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The Roles of Self-Affirmation and Emotional Disclosure in Promoting Adjustment to
Chronic Financial Stress: An Experimental Investigation

A dissertation submitted in partial satisfaction of the
requirements for the degree Doctor of Philosophy
in Psychology

by

Margaret Rolf Bauer

2018

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ABSTRACT OF THE DISSERTATION

The Roles of Self-Affirmation and Emotional Disclosure in Promoting Adjustment to Chronic Financial Stress: An Experimental Investigation

by

Margaret Rolf Bauer

Doctor of Philosophy in Psychology

University of California, Los Angeles, 2018

Professor Annette Louise Stanton, Chair

Background: Chronic stress can damage individuals' mental and physical health. Expressive disclosure about stressful events can decrease psychological distress and physical symptoms for individuals enduring a variety of chronic stressors (Frattaroli, 2006). The use of self-affirming statements about personal values is an active ingredient of expressive writing (e.g., Creswell et al., 2007). Additionally, when individuals face threat, their use of self-affirmation, or focusing on personally relevant values that are unrelated to the threat, can reduce their stress response (Creswell et al., 2005; Sherman, Bunyan, Creswell, & Jaremka, 2009). Few studies have examined the potential benefits of repeated self-affirmation on psychological and physical health beyond single laboratory sessions. This experimental study sought to integrate the existing research on expressive writing and self-affirmation theory by examining the effects of brief

expressive writing and self-affirmation writing protocols on psychological and physical health over two months, compared to a control writing condition.

Method: Undergraduate students experiencing chronic financial stress ($N=110$) were randomized to write about their most important value unrelated to finances (self-affirmation condition), their deepest thoughts and feelings about their financial stress (expressive writing), or how they spent their day (control condition) four times over the course of two laboratory sessions. Measures of mental and physical health were taken two weeks and eight weeks after their final writing session. The present study examined group differences in primary outcomes (negative affect, intrusive thoughts about finances, and physical symptoms) and secondary outcomes (symptoms of anxiety, depressive symptoms, and sleep) over time, as well as potential moderators (reward sensitivity and dispositional avoidance motivation) and mediators (increased positive affect, increased self-kindness, decreased avoidance coping) of self-affirmation and expressive writing.

Results: Multilevel modeling analyses revealed that the linear trajectories of negative affect in the expressive writing and self-affirmation conditions differed significantly from the control condition, accounting for 32% variance of the linear trajectory of negative affect. Specifically, negative affect increased significantly over the study period for the control condition, whereas it decreased slightly but not significantly in the expressive writing condition and significantly decreased in the self-affirmation condition. Experimental condition had no significant effect on the five other outcomes (i.e., intrusive thoughts about finances, physical symptoms, symptoms of anxiety, depressive symptoms, and sleep). Dispositional reward sensitivity significantly moderated the effect of expressive writing, but not self-affirmation, on negative affect and physical symptoms. Individuals in the expressive writing condition who were lower in

dispositional reward sensitivity evidenced significantly greater decreases in negative affect and physical symptoms over time compared to their counterparts in the control condition. The expressive writing and control conditions did not differ significantly on change in negative affect or physical symptoms for individuals who were high in dispositional reward sensitivity.

Dispositional avoidance motivation did not moderate the effect of expressive writing or self-affirmation, and no significant mediated effects were found for either condition.

Conclusions: Both expressive writing and self-affirmation may benefit undergraduates with chronic financial strain, particularly by buffering against increases in negative affect. Results also suggest that expressive writing might be especially beneficial for individuals who are low in reward sensitivity. However, because the present study was unable to identify mediators, continued research is needed to understand the other potential underlying mechanisms of self-affirmation (e.g., increased coping self-efficacy, sense of belonging, and reward processing). Emotional expression and reflection on personally-important values may be important components of, or combined to create, future interventions for individuals facing chronic stress.

The dissertation of Margaret Rolf Bauer is approved.

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2018

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Introduction

Chronic stress requires individuals to adapt across emotional, behavioral, cognitive, and physical domains. How an individual copes with or manages the stressor often influences the impact on their health and well-being (Taylor & Stanton, 2007). Disclosure of one's deepest thoughts and feelings regarding a stressor can result in improved psychological health, physical health, quality of life, and physiological functioning. Specifically, emotional disclosure through experimentally-induced expressive writing has largely evidenced psychological and health benefits (see Frattaroli, 2006 for a review). Given these data, researchers have turned their attention toward understanding how expressive writing produces psychological and physical benefits for individuals undergoing chronic stress. Expressive writing might produce improved health outcomes in part by prompting individuals to engage in self-affirmation. Two studies demonstrated that the frequency of self-affirmation statements, or statements about a valued self-domain or characteristic, in expressive essays mediated the relationship between expressive writing and decreases in self-reported physical symptoms (Creswell et al., 2007) and anxiety (Niles, Byrne Haltom, Lieberman, Hurr, & Stanton, 2016). Self-affirmation in the face of stress or threat could hold implications for health by reducing an individual's stress response as well as their defensiveness toward the threat (G. L. Cohen & Sherman, 2014). However, an experimental examination of self-affirmation writing on psychological and physical health outcomes over time has yet to be conducted. The proposed study seeks to replicate previous literature examining the effect of expressive writing as well as extend existing research on self-affirmation theory by examining the effects of repeated self-affirmation and emotionally expressive writing on psychological and physical adjustment to chronic stress, as compared to a control writing condition. This introduction contains a review of research demonstrating the effectiveness of

expressive writing for individuals experiencing chronic stress and literature examining the effects of self-affirmation on response to threat. Next, the importance of examining these processes in the context of chronic financial stress will be discussed. Finally, the proposed study's aims, methods, and analytic plan are outlined.

Expressive Writing

Since Pennebaker and Beall first experimentally manipulated emotional disclosure in 1986, three decades of research has examined the psychological and physical health benefits of disclosing information about stressful life events. Experimental studies of expressive writing typically randomize individuals to write over multiple sessions their deepest thoughts and feelings regarding a stressful experience or to write about neutral topics, such as how they spend their time (e.g., Spera, Buhrfeind, & Pennebaker, 1994). A meta-analysis of 146 randomized studies indicated that expressive writing has a significant positive effect on psychological health, physiological functioning, self-reported health, social relationships, and cognitive functioning (Fratraro, 2006). Expressive writing produced these benefits for healthy individuals as well as individuals confronting a variety of stressors such as, medical conditions, job loss, romantic break-up. With the growing support for the benefits of expressive disclosure, a focus on how expressive writing results in psychological and physical health improvements developed.

Several theories address the mechanisms that underlie the effects of expressive writing (see Sloan & Marx, 2004 for a review). First, some theorists have suggested that expressive writing decreases emotional inhibition (Sloan & Marx, 2004). Because suppressing emotions is related to increased sympathetic nervous system activation (Gross & Levenson, 1993) as well as chronic conditions such as hypertension and heart disease (Stephens, 1993), the disclosure of previously suppressed emotions through expressive writing might contribute to improved health.

Second, expressive writing might help individuals cognitively process their stressful experience (Pennebaker, 1997; Smyth, True, & Souto, 2001). Such writing could help people create a narrative about a stressful event that was not previously considered, in turn reducing stress and improving health. Third, expressive writing could be a form of exposure therapy, such that it helps individuals habituate to distressing information that was previously avoided.

More recently, research suggests that self-affirmation might be a mechanism through which expressive writing improves health. Two recent studies demonstrated that the frequency of self-affirmation statements (e.g., referring to a personal value or self-concept) within expressive writing essays predicted improved self-reported health outcomes for individuals enduring stressors. Creswell and colleagues (2007) found that for women with breast cancer who wrote about their deepest thoughts and feelings about their cancer experience (i.e., expressive writing) or the benefits they derived from their cancer experience (i.e., benefit-finding writing), greater use of statements referring to valued self-domains in the essays mediated the relationship between writing and decreased self-reported physical symptoms three months later. Other potential mechanisms of expressive writing (e.g., cognitive processing statements, benefit findings statements) were not statistically significant mediators. In another study, undergraduates and adults from the community who wrote about their deepest thoughts and feelings about a self-selected stressful event that had occurred in the past five years (Niles et al., 2016). The frequency of self-affirmation statements in essays predicted decreased anxiety three months later, but not depressive or physical symptoms. Additionally, greater detail about the stressor in essays was related to a decrease in anxiety. Greater use of negative affect words and discovery of meaning statements related to higher anxiety symptoms three months later.

