational analysis to look at the associations between participants' self-reported emotions (as measured in the manipulation check) and their responses on the self-report variables. I looked at participants' levels of self-reported gratitude, as well as their level of positive affect not including gratitude (i.e. a composite of all positive affect

words other than "grateful" and "appreciative"). I tested whether participants' self-reported levels of gratitude and positive affect were correlated with their self-reported coping style and perceived resources. For gratitude, there were significant effects for reappraisal, support seeking, and perceived social support, such that participants who experienced more gratitude were more likely to use reappraisal and support-seeking, and perceived that they had more social support. For positive affect other than gratitude, the only significant effects were for reappraisal and support-seeking (participants experiencing more positive affect reported greater reappraisal and support-seeking). (See Table 13 for the correlation table.)

**Discussion of Study 2**

In Study 2, I hypothesized that writing about things one is grateful for would lead to greater use of adaptive coping styles (reappraisal, support seeking, and problem solving), lower use of a maladaptive coping style (avoidance), and increased perceptions of social support and resource availability.

I found that asking participants to write about things that they are grateful for did increase momentary feelings of gratitude, although this difference was not especially large. I found that thinking about things one is grateful for using an immersed perspective (focusing on one's emotions) did not make people more grateful than thinking about these things using a distanced perspective (thinking about the event as an impartial observer), which is a somewhat surprising result. It is possible that participants may not have paid attention to the mindset manipulation, or that participants had difficulty adopting the requested mindset.

Although the task did lead people to feel slightly more grateful, my hypotheses about gratitude, coping, and resources were not confirmed. For coping, I found no significant

effects of condition. For perceptions of resources and perceptions of social support, I also found no significant effects of condition. However, a correlational analysis did reveal that participants who reported greater feelings of gratitude also reported greater use of reappraisal, greater use of social support, and increased perceptions of social support (a finding that will be discussed in greater detail in the General Discussion).

One possible issue in the present study concerns the definition of gratitude used. Participants were asked to write about things they were grateful for, but weren't given any constraints about what qualified as an event or situation one might be grateful for. An investigation of participants' open-ended responses suggests that participants wrote about a variety of topics (common topics included being grateful for social support from one's family and being able to attend UCSB). Lambert and colleagues (2009) suggest that there are two types of gratitude: being grateful for a benefit from a specific person, or more generally being grateful for a situation. The authors hypothesize that these types of gratitude may not have the same effects on health: "We suspect that benefit-triggered gratitude may have stronger implications for interpersonal relationships, whereas generalized gratitude may have stronger implications for personal mental outcomes" (pp. 1205). Consequently, it may be important in future studies to investigate the possibility that different types of gratitude have different effects, or to constrain participants to only writing about one type of gratitude.

Another issue in the present study is that some participants in the gratitude condition had trouble thinking of things to write about. In all three conditions, many participants had trouble thinking of things to write about (29.3% in the gratitude immersed condition, 37.5% in the gratitude distanced condition, and 50% in the control condition). Past research has

suggested that writing about more examples of something can backfire: if people have trouble thinking of things they are grateful for, they could actually feel *less* grateful (Schwarz et al., 1991). The fact that many participants found our writing task difficult suggests that this may have impacted the study.

## General Discussion

### Key Findings

Across the two studies, we did not find evidence that brief positive emotion inductions in the lab led to changes in coping, rumination, or perceptions of support and resources. In Study 1, amusement and love videos did not lead to increases in adaptive coping (either self-reported or measured through an implicit task), decreases in maladaptive coping (self-reported or implicit) or to decreases in self-reported rumination about a stressor. In Study 2, writing about things that one is grateful for did not lead to increases in adaptive coping (either self-reported or implicit), decreases in maladaptive coping (either self-reported or implicit), increases in perceptions of social support availability, or increases in perceived resource availability.