If self-affirmation is a mediator of the relationship between expressive writing and health benefits, writing specifically directed toward affirming values may also promote the health of individuals enduring chronic stress. A condition in which individuals are instructed to write directly about personally relevant values, as opposed to indirectly targeting values through emotional expression, theoretically should also produce psychological and physical health benefits. That is, capitalizing on an active ingredient of expressive writing might be a powerful way to reduce mental and physical health problems in individuals enduring chronic stress.

Self-Affirmation Theory

Self-affirmation theory suggests that when an individual faces a threat, the goal of the self-system is to protect one's self-integrity, or one's image of oneself as adequate (Steele, 1988). Stressors (e.g., medical diagnosis, financial strain) can pose psychological threat to one's perception of oneself as adequate. The theory suggests that the natural way of protecting the self-system is by reacting defensively toward the threat (i.e., distracting from, avoiding, or denying the stressor; Sherman & Cohen, 2006). This defensive response can hinder adaptive responding. Self-affirmation theory proposes that the self is made up of various roles, values, and social identities across different domains. When facing threat in one domain, the theory suggests that individuals can highlight attainment in other domains to maintain self-integrity. It is theorized that using self-affirmation, or focusing on personally relevant values that are unrelated to the threat, can help individuals act effectively rather than defensively in the face of threat. Self-affirmation theory posits that when individuals focus on values in other life domains, the sense of self is reinforced and attention shifts to a broader view of the self, causing them to become less defensive toward the stressor. Decreased defensiveness might allow individuals to employ more adaptive stress management strategies.

Experimental studies use several different manipulations to induce self-affirmation (see McQueen & Klein, 2006 for a review). Commonly, participants in self-affirmation studies are asked to rank a list of values from the most personally important to least important. Individuals in the self-affirmation condition are asked to write about their top-ranked value, whereas individuals in the control condition are asked to write about why their lowest ranked value might be important to someone else. In other studies, participants in the self-affirmation condition are asked to write about or list positive characteristics or experiences (e.g., a life event that made him or her feel proud, positive qualities). The control condition for these studies varies, ranging from listing qualities about their immediate environment (De Cremer & Sedikides, 2005), recent events (Harris, Mayle, Mabbott, & Napper, 2007), or unrelated filler tasks (e.g., uses for a knife Harvey & Oswald, 2000), nothing (Matz & Wood, 2005; Van den Bos, 2001)). In another approach, participants are asked to complete the Allport-Vernon-Lindzey Values Scale (Allport, Vernon, & Lindzey, 1960), which asks participants to select a preference between two alternative values systems in one of six domains (economics, politics, religion, aesthetics, social, theoretical). An example from the religion scale is *The more important study for mankind is (a) mathematics (b) theology* (Hunt, 1968). Participants in the self-affirmation condition typically complete preference statements in a domain that is important to them, whereas participants in the control condition complete preference statements in a domain that is unimportant to them. The common goal of these methods is to invoke self-affirmation, or a valued aspect of the self.

In support of self-affirmation theory, experimental studies suggest that engaging in one of these self-affirming actions can make individuals less defensive and avoidant in the face of threatening information. Defensive responses to threat include a variety of cognitive and behavioral reactions. Empirically-investigated defensive reactions include interpreting new

information in a way that reinforces one's beliefs, derogating others in order to protect the self, rejecting counter-attitudinal information, rejecting responsibility for failure, and promoting group membership (e.g., patriotism) in the face of a collective threat (see Sherman & Cohen, 2006 for a review). In a systematic review of self-affirmation manipulations, 69 self-affirmation studies in peer-reviewed journals were identified (McQueen & Klein, 2006). The review revealed strong effects of self-affirmation on dependent variables assessing defensiveness. Specifically, significantly greater acceptance of counter-attitudinal information, attitude change following a cognitive dissonance paradigm, and reduction in downward social comparisons were found consistently for affirmed participants; however, mixed effects or limited research was found for perceived risk cognitions, behavior change, task performance, mood, self-esteem, and physiological reactivity. Meta-analyses of effects across dependent variables were not conducted.

Three studies provide examples of the experimental methods used to study the effect of self-affirmation on defensive reactions. Women who were high and low caffeine consumers read false articles demonstrating a link between caffeine consumption and breast cancer risk. High caffeine consumers who completed the Allport-Vernon-Lindzey Values scale about their important value rated the fabricated article as more convincing and indicated a greater intention to decrease caffeine consumption than women who were not in the affirmation condition. Because the false article posed little self-threat to the low caffeine consumers, there was no effect of self-affirmation in those women (Sherman, Nelson, & Steele, 2000). In another study, smokers were asked to view four images that were designed to be used as warnings on cigarette packages. Individuals in the self-affirmation condition generated a list of their most desirable qualities, while individuals in the control condition generated a list of recent events. Self-affirmed participants rated the images as more threatening and more personally relevant than

individuals in the control condition. One week later, the motivation to reduce smoking remained higher for self-affirmed participants than those who were not affirmed (Harris et al., 2007). Similarly, relative to controls, self-affirmed sexually active individuals rated themselves as more at-risk for HIV and were more likely to purchase condoms after watching an AIDS education video (Sherman et al., 2000). Thus, self-affirmations may benefit individuals by curtailing defensive reactions.

In addition to decreasing avoidance and defensiveness toward threats, experimental studies demonstrate that self-affirmation can buffer against individuals' physiological and cognitive response to stress. In one study, participants who completed the Allport-Vernon-Lindzey values list about their most important value prior to completing the Trier Social Stress Task had lower cortisol responses compared to participants who completed the values list about their lowest ranked value (Creswell et al., 2005), although no effects were found on heart rate or blood pressure. Sherman and colleagues (2009) examined the effects of self-affirmation on urine epinephrine and norepinephrine levels during the two weeks prior to an examination in undergraduates. Participants collected urine samples two weeks prior to the exam as well as on the morning of the exam. Participants who wrote two values essays about their most important value did not evidence an increase in epinephrine levels 14 days prior to the exam and the morning of their exam, whereas individuals who wrote about why the value they ranked least important might be important for their peers evidenced an increase in epinephrine levels between the two time points. Creswell and colleagues (2013) investigated whether self-affirmation can attenuate the negative effects of stress on cognitive tasks. Individuals experiencing high levels of self-reported chronic stress who wrote a values essay performed significantly better on a difficult problem-solving task than high-stress individuals who did not write a values essay. Together,

these studies suggest that self-affirmations can buffer against negative neuroendocrine and cognitive consequences of stress.

In addition to reducing defensiveness and attenuating individuals' stress response, self-affirmations are related to improved health behaviors. Two recent meta-analyses of the effects of self-affirmation on health behavior change found that there was a reliable, albeit small, aggregate effect of self-affirmation on intentions to change behavior ($d = .14$; $d = .26$) as well as subsequent behavior change ($d = .32$; $d = .27$) across a range of health behaviors (e.g., diet, alcohol use, caffeine consumption) (Epton, Harris, Kane, van Koningsbruggen, & Sheeran, 2015; Sweeney & Moyer, 2015). Self-affirmation, therefore, might not only reduce defensiveness toward threatening information, but also serve as a catalyst for behavior change.

Despite the growing body of research on self-affirmation, many questions remain. Most experimental manipulations examine the immediate effects of self-affirmation manipulations in the laboratory; however, one of the only randomized controlled trials of repeated, brief self-affirmation writing assessed how self-affirmation influences the academic performance of ethnic minority students over time. Ethnic minority students face various daily threats and stressors in their school environment (G. L. Cohen, Garcia, Apfel, & Master, 2006). Ethnic minority students who wrote about their most important value seven or eight times over a two-year period maintained their grade point averages over the two years, whereas grade point average significantly declined over time for minority students who wrote essays about their least important value or daily routines. Despite these promising results, similar interventions, using repeated self-affirmation writing sessions, are limited, and its impact on physical and psychological health over time has not been studied.

Financial Stress

Because of its known consequences for psychological and physical functioning, chronic financial stress provides a useful context in which to consider the effects of self-affirmation and expressive writing. Financial stress is the persistent inability to afford basic necessities (Pearlin & Radabaugh, 1976), and it is one of the most common sources of chronic stress (Fox & Chancey, 1998). Exposure to unremitting stressors commonly predicts psychological distress (Hammen, 2005; Lange & Byrd, 1998; Richardson, Elliot, & Roberts, 2013; Roberts et al., 2000), physical health problems (e.g., S. Cohen, Janicki-Deverts, & Miller, 2007), and unhealthy behaviors, such as poor sleep (e.g., Vgontzas, 2008), smoking, alcohol consumption and physical activity (Steptoe, Wardle, Pollard, Canaan, & Davies, 1996). Studies of chronic financial stress specifically also evidence a significant relationship between financial stress and depression (Angel, Frisco, Angel, & Chiriboga, 2003), worse physical health (Kahn & Pearlin, 2006) and mortality (Szanton et al., 2008). Furthermore, financial stress is thought to contribute to socioeconomic disparities in health outcomes, such as cardiovascular disease, obesity, cancer, healthcare utilization, and unhealthy behaviors (Adler & Newman, 2002; Lantz, House, Mero, & Williams, 2005; Skinner, Zautra, & Reich, 2004). Investigating methods to facilitate adjustment to chronic financial stress holds important implications for improving health outcomes and reducing health disparities.

In addition to having an established effect on physical and mental health, financial stress poses particular challenges to college students. Low-income college students are more academically underprepared (Tinto, 2006), more at risk for dropping out of college (Hu & St. John, 2001), and have lower academic attainment (Corrigan, 2003) than their high-income counterparts. Unique challenges, including greater family obligations (Corrigan, 2003), working more hours while attending college (Tinto, 2006), and lower self-efficacy and lower general

well-being (Tong & Song, 2004) can further jeopardize a low-income student's academic performance. Increased risk for a range of negative outcomes makes undergraduates experiencing chronic financial stress a particularly relevant sample in which to examine the potential benefits of self-affirmation and expressive writing processes.

Present Study

The present study involved a coping induction paradigm to compare the effects of two coping strategies (i.e., a self-affirmation writing condition and an expressive writing condition) to that of a control condition in reducing psychological distress and physical symptoms in undergraduates with chronic financial stress. Expressive writing interventions have evidenced significant psychological and physical health benefit for individuals with chronic stress (Frattaroli, 2006), but have not been tested in a sample of undergraduates with chronic financial strain. Additionally, examination of a writing intervention that operates on a mediator, or active ingredient, of expressive writing (i.e., self-affirmation) has yet to be examined. Because self-affirmation is a mediator of the relationship between expressive writing and physical health (Creswell et al., 2007; Niles et al., 2016), investigating its effects on mental and physical health using an experimental induction paradigm holds significant implications for the development of interventions for individuals enduring chronic stress.

Participants in both the expressive writing and self-affirmation conditions are expected to demonstrate improved psychological and physical health compared the control group. If self-affirmation writing demonstrates comparable reductions in mental and physical health outcomes to expressive writing in the present experiment, findings would suggest that writing about personally relevant values is a potentially powerful and cost-effective component of future interventions. Results will remain meaningful if self-affirmation is not similarly effective to

expressive writing at improving psychological and physical health. This would indicate that the efficacy of expressive writing is dependent on multiple mechanisms, suggesting that focusing on personally relevant values alone is insufficient to produce therapeutic benefit for individuals with chronic stress.

Moderators. It is also important to understand for whom expressive writing and self-affirmation work. The positive effects of expressive writing and self-affirmation might not occur for all individuals or in all circumstances (Sherman & Cohen, 2006). The second aim of the present study is to examine moderators of the relationship between self-affirmation and health outcomes as well as expressive writing and outcomes. Because the content of the two experimental groups are different (i.e., writing about emotions vs. values), distinct moderators were selected for each the experimental condition.

Reward sensitivity is a potential moderator of self-affirmation. Recent research suggests that engaging in self-affirmation activates neural reward regions (Dutcher et al., 2016). It is possible that a person's dispositional reward sensitivity may influence the effectiveness of self-affirmation. If reflecting on important values activates neural reward regions, then self-affirmation may benefit individuals who are low in reward sensitivity (i.e., a deficits model). Alternatively, self-affirmation could bolster individuals' strengths and benefit those who are already high in reward sensitivity. This is a burgeoning area of research and the effect of self-affirmation has not been assessed as a function of reward sensitivity.

Research has investigated whether expressive writing might be most beneficial for individuals who routinely suppress or avoid their emotions; however, findings are mixed. Gortner and colleagues (2006) found that college students who were high in dispositional suppression of emotions had significantly fewer depressive symptoms 6 months later than

individuals low in suppression who wrote expressively about stressful or traumatic events. Similarly, several studies demonstrated that individuals who have a dispositional difficulty expressing emotions (i.e., alexithymia) had greater improvements in physical and mental health functioning after expressive writing than individuals with low difficulty of expressing emotions after expressive disclosure (Norman, Lumley, Dooley, & Diamond, 2004; Paez, Velasco, & Gonzalez, 1999; Solano, Donati, Pecci, Persichetti, & Colaci, 2003). Although findings are not entirely consistent (Moore, Brody, & Diergerger, 2009; Smyth, Anderson, Hockemeyer, & Stone, 2002), dispositional avoidance was hypothesized as a moderator of expressive writing. Because emotional expression is not a component of self-affirmation, the effects of self-affirmation might not be contingent on an individual's tendency to avoid.

In summary, directional hypotheses about reward sensitivity as a moderator of self-affirmation are premature due to limited previous literature. That is, it is plausible that a deficit model could exist, in that individuals who are low in dispositional reward sensitivity at baseline benefit more from self-affirmation writing than those who are not. Alternatively, self-affirmation could capitalize on preexisting strengths and be most effective for individuals who are high in dispositional reward sensitivity. Last, it is hypothesized that consistent with previous literature (Norman et al., 2004; Paez et al., 1999; Solano et al., 2003), expressive writing will produce a greater reduction in negative mental and physical health outcomes for individuals low in dispositional avoidance than those who are high in dispositional avoidance.

Mediators. The final aim of the present study was to examine mediators of the relationship between self-affirmation/expressive writing and health outcomes. Information on how the writing conditions influence mediators as well as how mediators influence outcomes can inform future intervention development as well as bolster understanding of theoretical constructs

(MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002; Stanton, Luecken, MacKinnon, & Thompsen, 2013). Developing effective coping interventions is critical for improving the health and well-being of individuals experiencing the negative health consequences of unremitting stressors.

As discussed above, several theories of mechanisms underlying expressive writing have been proposed (see Sloan & Marx, 2004 for a review), including decreased emotional inhibition, increased exposure/emotional processing, and increased cognitive processing. However, fewer studies have investigated mechanisms of self-affirmation. In order to illuminate potential mechanisms underlying self-affirmation, three potential mediators of the relationship between writing conditions and health outcomes were investigated: positive affect, self-compassion, and avoidance. Mechanisms under investigation in the present study were selected because mediators of self-affirmation are largely understudied.

Studies demonstrated an effect of self-affirmation on increased positive affect on both implicit (Koole, Smeets, Van Knippenberg, & Dijksterhuis, 1999) and explicit (Schmeichel & Vohs, 2009) measures of positive mood. Some studies of positive affect evidence a relationship with improved physical and psychological functioning (S. Cohen & Pressman, 2006). Positive affect could be adaptive for health outcomes by improving neuroendocrine and immune responses to stress (Epel, McEwen, & Ickovics, 1998; McEwen, 1998), decreasing cardiovascular activity (Steptoe, Wardle, & Marmot, 2005), and buffering against depression (Zautra, Reich, & Guarnaccia, 1990). Thus, it is possible that positive affect may mediate the relationship between self-affirmation and health outcomes.

In addition to positive affect, positive feelings about the self might mediate the relationship between self-affirmation and health outcomes. Self-compassion, or feelings of

sympathy and love directed at the self, recently has been proposed as a potential mechanism for the effects of self-affirmation (Lindsay & Creswell, 2014). Because self-affirmation is thought to reinforce one's sense of self, it is possible that it also produces increases in self-directed compassion. A self-affirmation induction produced an increase in state self-compassion in a study of healthy undergraduate students (Lindsay & Creswell, 2014). Furthermore, self-affirmation did not lead to increases in reported compassion for others, suggesting the compassionate feelings engendered by self-affirmation are self-directed. Greater feelings of self-compassion, in turn, led to greater helping behavior on a laboratory shelf-collapse incident. Self-compassion is significantly related to lower anxiety and depressive symptoms (Boyle, Stanton, Ganz, Crespi, & Bower, 2017; Neff, 2003) as well as lower inflammatory response to acute stressors (Breines et al., 2014). Research suggests that self-compassion may be a mechanism through which self-affirmation and expressive writing produce changes in health outcomes.