### Strengths and Limitations of the Present Studies

One strength of the present studies was that they sought to determine the effects of three specific positive emotions, rather than determining the effect of general positive affect on behavior. As research on negative emotions has found that different negative emotions can have different effects on behavior (Dickerson et al., 2004), it is equally important to determine whether different positive emotions have distinct effects. Determining the role of specific positive emotions is important both for theoretical reasons, as well as for practical

reasons. For example, if different positive emotions lead to different coping styles (as I hypothesized), clinicians could develop different positive emotion interventions for clients undergoing stressful events (depending on which coping style would prove most adaptive for that client's situation).

An additional strength of the present studies was its use of an implicit coping measure, rather than only including explicit measures of coping. To my knowledge, only one prior study has used an implicit measure of coping (Smith, Stewart, Myers, & Latu, 2008), and the present study was the first to study the role of positive emotions in relation to an implicit coping measure. Although most researchers have measured coping using self-report measures, measuring coping at an implicit level may prove to have an advantage over self-report measurements. Researchers often use implicit measures when participants are unwilling to report their true attitudes due to issues of social desirability (Fazio & Olson, 2003), and coping provides an example of a domain in which participants may be unwilling to report their true attitudes. Participants completing a coping measure are presumably quite aware of which answer choices are the most "adaptive": even participants with little knowledge of psychology are likely to know that avoiding the problem or turning to drugs and alcohol is an ineffective coping style, while taking steps to actively confront the problem is more adaptive. Consequently, participants completing a self-report measure of coping may be motivated by self-presentation concerns to over-report their use of adaptive coping styles, and to under-report their use of maladaptive coping styles. An additional limitation of explicit measures of coping concerns the fact that explicit measures may not accurately capture how someone behaves under stress. When individuals have little opportunity to

engage in careful and deliberative behavior, behavior may be better predicted by implicit attitudes than explicit ones (Fazio & Olson, 2003). As stressful situations are cognitively demanding and threaten to deplete individuals' self-regulatory resources, people under stress may have less of an ability to engage in careful and deliberative processing before acting, and, consequently, may be more likely to engage in behaviors guided by their automatic attitudes. Consequently, if we want to know how individuals actually act under stress, it is important to measure coping at both the implicit and explicit level.

However, the present studies also suffered from several limitations, which may have limited their ability to detect significant associations between positive emotions and coping. First, the emotion inductions that participants completed were not very successful. In Study 1, this may be attributable to the fact that the positive emotion videos participants watched were quite brief: the amusement video lasted approximately forty seconds and the love video lasted approximately two minutes. Although these film clips were strong enough to successfully induce emotions in prior research, the film clips did not elicit the intended emotions in the present study. Study 2 had a longer task (approximately 9-10 minutes) and the manipulation check suggested that the gratitude interventions did lead to greater levels of gratitude. However, the difference in the gratitude and neutral conditions was not very large (5.5 versus 4.75 on a 7-point scale), suggesting that this emotion induction was not very strong. In this study, the problem may have been that participants were writing for long enough that they ran out of things to write about (an examination of the exit surveys suggests that some participants in the gratitude conditions reported difficulty with thinking of things to write about). This could have had the ironic effect of making them feel *less* grateful, as

writing about more examples of something backfires if people have trouble thinking of things to write about (Schwarz et al., 1991). Consequently, having participants write briefly about things they are grateful for, but to do so over several testing sessions, might be more effective than the emotion inductions used in the present studies.

Finally, the two studies may have failed to yield significant results because the measurements of coping in response to a hypothetical stressor (or stress prime) may have lacked ecological validity. Although the COPE measure has previously been validated (Carver, 1997) and lexical decision tasks have previously been used to measure implicit behavioral tendencies (Mikulincer et al., 2000), participants may have had difficulty accurately imagining how they would respond to a real-life stressor. Consequently, future research would benefit from including actual stressors rather than hypothetical stressors.