Reductions in avoidance coping might mediate self-affirmation writing's effects on health. Avoidant coping, which involves cognitive or behavioral efforts to avoid stress-related thoughts and feelings (e.g., withdrawal, denial, distraction), negatively impacts one's mental and physical health in the context of chronic stress (Moskowitz, Hult, Bussolari, & Acree, 2009; Penley, Tomaka, & Wiebe, 2002; Roesch & Weiner, 2001). Suppression of emotions can increase sympathetic nervous system activation such as heightened cardiovascular and electrodermal activity (Gross, 2002; Gross & Levenson, 1993, 1997). The heightened physiological arousal associated with avoidance coping might be harmful to health over time. For example, elevated heart rate reactivity and poor recovery could lead to poor cardiovascular functioning (Hocking Schuler & O'Brien, 1997). Additionally, avoidance of unwanted thoughts is theorized paradoxically to increase the frequency of previously suppressed thoughts (Wegner,

Shortt, Blake, & Page, 1990). Intrusive thoughts are a hallmark symptom of many anxiety and stress-related disorders (American Psychiatric Association, 2013). Additionally, Horowitz and colleagues (1986) theorize that intrusive thoughts about a stressful experience are suggestive of incomplete cognitive processing of the stressor. In a meta-analysis of coping in individuals with HIV, Moskowitz and colleagues (2009) found that avoidance coping was associated significantly with greater negative affect, lower positive affect, worse health behaviors, and poorer physical health. Therefore, developing interventions that target maladaptive avoidance coping could benefit the mental and physical well-being of individuals enduring chronic stress.

Although reducing avoidant and defensive responding toward a threat is a central component of self-affirmation theory, few empirical investigations address the effect of self-affirmation on avoidant behavior. One study found that completing a self-affirmation exercise decreased individuals' avoidance of medical screening feedback (Howell & Shepperd, 2012). However, no studies to our knowledge have investigated whether self-affirmation can decrease the use of avoidance to cope with a chronic stressor. Given the deleterious health effects of avoidance, self-affirmation may improve health outcome through reductions in avoidance coping.

Outcomes. Outcome variables were selected to examine the effects of expressive writing and self-affirmation on general psychological functioning, finance-specific distress and physical functioning.

Psychological health outcomes. As discussed above, undergraduates experiencing financial strain are at risk for poor mental health and psychological distress broadly (Lange & Byrd, 1998; Richardson et al., 2013; Roberts et al., 2000). Financial stress has also been related to negative affect in adults (Skinner et al., 2004). In order to capture a range of negative emotions, negative affect was selected as the primary outcome of the present study. Additionally,

negative affect or mood has commonly been assessed as an outcome in other investigations of experimental writing manipulations (e.g., Moreno, Harris, & Stanton, 2017; Paez et al., 1999; Stanton et al., 2002). In addition to examining the effects of writing conditions on undergraduates' broad negative emotional experience, this study also investigated whether writing can influence the cardinal symptoms of anxiety and depression as secondary outcomes.

Finance-specific psychological distress. Finance-related psychological adjustment was assessed using a measure of intrusive thoughts about finances. Intrusive thoughts about chronic stressors are related to a host of negative emotional and physical consequences in other chronically-stressed populations (e.g., Dougall, Craig, & Baum, 1999; Dupont, Bower, Stanton, & Ganz, 2014; Ironson et al., 1997). Additionally, intrusive thoughts about finances are related to depressive symptoms and negative affect in undergraduates with financial stress (Moreno et al., 2017). Further, worry about finances is related to physical health outcomes in individuals with financial strain (Rios & Zautra, 2011). Thus, intrusive thoughts about finances was selected as a primary outcome in this study.

Physical health outcomes. Financial strain is related to a range of physical health problems (Drentea & Lavrakas, 2000; Jessop, Herberts, & Solomon, 2005; Northern, O'Brien, & Goetz, 2010; Skinner et al., 2004). General physical symptoms were assessed as the third primary outcome in the present study. Physical symptoms are commonly assessed as an outcome in studies of experimental writing manipulations in undergraduates (e.g., Chung & Pennebaker, 2008; Lu & Stanton, 2010; Niles et al., 2016). Additionally, because sleep disturbance is an important risk factor for poor psychological, physical, social, and academic consequences in undergraduate students (Galambos, Dalton, & Maggs, 2009; Gomes, Tavares, & de Azevedo, 2011; Nyer et al., 2013), it was examined as a secondary outcome.

Aims of the Present Study

Aim 1. The primary aim of the present study was to examine the effects of self-affirmation and expressive writing on psychological and physical health outcomes over time.

Hypothesis 1. It was hypothesized that individuals in the self-affirmation condition and expressive writing condition would have greater decreases in negative psychological and physical health outcomes from baseline to the 8-week follow-up compared to individuals in the control condition.

Aim 2. The second aim was to examine potential moderators of the effects of self-affirmation and expressive writing on psychological and physical health outcomes.

Hypothesis 2a. It was hypothesized that dispositional reward sensitivity would moderate the effects of self-affirmation on health outcomes over time. The limited previous research did not justify directional hypotheses. It is possible that self-affirmation could produce greater decreases in negative health outcomes over time for individuals who are lower in dispositional reward sensitivity (i.e., produce a greater benefit for those low in dispositional reward sensitivity). Alternatively, self-affirmation could build on individuals' preexisting strengths and produce a greater decrease in negative health outcomes for individuals high in dispositional reward sensitivity. Reward sensitivity was also examined as a moderator of expressive writing, but directional hypotheses were not warranted due to the limited literature about reward sensitivity and expressive writing.

Hypothesis 2b. It was hypothesized that dispositional avoidance motivation would moderate the effects of expressive writing on health outcomes. Consistent with previous literature (Norman et al., 2004; Paez et al., 1999; Solano et al., 2003), expressive writing was expected to produce greater reductions in negative psychological and physical health outcomes

over time for individuals low in dispositional avoidance. Dispositional avoidance was also examined as a moderator of self-affirmation, but directional hypotheses are not warranted due to the limited literature about dispositional avoidance and self-affirmation.

Aim 3. The third aim was to examine potential mediators of the effects of self-affirmation on health outcomes.

Hypothesis 3. It was hypothesized that self-affirmation would lead to increases in positive affect and self-compassion as well as decreases in avoidance coping compared to the control group, which would in turn lead to decreases in negative in psychological and physical health outcomes. Although selection of mediators was grounded in self-affirmation theory, exploratory analyses examined positive affect, self-compassion, and avoidance coping as potential mediators of expressive writing as well.

Method

Sample

Undergraduate students with chronic financial stress were recruited through the UCLA Psychology Department's electronic recruitment system as part of their enrollment requirement for course credit in their Psychology 10 class or extra credit in an upper-division psychology course. Students were screened online using a modified screening version of the Pearlin and Radabaugh's (1976) measure of economic strain. Participants who scored an average of 3 or above on the screening version of the Pearlin Economic Strain measure, which has been used as a cutoff for moderate chronic financial strain in a previous study of chronic financial stress (Moreno et al., 2017) were invited to participate. An average of a 3 or above on this measure indicates that it was on average "*somewhat stressful*" to "*very stressful*" for the individual to afford basic needs (e.g., housing, food, tuition) over the last six months. In order to be eligible,

participants must experience chronic financial stress, as indicated by a score of 3 or above on the economic strain screening measure, be over 18 years of age, and be fluent in English. Of the 2,704 students who completed the screening questionnaire as part of enrollment in their psychology course, 823 (30%) were eligible to enroll in the study. Students were only able to see and enroll in studies for which they were eligible through the UCLA Psychology Department electronic recruitment system. Students were able to sign up for studies directly through the electronic recruitment system or after receiving a recruitment email from a study staff member. Rather than actively declining from participation, students who did not enroll most commonly self-enrolled in other studies for their course credit or were not reached by study staff. A total of 112 students enrolled in the study. Of the participants enrolled, 2 (1.8%) participants dropped out after study session 1 and before completion of all study tasks. One participant reported they no longer needed course credit after the first session and withdrew; the other student learned of a family emergency during the first session and terminated participation. Of the participants who completed both the in-person study sessions, 110 (100%) completed the 2-week follow-up assessment. When consenting for the study, participants were given the chance to consent to be contacted for the 8-week follow-up assessment that was not a part of their psychology course requirement. Of the 110 participants, 6 (5%) declined to be contacted for the 8-week assessment and 17 (15%) did not complete the 8-week assessment after being contacted. A total of 87 (79%) participants completed both the 2-week and 8-week follow-up assessments.

Procedure

The procedure used is an adapted version of a protocol previously used in the laboratory with which this author is affiliated (e.g., Low, Stanton, & Bower, 2008; Stanton et al., 2002).

Participants completed four written essays across two in-person laboratory sessions as well as took part in two online follow-up sessions.

At the first laboratory session, eligible participants granted informed consent for the study procedures as well as indicated their willingness to be contacted for the two-month follow-up session. Then participants completed self-report questionnaires online, including demographic information, measures of financial stress, dependent variables, and proposed moderator and mediator variables. After completing questionnaires, participants were randomly assigned (using a random number generator) to one condition of the coping induction paradigm (i.e., self-affirmation, expressive writing, control). Block randomization was used to ensure balanced sample size across groups over time. Participants were randomized to the three experimental groups in blocks of 12. Study team members were blind to study condition until baseline questionnaires were completed, at which point they opened a randomization envelope to find the writing instructions for the assigned group of that participant. Participants wrote about a randomly assigned writing topic: a) their top three most important values (e.g., family and friends, religion, independence) that was unrelated to their financial stress (i.e., induced self-affirmation), b) their deepest thoughts and emotions regarding their financial stress (i.e., induced emotional expression, Pennebaker, 1997), or c) objective details (e.g., wake time, meals, activities) about how they spend their time (i.e., control condition, e.g., Gortner et al., 2006). Table 1 contains instructions for each group. The experimenter played an audio recording of the condition instructions for participants while they sat in front of the laboratory computer. The only difference between conditions is that prior to hearing their writing instructions, participants in the self-affirmation condition completed a values rankings list, in which they ranked their top 10 values from most to least important. The values ranking list was the same as ranking lists used

in previous self-affirmation studies (Sherman et al., 2000); however, the “business/money” value was removed to ensure that participants were writing about a value not explicitly related to their financial strain. Participants wrote in a private room for 20 minutes, after which the experimenter asked the participant to stop writing. Following completion of the first writing task, participants had a one-hour break, which they could spend however they pleased (e.g., take a walk, check email). After the 1-hour break, participants returned to the lab and took their seat at the computer. The experimenter played the audio-recorded writing instructions for the second writing task and participants wrote for 20 minutes. See Figure 1 for a time line of Session 1.

Session 2 took place between 24-48 hours after the previous session. Participants returned to the laboratory and first completed the third writing sample for 20 minutes, followed by a one-hour break. Participants then completed the fourth writing sample for 20 minutes. After completion of the final two writing tasks, participants scheduled their 2-week and 2-month follow-up sessions with the experimenter. Figure 2 includes a time line of Session 2.

Two weeks after Session 2, participants received an email with instructions for completing the two-week follow-up assessment through a secure online survey company (i.e., Survey Monkey). Participants completed the same outcome and mediator measures that were completed at Session 1. Eight weeks after Session 2, consenting participants, received an email asking them to complete an eight-week follow-up session. The email directed them to the online survey that was identical to the two-week follow-up assessment. The two-week assessment was timed to capture change in potential mediators, and the eight-week assessment was timed to capture change in the dependent variables as well as mediators. To keep questionnaire administration consistent across in-person and online sessions, questionnaires were completed electronically at all sessions.

Per UCLA Psychology Department regulation, participants received 1 course credit for each hour they participated in the study (i.e., 3 research credits for Session 1, 2 research credits for Session 2, and 1 research credit for completion of the two-week follow-up visit). Students were no longer enrolled in their psychology course at the time of the eight-week follow-up assessment and unable to receive course credit as compensation. Therefore, participants were compensated for their participation in the eight-week follow-up with a \$10 deposit on their UCLA Bruin Card. The Institutional Review Board at UCLA approved all study procedures. Trained bachelor's-level or master's-level study team members conducted study sessions. Data were collected from October 2015 to July 2017.

Measures

Screening Measure

Financial stress. Financial stress was assessed using a 9-item version of Pearlin Financial Stress Measure (Pearlin & Radabaugh, 1976). Participants rated nine items about how stressful it has been for them to afford basic necessities over the past 6 months on a 5-point Likert Scale from 0 (*not at all stressful*) to 5 (*very stressful*). A sample item is “*afford housing (e.g. an apartment or a dorm) that is suitable for yourself.*” As done in a previous study of financial stress, these 9 items were used for to screen participants for eligibility in the study (Moreno et al., 2017). An average score of a three or above will qualify individuals for the study. Internal consistency in this sample was adequate ($\alpha = .68$).

Psychological Health Outcomes

Negative affect (primary outcome). Negative affect was measured using the 10-item negative affect subscale of the Positive and Negative Affect Schedule-X (PANAS-NA; Watson & Clark, 1999). Participants rated the extent to which they felt each item over the past week on a

5-point Likert scale from 1 (very slightly or not at all) to 5 (extremely). Sample items are “*nervous*,” “*irritable*,” and “*distressed*”. Higher scores indicate greater negative affect. The PANAS-X negative affect subscale demonstrates good convergent validity as demonstrated by strong correlations with other measures of negative mood (Watson & Clark, 1999). Internal consistency in this sample was good across all time points (baseline $\alpha = .86$, two-weeks $\alpha = .89$, eight-weeks $\alpha = .87$).

Anxiety. Symptoms of general anxiety were assessed using the Generalized Anxiety Disorder-2, a 2-item anxiety screening measure (GAD-2; Kroenke, Spitzer, Williams, & Löwe, 2009; Kroenke, Spitzer, Williams, Monahan, & Löwe, 2007). Participants rated how bothered they were over the past two weeks by each item on a 4-point Likert scale from 0 (*not at all*) to 3 (*nearly every day*). Items are “*Feeling nervous, anxious, or on edge*” and “*Not being able to stop or control worrying*”. This measure demonstrated good construct validity as evidenced by strong correlations with measures of mental health and moderate correlations with measures of social functioning (Kroenke et al., 2009) as well as sensitivity and specificity for anxiety disorders (Kroenke et al., 2007). Internal consistency in this sample was solid across all time points (baseline $\alpha = .82$, two-weeks $\alpha = .82$, eight-weeks $\alpha = .91$).

Depressive symptoms. Depressive symptoms were assessed using the Patient Health Questionnaire-2, a 2-item depression screening measure (PHQ-2; Kroenke, Spitzer, & Williams, 2003). Participants rated how bothered they were over the past two weeks by each item on a 4-point Likert scale from 0 (*not at all*) to 3 (*nearly every day*). Items are “*Feeling down, depressed, or hopeless*” and “*Little interest or pleasure in doing things*”. This measure demonstrated good construct validity as evidenced by strong correlations with measures of mental health and moderate correlations with measures of social functioning (Kroenke et al., 2009) as well as

sensitivity and specificity for major depression (Kroenke et al., 2003). Internal consistency in this sample was adequate across all time points (baseline $\alpha = .83$, two-week $\alpha = .85$, eight-week $\alpha = .73$).

Finance-related intrusive thoughts (primary outcome). Intrusive thoughts related to participants' financial stress were assessed using the 7-item intrusive thoughts subscale of the Impact of Events Scale (IES; Sundin & Horowitz, 2002). Participants rated frequency of intrusive thoughts over the past week on a 6-point Likert scale ranging from 0 (*not at all*) to 5 (*extremely*). A sample item is “*Any reminder brought back feelings about it.*” Higher scores indicate greater intrusive thoughts. The IES has strong test-retest reliability ($r_{tt} = .79-.87$). The IES has demonstrated convergent validity with measures of posttraumatic stress disorder (Foa, Cashman, Jaycox, & Perry, 1997). Internal consistency in this sample was solid across all time points (baseline $\alpha = .87$, two-week $\alpha = .87$, eight-week $\alpha = .91$).