**Detecting the Link Between Positive Emotions and Health: New Methods or New Models?**

**New Methods.** Although the link between positive emotions and coping has been successfully documented in correlational and longitudinal studies (e.g. Fredrickson & Joiner, 2002; Wood et al., 2010) and the correlational analyses conducted with the present data suggest some association between gratitude, love, and positive coping (see Tables 7 and 13), the present set of studies failed to find any causal link between temporarily activated positive emotions and coping. Consequently, we need to consider two possible reasons that the studies may have failed to find significant effects: we may need to make improvements to our methodology, or our conceptual model may be in need of revision.

As discussed above, the main methodological limitation of the present studies was the fact that they did not lead to substantial changes in emotion. Since the emotion inductions produced relatively weak effects, it may just be that we need to study these processes over a longer period of time. It could be that things like coping and perceived resources, which are developed over the course of a lifetime, take more than one experience with a positive emotion in order to be changed. If this is the case, we could study positive emotions and coping with longer interventions: for example, a daily diary gratitude intervention that people fill out for several weeks. In the current studies, I found that both gratitude and love were correlated with coping style (participants reporting more gratitude reported more reappraisal and support seeking; participants reporting more love reported more support seeking). Therefore, it could be that gratitude and love *do* lead to changes in coping, but that the manipulation used in the present study was not strong enough to bring about these changes.

Another possibility is that we had an issue with how we measured coping. It could be that our self-report measures may not be sensitive enough to pick up on momentary changes in coping and perceived resources. The questionnaires that we used for our dependent variables were mostly questionnaires adapted from trait coping scales, which, by their very design, are *not* supposed to be easily moved by specific experiences. Additionally, if we are interested in assessing whether cognition has been "broadened" by a positive emotion, open-ended response formats may work better than the multiple choice questions used in the present study. The broaden and build theory suggests that people experiencing positive emotions should be able to think of more creative ideas, so it should make participants better at thinking of coping styles on their own (for example, if you give someone a blank piece of

paper, they should theoretically be able write down more coping styles than someone not in a positive mood). However, thinking of a coping style and deciding to use that coping style are different processes, so positive emotions may not make people more likely to say they will adopt a given coping style on a multiple choice test.

**New Models.** Another important possibility to consider is that my original hypotheses about positive emotions and coping may have been wrong wrong; we may need to develop new models to understand the causal relationship between positive emotions and coping. Maybe positive emotions don't affect health through their effects on coping or psychosocial resources. If this is the case and coping and perceptions of resources aren't the mechanisms through which positive emotions affect health, what else could it be?

One possibility is that positive emotions lead to changes in the actual social environment. In this model, positive emotions make one better liked by others (since people prefer to interact with happy people), which then helps one accumulate more *actual* (rather than perceived) social and personal resources, which in turn is good for health outcomes. There is some evidence for this idea that positive affect impacts actual social outcomes. In one study, women who displayed more positive emotion in college yearbook photos were rated more favorably by observers and had better marriages at age 52 (Harker & Keltner, 2001). In a recent review on happiness and success, it was found that happiness is associated with better outcomes in many domains, including friendships and marriages (Lyubomirsky, King, & Diener, 2005). If it is the case that positive emotions affect health through their effects on actual social resources, we would expect that it is *expressing* positive emotions (rather than merely experiencing them) that leads to beneficial health outcomes, since people

need to be aware that one is in a good mood in order to like that person more because of it. There is some evidence that expressing positive emotions is beneficial even when reflecting on positive emotions isn't. In one study, (Lambert et al., 2010), an intervention in which participants were asked to express their gratitude towards a close relationship partner led participants to rate the relationship as having greater communal strength. However, a similar intervention in which participants merely reflected on things they were grateful for in the relationship did not have these benefits. It may be that the main health benefits of positive emotions arise from the expression of positive emotions: that is, expressing a positive emotion to someone else leads to stronger relationships, which in turn leads to better physical health. More research is needed to investigate this possibility.