Physical Health Outcomes

Physical symptoms (primary outcome). Physical symptoms were measured using the 9-item version of the Pennebaker Inventory of Limbic Languidness (PILL; King & Emmons, 1990; Pennebaker, 1982), which assesses the number of days during the past 14 days when participants felt common physical symptoms, including “*headache,*” “*runny/congested nose,*” “*stomach ache/pain/upset*”. Items were averaged with higher scores indicating greater physical symptoms on average. In a study of breast cancer patients, this measure evidenced a significant but relatively low correlation with number of non-routine medical appointments in women with breast cancer ($r = .21$; Stanton et al., 2002). Internal consistency in this sample was adequate across all time points (baseline $\alpha = .77$, two-week $\alpha = .85$, eight-week $\alpha = .90$).

Sleep. Sleep was assessed using the 8-item Patient Reported Outcomes Measurement Information System Sleep Disturbance 8a form (PROMIS-Sleep; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). The scale contains 1 item assessing overall sleep quality rated from 1 (*very poor*) to 5 (*very good*) and 7 items assessing sleep-related impairment (e.g. “*I had difficulty falling asleep*”) rated from 1 (*not at all*) to 5 (*a little bit*). Three questions were reverse scored so that higher scores represented greater sleep impairment with a total scale range of 8-40. The PROMIS-Sleep has good test-retest reliability ($r_{tt} = .85$ over approximately 28 days) and good convergent validity as demonstrated by moderate to strong correlations with measures of sleep-functioning (Yu et al., 2011). Internal consistency in this sample was high across all time points (baseline $\alpha = .88$, two-week $\alpha = .89$, eight-week $\alpha = .91$).

Moderators

Reward sensitivity. Dispositional reward sensitivity was assessed using the Behavioral Activation System-Reward Responsivity subscale of the BIS/BAS (BAS-Rew; Carver & White, 1994). Participants rated how true each item was on a 4-point Likert Scale from 1 (*very true for me*) to 4 (*very false for me*). A sample item is “*When I get something I want, I feel excited and energized*”. The BAS-Rew subscale demonstrated good divergent validity as evidenced by low to moderate correlations with measures of positive affect and positive temperament (Carver & White, 1994). Internal consistency in this sample was slightly low ($\alpha = .55$).

Dispositional avoidance motivation. Dispositional avoidance motivation was assessed using the 7-item Behavioral Inhibition System subscale of the BIS/BAS (BIS; Carver & White, 1994). Participants rated how true each item is on a 4-point Likert Scale from 1 (*very true for me*) to 4 (*very false for me*). A sample item is: “*I worry about making mistakes.*” The BIS subscale has demonstrated adequate internal reliability in previous studies and good convergent

and discriminant validity as demonstrated by moderate correlations with measures of negative affect and harm avoidance (Carver & White, 1994). Internal consistency in this sample was adequate ($\alpha = .62$).

Mediators

Positive affect. Positive affect was assessed using the 10-item positive affect subscale of the Positive and Negative Affect Schedule-X (PANAS-PA; Watson, Clark, & Tellegen, 1988). Participants rated the extent to which they felt each item over the past week on a 5-item Likert-scale ranging from 1 (*very slightly or not at all*) to 5 (*extremely*). Sample items include: “*Excited*,” “*Interested*,” “*Proud*.” In previous studies the PANAS has demonstrated strong internal consistency (α 's = .86-.90), adequate test-retest reliability over 8 weeks ($r_{tt} = .47-.68$), and good convergent validity as demonstrated by inverse relationships with measures of depression, anxiety and general distress (Watson et al., 1988). Internal consistency in this sample was good across all time points (baseline $\alpha = .87$, two-week $\alpha = .90$, eight-week $\alpha = .91$).

Self-compassion. Self-compassion was measured using the 5-item self-kindness subscale of the Self-Compassion Scale (SCS; Neff, 2003). Participants rated how often they behaved in the stated manner of each item on a 5-point Likert-scale from 1 (*almost never*) to 5 (*almost always*). A sample item includes: “*I try to be understanding and patient towards those aspects of my personality I don't like*.” The SCS has good test-retest reliability ($r_{tt} = .80-.93$) and convergent validity as evidenced by inverse relationships with self-criticism and positive relationships with social connectedness and emotional intelligence (Neff, 2003). Internal consistency in this sample was high across all time points (baseline $\alpha = .87$, two-week $\alpha = .87$, eight-week $\alpha = .92$).

Avoidance coping. Avoidance of financial stress was measured using the 12 items from the three avoidance subscales (*denial, mental disengagement, behavioral disengagement*) of the COPE Inventory (Carver, Scheier, & Weintraub, 1989). Items were anchored to the experience of financial stress. Participants rated how often they did each item over the past two weeks on a 4-point Likert scale from 1 (*I don't do this at all*) to 4 = (*I do this a lot*). Sample items include: “*I turn to work or other substitute activities to take my mind off things*” (mental disengagement), “*I admit to myself that I can't deal with it, and quit trying*” (behavioral disengagement), and “*I pretend that it hasn't really happened*” (denial). Items were averaged across the three subscales. Subscales of the COPE have evidence adequate test-retest reliability over one week ($r_{tt} = 0.47$) and validity as demonstrated by inverse correlations with desirable personality traits (e.g., optimism, hardiness) and positive correlations with anxiety (Carver et al., 1989). Internal consistency in this sample was good across all time points (baseline $\alpha = .86$, two-week $\alpha = .84$, eight-week $\alpha = .86$).

Demographic Variables

Demographic variables were obtained via self-report. Demographic variables included age, ethnicity, gender, household income, relationship status, employment, and year in school.

Essay Content Analysis

To examine the content of the essays in each condition, Linguistic Inquiry Word Count (LIWC) software (Pennebaker, Chung, Ireland, Gonzales, & Booth, 2007) was used to assess the frequency of positive emotion words (e.g., “glad”), negative emotion words (e.g., “sad”), causal words (e.g., “because”) and insight words (e.g., “understand”) as well as the total number of words used in each condition. LIWC software provided the average proportion of positive, negative, causal, and insight words used in each essay. Proportion of words used in each essay

was averaged across the four essays to create a cumulative proportion of words used in each category. Additionally LIWC analysis of financial words used in each condition was assessed as part of the manipulation check (see below).

Manipulation Check

To assess fidelity to experimental instructions, two raters who were unaware of condition read 112 (25%) essays selected at random and determine condition assignment of each essay. Condition assignment between raters will be compared for agreement. Additionally, following text analysis of financial words, conditions were compared on use of financial words. It was expected that the expressive writing group would use significantly more financial words than the self-affirmation or control condition because it was the only group instructed to write explicitly about finances.

Data Analytic Plan

First, descriptive statistics were computed for demographic and study variables. The two experimental groups were compared to the control condition on baseline levels of financial stress, dependent variables, potential mediator and moderator variables, and demographic factors to determine if experimental groups and their comparison condition (i.e., control group) differed prior to the start of the study. T-tests were used for continuous variables and chi-square tests for categorical variables.

Second, Analysis of Variances (ANOVAs) and Welch ANOVAs (when the homogeneity of variance assumption was violated) were used to examine differences in essay content for each group. The three conditions were compared on average word count, positive emotion words, negative emotion words, causal words, insight words, and total words used across the four essays. Tukeys and Games-Howell post-hoc test were used to assess pairwise comparisons.

Main Effect Analyses (Aim 1)

Multilevel structural equation modeling (du Toit & du Toit, 2008; Muthén & Muthén, 2012) was conducted using Mplus version 7.3 because data were hierarchical with three repeated study assessments nested within participants. Multilevel models account for the non-independence of repeated observations and allow for examination the effect of time-varying (i.e., repeated measures) and time-invariant (i.e., measured at one time point) predictors on time-varying outcomes. For main effect and moderation analyses, a two-level model with repeated measures (Level 1) nested within individuals (Level 2) was used.

First, an unconditional model without predictors was fit for each dependent variable. Likelihood ratio tests were conducted to test random intercept and linear slope terms, which capture potential variability in participants' baseline levels of and linear trajectory of dependent variables, respectively. All significant variance and covariance components were retained in future models. Then, to examine the effect of condition on change in dependent variables over time, models were fit separately for each outcome variable with condition, time, and the interaction between time and condition as predictors. The dependent variables (i.e., PANAS-NA, GAD-2, PHQ-2, IES, PILL, PROMIS-Sleep) were assessed at each study assessment and analyzed as Level 1 variables. Given the between-subjects study design, participants' condition assignment did not change over the course of the study and condition was analyzed as a Level 2 variable. Condition was dummy-coded. One dummy coded variable compared the effect of the self-affirmation condition to the control condition and the second dummy coded variable compared the effect of the expressive writing condition to the control condition. Time was coded as 0, 1, and 4 to represent measurement occasions (i.e., baseline, 2-week follow-up, 8-week follow-up). Effect sizes were estimated using *pseudo-R*², which estimates the proportional

reduction in between-subjects residual variance with the addition of condition as a predictor to an empty model (Raudenbush & Bryk, 2002). This is an analog to R^2 change values in single-level regression analysis. Main effect analyses were performed on primary and secondary outcomes.

Moderation Analyses (Aim 2)

To test moderation, interactions between the proposed moderators (i.e., BIS, BAS-Rew), dummy-coded condition variables, as well as their interaction with time, were added to the multilevel models. Moderators were centered around the grand mean before interaction terms were created. Moderation analyses were conducted separately for each moderator and each primary dependent variable (i.e., PANAS-NA, IES, PILL). Simple slopes were calculated to probe any significant interactions (D. J. Bauer & Curran, 2005).

Mediation Analyses (Aim 3)

Because temporal precedence is assumed for mediation (MacKinnon, 2008), single-level structural equation models were used to examine change in proposed mediators as predictors of change in primary outcome variables. To examine the indirect effects of writing condition on psychological and physical health, changes in primary outcome variables from baseline to the 8-week follow-up were analyzed as dependent variables and changes in mediators (i.e., PANAS-PA, SCS-SF, COPE-Avoid) from (1) baseline to the 2-week follow-up as well as (2) baseline to the 2-month follow-up were analyzed as mediators. To test mediation, bootstrapping analyses were used (Preacher & Hayes, 2008). Bootstrapping produces 5,000 samples using random sampling with replacement to generate estimates of the indirect effects ($a \times b$) and confidence intervals around the effect. The mean of the indirect effects produced from the 5,000 bootstrapped samples was assessed for each mediator and outcome. Confidence intervals that do not include zero indicate statistically significant mediation. Models were fit separately for each

mediator variable. As in previous analyses, models were fit using Mplus version 7.3 and using full information maximum likelihood to handle missing data. Mediation analyses were performed for primary outcomes only (i.e., PANAS-NA, IES, PILL).

Missing Data

Twenty-one percent of participants had missing data at the 2-month follow-up. *T*-tests and chi-square tests were used to determine whether participants who participated in the 8-week follow-up differed from those who did not on demographic variables (i.e., household income, ethnicity, age, year in school), financial strain (i.e., Pearlin screening measure), condition assignment, and baseline levels of the dependent variables. There were no significant differences between people with and without missing data on any of these variables (all *ps* > .05). To account for missing data, full information maximum likelihood with robust standard errors was used (FIML; Enders & Bandalos, 2001).

Covariates

The two experimental groups were independently compared to the control group for differences on baseline values of all study variables (i.e., outcome, moderator, and mediator variables) and demographic factors (i.e., ethnicity, age, household income, gender, year in school) using *t*-tests and chi-square tests. At baseline, the self-affirmation group ($M = 29.16$, $SD = 8.20$) reported significantly more negative affect than the control group ($M = 24.92$, $SD = 8.27$) ($t(72) = 2.22$, $p = .03$), but there were no other statistically significant differences between self-affirmation and control conditions on any other variables (all *ps* > .05). The expressive writing group and control group did not significantly differ on any variables (all *ps* > .05). Because the control and self-affirmation group differed on baseline negative affect, models were fit to examine the effect of person-specific baseline negative affect on the linear trajectory of each

dependent variable. Additionally, models were fit to determine if baseline negative affect moderated the effect of self-affirmation on the linear trajectory of each dependent variable. Negative affect was retained as a covariate in subsequent analyses if it significantly predicted the linear trajectory of the dependent variable or moderated the effect of the self-affirmation condition.

Results

Demographic Characteristics

On average, participants were 19 years old and were in their first (46.2%) or second (28.6%) year of college. The majority of participants were female (83.6%) and self-identified as being Asian (35.5%) or Latino (38.2%). Approximately half of the sample reported a household income of less than \$40,000 (47.3%). The majority of participants were receiving scholarships (81.8%) and approximately half had loans (50.9%) and currently held a job (46.4%) to support their education and expenses. On average, participants scored above the screening cutoff of a 3 on the financial distress screening ($M = 3.73$, $SD = .55$), indicating that affording a range of nine necessities as somewhat to moderately stressful over the past six months. See Table 2 for overall sample characteristics.

Descriptive Statistics for Outcome Variables at Study Entry

On average, participants were slightly above the clinical cutoff of 3 for anxiety ($M = 3.42$, $SD = 1.80$) on the GAD-2 and slightly below the cutoff suggestive of depression ($M = 2.29$, $SD = 1.78$) on the PHQ-2. On both the anxiety and depression scales, participants were above population norms of individuals ages 14-24 (Löwe et al., 2010). Similarly, on average participants in this sample were above the norms for negative affect in undergraduates ($M = 26.24$ $SD = 8.12$) (Watson & Clark, 1999). Average rates of intrusive thoughts about finances ($M =$

= 11.69 $SD = 5.65$) were comparable to frequency of intrusions reported by trauma-exposed populations immediately following a traumatic event, and they were higher than intrusions reported months after a trauma (Sundin & Horowitz, 2003). Physical symptoms on the PILL were comparable to rates of physical symptoms in other samples of undergraduates (Lu & Stanton, 2010; Niles, Haltom, Mulvenna, Lieberman, & Stanton, 2014). Scores on the PROMIS sleep disturbance measure were compared to scores from adults in the United States population that were calibrated to a mean of 50 and standard deviation of 10. On average participants in this sample had a T-score of 53.3, which is slightly above the average for adults in the general U.S. population. See Table 3 for scores on outcome variables at all time points and Table 4 for correlations among outcome variables at baseline.

Descriptive Statistics for Moderator Variables at Study Entry

Scores on the BIS in the present sample were slightly lower than a large sample of undergraduates (Demianczyk, Jenkins, Henson, & Conner, 2014). However, participants' BAS reward sensitivity average score was comparable in this sample (Demianczyk et al., 2014). See Table 5 for descriptive statistics on moderator variables.

Descriptive Statistics for Mediator Variables at Study Entry

Participants in this sample were below the norms for positive affect in undergraduates ($M = 26.24$ $SD = 8.12$) (Watson & Clark, 1999), but had comparable rates to positive affect in another sample of undergraduates experiencing chronic financial stress (Moreno et al., 2017). Rates of self-compassion in this sample were comparable to rates seen in samples of healthy undergraduates (Neff, 2003). Levels of coping with finances through avoidance were comparable to rates found in another sample of undergraduates experiencing financial strain (Moreno et al., 2017). See Table 6 for descriptive statistics on mediator variables.

Statistical Power

The target sample size was 126 participants, which was estimated to be sufficient to detect a moderate effect size for main, moderated, and mediated effects with 80% statistical power or greater according to a priori power analysis conducted with G*Power 3.1 for originally proposed ANCOVA models. A final sample of 110 participants was accrued. Post hoc power analyses based on the present analytic approach were calculated using the $n_{\text{effective}}$ technique for multilevel models (Snijders & Bosker, 1999). Because the main effect analyses and moderation analyses involve Level 2 predictors (i.e., condition or interactions between condition and Level 2 dispositional emotion regulation variables) the effective sample size for multilevel main effect and moderation analyses is equivalent to that of a single-level regression (i.e., $n_{\text{effective}} = 110$). Therefore, post hoc power for all models was calculated for a sample of 110 using G*Power for f^2 effect sizes. For main effect analyses and calculation of the a and b paths in single-level mediation analyses, power was to .24 to detect a small effect ($f^2 = .02$), .96 to detect a medium effect ($f^2 = .15$), and more than .99 to detect a large effect ($f^2 = .35$) with a sample of 110 participants and alpha of .05. For moderation analyses, power was to .16 to detect a small effect ($f^2 = .02$), .83 to detect a medium effect ($f^2 = .15$), and more than .99 to detect a large effect ($f^2 = .35$) with a sample of 110 participants and alpha of .05. Therefore, the present study is well-powered to detect moderate and large effects, but it is underpowered to detect small effects.