Another possibility is that positive emotions actually have direct effects on health. Positive emotions may exert their effects on bodily systems (such as promoting cardiovascular health, lower cortisol levels, and lower levels of inflammation) *independently* of any effects they may have on psychosocial variables. As an example of the effects positive emotions can have on body systems, one study (McCraty et al., 1995) found that thinking about appreciation (during a lab session) led to increases in heart rate variability, a biomarker considered to be beneficial for health. Although it would be difficult to conclusively rule out all potential psychosocial mediators, researchers should be aware of the possibility of direct effects when investigating results of their studies. Additionally, researchers should consider that positive emotions may have both direct and indirect effects on health.

Because the current studies did find some correlational evidence that positive emotions are associated with coping, we should not yet abandon the possibility that positive emotions can cause changes in coping. It may have simply been that our manipulations were too weak to affect the dependent variables. However, it may be the case that not all positive emotions have effects on coping (in Study 1, we only found effects for love, not amusement, and, in Study 2, we found that gratitude was associated with increased support seeking while more generalized positive affect was not). Since the correlational analyses in the present studies were purely exploratory, we should be cautious about making any conclusions about which specific emotions are associated with which specific coping styles, but it does suggest the possibility that different emotions may have different effects. Another possibility is that these positive emotion interventions don't "work" the same way for everyone: it may be that some people don't feel more positive affect as a result of these types of interventions, or that feeling more positive affect doesn't lead to changes in coping for everyone. However, it is important to note that the correlational analyses I conducted are open to many alternative explanations: it may be that adaptive coping leads to positive emotions, or that a third variable (e.g. good mental health) contributes to both positive emotions and coping. These are all possibilities that researchers should be aware of when conducting studies on positive emotions and coping.

**Directions for Future Research**

One potential direction for future research involves changing the way of measuring the dependent variables of interest. For example, to assess whether thinking has been broadened, we could use open-ended (rather than multiple choice) response formats.

Participants could be given a hypothetical stressful event and asked to list as many ways as possible to cope with it. We would expect participants who are feeling positive emotions to list more ways of coping with the stressful event.

Another direction for future research involves conducting diary studies on positive emotions and coping. It could be that brief lab interventions are not able to change coping styles, but more long-lasting interventions are. In this study design, participants might be asked to write about one thing that made them happy (or one thing that made them feel grateful) each week, over the course of several weeks. Participants' coping styles, perceived resources, or perceived support availability could be measured before and after the intervention.

Additionally, future research should measure coping responses to actual stressors, rather than hypothetical stressors. For example, participants could be assigned to complete difficult math problems or prepare for a speech in front of an evaluative audience, and coping could then be measured. Additionally, both coping and physiological measures of stress reactivity (such as challenge and threat, or cortisol reactivity) could be measured using this paradigm, in order to test whether coping mediates the relationship between positive emotions and stress reactivity. Measuring responses to actual stressors could also be combined with the diary methods previously mentioned: for example, participants could be asked to complete a positive emotion intervention for several weeks leading up to midterms, and their methods of coping with their midterms could then be assessed.

Finally, research could investigate the extent to which the effects of positive emotions on health are socially mediated. Participants could be asked to express positive emotions to

others (for example, being instructed to express gratitude towards one's romantic partner), and then both health outcomes and ratings of relationship quality could be assessed. If the effects of positive emotions on health are socially mediated, we would expect that positive emotions would lead to better health outcomes, and that this would be mediated by relationship quality. Although the present studies did not lead to significant results, there are many other potential study designs that could help illuminate the links between positive emotions and health.

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**Table 1. Effects of condition on coping style.**

| Condition | | Active Coping | Emotional Support-seeking | Instrumental Support-seeking | Reframing/ Reappraisal | Avoidance |
|---|---|---|---|---|---|---|
| **Neutral** | Mean | 3.2273 | 2.4886 | 2.7386 | 2.6932 | 12.1591 |
| | N | 44 | 44 | 44 | 44 | 44 |
| | SD | .74283 | .89889 | .93067 | .84369 | 2.55127 |
| **Amusement** | Mean | 3.2500 | 2.6667 | 3.0278 | 2.4861 | 11.6111 |
| | N | 36 | 36 | 36 | 36 | 36 |
| | SD | .74162 | 1.00000 | .94070 | .83226 | 3.00740 |
| **Love** | Mean | 3.2571 | 2.4571 | 2.5857 | 2.5857 | 12.2000 |
| | N | 35 | 35 | 35 | 35 | 35 |
| | SD | .78937 | .99537 | .92741 | .86165 | 2.93859 |
| **Total** | Mean | 3.2435 | 2.5348 | 2.7826 | 2.5957 | 12.0000 |
| | N | 115 | 115 | 115 | 115 | 115 |
| | SD | .75034 | .95679 | .94156 | .84266 | 2.80663 |

**Table 2. Means by condition and prime (Reappraisal).**

| Condition | Prime | Mean | Standard Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| **Neutral** | Neutral | 839.132 | 42.361 | 754.815 | 923.449 |
| | Failure | 895.453 | 48.404 | 799.107 | 991.800 |
| **Amusement** | Neutral | 908.019 | 43.902 | 820.635 | 995.403 |
| | Failure | 946.865 | 50.165 | 847.014 | 1046.716 |
| **Love** | Neutral | 946.827 | 44.738 | 857.778 | 1035.876 |
| | Failure | 949.103 | 51.121 | 847.350 | 1050.856 |

**Table 3. Means by condition and prime (Social support).**

| Condition | Prime | Mean | Standard Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| **Neutral** | Neutral | 687.690 | 24.379 | 639.165 | 736.214 |
| | Failure | 692.179 | 27.412 | 637.618 | 746.741 |
| **Amusement** | Neutral | 771.170 | 25.266 | 720.881 | 821.460 |
| | Failure | 770.259 | 28.409 | 713.713 | 826.805 |
| **Love** | Neutral | 691.817 | 25.747 | 640.569 | 743.065 |
| | Failure | 714.458 | 28.950 | 656.834 | 772.081 |

**Table 4. Means by condition and prime (Problem solving).**

| Condition | Prime | Mean | Standard Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| **Neutral** | Neutral | 669.026 | 23.048 | 623.150 | 714.901 |
| | Failure | 684.179 | 22.710 | 638.976 | 729.383 |
| **Amusement** | Neutral | 742.178 | 23.886 | 694.634 | 789.723 |
| | Failure | 730.913 | 23.536 | 684.065 | 777.761 |
| **Love** | Neutral | 683.672 | 24.341 | 635.223 | 732.122 |
| | Failure | 723.747 | 23.985 | 676.007 | 771.488 |

**Table 5. Means by condition and prime (Avoidance).**

| Condition | Prime | Mean | Standard Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| **Neutral** | Neutral | 733.566 | 29.288 | 675.270 | 791.861 |
| | Failure | 725.245 | 26.293 | 672.910 | 777.580 |
| **Amusement** | Neutral | 809.006 | 30.353 | 748.589 | 869.422 |
| | Failure | 747.513 | 27.250 | 693.274 | 801.752 |
| **Love** | Neutral | 703.319 | 30.931 | 641.752 | 764.886 |
| | Failure | 704.665 | 27.769 | 649.393 | 759.937 |

**Table 6. Effects of condition on rumination.**

| **Condition** | | **Rumination** |
|---|---|---|
| **Neutral** | Mean | .0687 |
| | N | 44 |
| | SD | .93771 |
| **Amusement** | Mean | -.0197 |
| | N | 36 |
| | SD | .93545 |
| **Love** | Mean | -.0662 |
| | N | 35 |
| | SD | .85201 |
| **Total** | Mean | .0000 |
| | N | 115 |
| | SD | .90560 |

*Note: all rumination variables were converted to standardized Z-scores before creating the composite rumination variable.*

**Table 7. Correlations between self-reported emotion and self-reported dependent variables.**

| | Reappraisal | Emotional support | Instrumental support | Active coping | Avoidance | Rumination |
|---|---|---|---|---|---|---|
| Amusement | .004 | -.009 | -.028 | .090 | .012 | .049 |
| Love | .070 | .237* | .236* | .195* | .070 | .067 |

* $p < .05$

**Table 8. Effects of condition on self-reported coping.**

| | **Immersed** | **Distanced** | **Neutral** |
|---|---|---|---|
| **Reappraisal** | 3.0938 | 2.9438 | 3.002 |
| **Support-Seeking** | 2.7719 | 2.8496 | 2.7071 |
| **Active Coping** | 3.2062 | 3.1062 | 3.2619 |
| **Avoidance** | 1.5354 | 1.4062 | 1.4087 |

**Table 9a: Means for Prime X Condition (Reappraisal words)**

| Condition | Prime | Mean | Standard Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| Immersed | Neutral | 870.259 | 35.159 | 800.646 | 939.871 |
| | Failure | 873.758 | 36.099 | 802.285 | 945.231 |
| Distanced | Neutral | 895.144 | 35.596 | 824.666 | 965.621 |
| | Failure | 842.293 | 36.547 | 769.932 | 914.654 |
| Neutral | Neutral | 904.304 | 34.738 | 835.524 | 973.083 |
| | Failure | 881.419 | 35.666 | 810.801 | 952.036 |

**Table 9b: Means for Prime X Condition (Reappraisal words, difference score)**

| Condition | Prime | Mean | Standard Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| Immersed | Neutral | 164.693 | 31.094 | 103.130 | 226.256 |
| | Failure | 179.281 | 30.388 | 119.114 | 239.447 |
| Distanced | Neutral | 244.048 | 31.480 | 181.720 | 306.375 |
| | Failure | 169.903 | 30.766 | 108.989 | 230.818 |
| Neutral | Neutral | 203.214 | 30.721 | 142.388 | 264.040 |
| | Failure | 183.233 | 30.024 | 123.787 | 242.680 |

**Table 10a: Means for Prime X Condition (Support words)**

| Condition | Prime | Mean | Standard Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| Immersed | Neutral | 717.652 | 21.290 | 675.499 | 759.806 |
| | Failure | 711.435 | 20.363 | 671.118 | 751.751 |
| Distanced | Neutral | 678.493 | 21.555 | 635.815 | 721.170 |
| | Failure | 709.628 | 20.616 | 668.811 | 750.445 |
| Neutral | Neutral | 737.860 | 21.035 | 696.212 | 779.509 |
| | Failure | 700.506 | 20.119 | 660.672 | 740.339 |

**Table 10b: Means for Prime X Condition (Support words, difference score)**

| Condition | Prime | Mean | Standard Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| Immersed | Neutral | 12.087 | 16.797 | -21.170 | 45.344 |
| | Failure | 16.957 | 16.355 | -15.424 | 49.339 |
| Distanced | Neutral | 27.396 | 17.006 | -6.274 | 61.066 |
| | Failure | 37.238 | 16.558 | 4.455 | 70.022 |
| Neutral | Neutral | 36.771 | 16.596 | 3.912 | 69.629 |
| | Failure | 2.320 | 16.159 | -29.674 | 34.314 |

**Table 11a: Means for Prime X Condition (Problem solving words)**

| Condition | Prime | Mean | Standard Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| Immersed | Neutral | 748.184 | 23.860 | 700.943 | 795.425 |
| | Failure | 681.915 | 19.226 | 643.849 | 719.981 |
| Distanced | Neutral | 683.180 | 24.156 | 635.352 | 731.008 |
| | Failure | 687.459 | 19.465 | 648.920 | 725.997 |
| Neutral | Neutral | 739.746 | 23.574 | 693.071 | 786.421 |
| | Failure | 709.531 | 18.995 | 671.921 | 747.141 |

**Table 11b: Means for Prime X Condition (Problem solving words, difference score)**

| Condition | Prime | Mean | Standard Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| Immersed | Neutral | 42.619 | 19.140 | 4.722 | 80.515 |
| | Failure | -12.562 | 14.234 | -40.744 | 15.619 |
| Distanced | Neutral | 32.084 | 19.378 | -6.284 | 70.451 |
| | Failure | 15.069 | 14.411 | -13.463 | 43.601 |
| Neutral | Neutral | 38.657 | 18.911 | 1.214 | 76.100 |
| | Failure | 11.346 | 14.063 | -16.498 | 39.190 |

**Table 12a: Means for Prime X Condition (Avoidance words)**

| Condition | Prime | Mean | Standard Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| Immersed | Neutral | 750.445 | 21.193 | 708.485 | 792.405 |
| | Failure | 712.869 | 19.029 | 675.193 | 750.544 |
| Distanced | Neutral | 717.214 | 21.456 | 674.733 | 759.695 |
| | Failure | 714.356 | 19.265 | 676.212 | 752.500 |
| Neutral | Neutral | 723.802 | 20.939 | 682.344 | 765.259 |
| | Failure | 742.731 | 18.801 | 705.506 | 779.955 |

**Table 12b: Means for Prime X Condition (Avoidance words, difference score)**

| Condition | Prime | Mean | Standard Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| Immersed | Neutral | 44.880 | 17.010 | 11.200 | 78.559 |
| | Failure | 18.391 | 18.058 | -17.361 | 54.144 |
| Distanced | Neutral | 66.118 | 17.222 | 32.020 | 100.215 |
| | Failure | 41.967 | 18.282 | 5.770 | 78.164 |
| Neutral | Neutral | 22.712 | 16.807 | -10.564 | 55.988 |
| | Failure | 44.545 | 17.841 | 9.221 | 79.870 |

**Table 13. Correlations between self-reported emotion and self-reported dependent variables.**

| | **Reappraisal** | **Support Seeking** | **Active Coping** | **Avoidance** | **ISEL** | **Resources** |
|---|---|---|---|---|---|---|
| Gratitude | .28** | .31** | .17 | -.06 | .32** | .18 |
| Positive affect *other than gratitude* | .26** | .22* | .04 | .11 | .17 | .07 |

* $p < .05$

** $p < .01$

**Appendix 1. ISEL Items**

1. If I wanted to go on a trip for a day (for example, to the country or mountains), I would have a hard time finding someone to go with me.
2. I feel that there is no one I can share my most private worries and fears with.
3. If I were sick, I could easily find someone to help me with my daily chores.
4. There is someone I can turn to for advice about handling problems with my family or friends.
5. If I decide one afternoon that I would like to go to a movie that evening, I could easily find someone to go with me.
6. When I need suggestions on how to deal with a personal problem, I know someone I can turn to.
7. I don't often get invited to do things with others.
8. If I needed a ride to the airport very early in the morning, I would have a hard time finding someone to take me.
9. If I wanted to have lunch with someone, I could easily find someone to join me.
10. If I was stranded 10 miles from home, there is someone I could call who could come and get me.
11. If a crisis with family or friends arose, it would be difficult to find someone who could give me good advice about how to handle it.
12. If I needed some help in moving to a new house or apartment, I would have a hard time finding someone to help me.

**Appendix 2. Perceived Resources Questionnaire**

1. You have a serious argument with a close friend.
2. You learn that your financial resources (income, family support, loans, and/or financial aid) will not cover your tuition for school.
3. You learn that you have four midterms over the course of two days.
4. You have to deliver news to a parent that you know will disappoint him/her.
5. You find out that your friends attended a social event together and did not invite you.
6. You learn that you performed poorly on a test for an important class.
7. You learn that one of your parents was laid off from work.
8. You want to take a vacation with your friends, but you do not have the money to do so.