Manipulation Check

Two raters, who were unaware of condition, determined condition assignment of 112 (25%) of the essays with 100% accuracy and agreement. LIWC analyses revealed that the groups significantly differed on use of words about finances ($F(2, 107) = 291.30, p < .001$). Individuals in the expressive writing condition ($M = 3.92, SD = 1.07$) used a significantly greater proportion

of words about finances than individuals in the self-affirmation ($M = .66, SD = .44$) and control conditions ($M = .46, SD = .32$) ($ps < .001$), but there was no significant difference between the self-affirmation and control conditions ($p = .07$). Consistent with rater evaluation, these results suggest that the content of essays in the expressive writing group included significantly more discussion of finances.

Essay Content

There was no significant difference between conditions on average number of words used across essays ($F(2, 107) = 1.34, p = .27$). There was a significant difference between groups on average use of positive emotion words ($F(2, 107) = 180.82, p < .001$), negative emotion words ($F(2, 107) = 108.84, p < .001$), causal words ($F(2, 107) = 65.38, p < .001$), and insight words ($F(2, 107) = 140.89, p < .001$) across the four essays. Games-Howell post-hoc pairwise comparisons revealed that individuals in the self-affirmation condition ($M = 5.54, SD = 1.44$) used a significantly higher proportion of positive emotion words than individuals in the expressive writing ($M = 2.85, SD = .73$) and control conditions ($M = 1.26, SD = .52$) ($ps < .001$). Individuals in the expressive writing condition used significantly more positive emotion words than the control condition ($p < .001$). Conversely, individuals in the expressive writing condition ($M = 2.77, SD = .74$) used a significantly higher proportion of negative emotion words than individuals in the self-affirmation ($M = 1.65, SD = .69$) and control conditions ($M = .66, SD = .33$) ($ps < .001$). Individuals in the self-affirmation condition used significantly more negative emotion words than those in the control condition ($p < .001$). Individuals in the self-affirmation condition used significantly more causal ($M = 3.32, SD = .94$) and insight ($M = 3.64, SD = .85$) words than the expressive writing (causal: $M = 2.48, SD = .66$); insight: $M = 3.00, SD = .74$) and control conditions (causal: $M = 1.36, SD = .56$; insight: $M = 1.05, SD = .41$). The expressive

writing group used significantly more causal and insight words than the control group ($ps < .001$). See Table 7 for descriptive statistics of word use variables.

Excerpts characteristic of essays from each condition can be found in Table 8. In the self-affirmation condition, the value most frequently written about was relationship with friends and family (89%), followed by independence (73%), and sense of humor (43%). See Table 9 for percentages of the subjects who wrote about each value in one of their essays.

Main Effect Analyses

Deviance change tests. Deviance change tests revealed significantly better model fit when including a random intercept and random linear slope for negative affect (intercept: $\chi^2(1) = 44.95, p < .001$; slope $(\chi^2(2) = 8.55, p = .01)$ and physical symptoms (intercept $\chi^2(1) = 45.02, p < .001$); slope $(\chi^2(2) = 5.98, p = .05)$. Deviance change tests indicated significantly better model fit when including a random intercept, but not a random slope for symptoms of anxiety (intercept: $\chi^2(1) = 20.05, p < .001$; slope $\chi^2(2) = 2.11, p = .35$), depressive symptoms (intercept $\chi^2(1) = 54.67, p < .001$; slope $\chi^2(2) = 1.57, p = .46$), intrusive thoughts (intercept $\chi^2(1) = 44.72, p < .001$; slope $(\chi^2(2) = 1.69, p = .43)$, and sleep disturbance (intercept: $\chi^2(1) = 42.55, p < .001$; slope $(\chi^2(2) = 3.05, p = .22)$.

Covariates. Because the self-affirmation condition had significantly higher PANAS-NA at baseline than the control condition, models were fit to examine the effect of baseline negative affect on the linear trajectory of each dependent variable as well as determine if baseline negative affect moderated the effect of self-affirmation on the linear trajectory of each dependent variable. Covariate analyses of baseline negative affect revealed no significant effect of baseline negative affect on the linear trajectory of any DV (i.e., GAD-2, PHQ-2, IES, PILL), except the PROMIS sleep disturbance measure. Baseline negative affect significantly predicted the linear

trajectory of PROMIS-Sleep ($b = -.05$, $p = .01$), such that sleep disturbance decreased significantly more over time for individuals higher in negative affect at baseline. The effect of negative affect on the linear trajectory was controlled in subsequent analyses of PROMIS-Sleep. Baseline negative affect did not significantly moderate effect of self-affirmation on the linear trajectory of any outcome (all $ps > .05$) and the interaction was not included in any further analyses.

Including baseline negative affect as a covariate in models predicting the linear trend of negative affect over time violates the assumption of exogeneity in multilevel models (Gunasekara, Richardson, Carter, & Blakely, 2014). Therefore, analyses examining the effect of baseline negative affect predicting the linear trajectory of negative affect were not conducted. However, in the unconditional model of PANAS-NA, the covariance between the intercept of negative affect and slope of negative affect was not significant ($\rho = -.40$, $p = .10$), suggesting that individuals' baseline level of negative affect was not significantly related to its change over time.

Negative affect. Condition significantly predicted the linear trajectory of PANAS-NA. Specifically, the linear trajectory of PANAS-NA over the study period was significantly more negative in the self-affirmation group ($b = -2.23$, $p < .001$) and expressive writing group ($b = -1.30$, $p = .02$) than the control group. Negative affect significantly increased in the control group ($b = .78$, $p = .03$), whereas it significantly decreased in the self-affirmation group ($b = -1.46$, $p < .001$) and decreased slightly but not significantly in the expressive writing group ($b = -.52$, $p = .19$)¹. Figure 3 contains a graph of the linear trajectory of PANAS-NA for each condition.

¹ There were no statistically significant differences in linear trajectory between the self-affirmation and expressive writing conditions for any outcome variables.

Effect size estimates indicate that the addition of the dummy-coded condition variables resulted in a 32% reduction in residual variance of the linear trajectory of PANAS-NA. Table 10 includes complete models for all psychological health outcomes.

To try to ensure that differences observed in the linear trajectory of PANAS-NA for the self-affirmation and control condition were not a result of baseline differences of negative affect, a single-level ANCOVA was performed to examine the effect of condition on PANAS-NA at the 8-week follow-up assessment, controlling for baseline levels of negative affect. The effect of condition was significant ($F(2, 77) = 6.65, p = .002$) and, consistent with multilevel analysis, post hoc pairwise comparisons revealed negative affect at the 8-week follow-up was significantly lower in the self-affirmation group compared to the control condition while controlling for baseline negative affect ($p < .001$).

Anxiety. Condition did not significantly predict the linear trajectory of GAD-2. Change in GAD-2 over time in the control group did not significantly differ from the self-affirmation ($b = -.16, p = .31$) or the expressive writing condition ($b = -0.08, p = .53$). Although differences in slopes between groups were not significant, anxiety in the control group ($b = -.14, p = .20$) decreased slightly but not significantly over time, whereas anxiety in the self-affirmation ($b = -.29, p = .01$) and expressive writing ($b = -.22, p = .01$) groups both decreased significantly.

Depression. Condition did not significantly predict the linear trajectory of PHQ-2. Change in PHQ-2 over time in the control group was not significantly different from the self-affirmation ($b = -.14, p = .25$) or expressive writing condition ($b = -0.02, p = .85$). Although differences in slopes between groups were not significant, depressive symptoms in the control ($b = -.06, p = .44$) and expressive writing ($b = -.08, p = .16$) groups decreased slightly but not

significantly over time, whereas depressive symptoms in the self-affirmation group decreased significantly ($b = -.21, p = .02$).

Intrusive thoughts about finances. Condition did not significantly predict the linear trajectory of IES. Change in IES over time in the control group was not significantly different from the self-affirmation ($b = -.37, p = .29$) or expressive writing ($b = -0.07, p = .84$) conditions. Although differences in slopes between groups were not significant, intrusive thoughts in the control ($b = -.06, p = .83$) and expressive writing ($b = -.11, p = .67$) groups decreased slightly, but not significantly, over time, whereas there was a marginally significant decrease in intrusive thoughts in the self-affirmation group ($b = -.44, p = .06$).

Physical symptoms. Condition did not significantly predict the linear trajectory of PILL. Change in PILL over time in the control condition did not significantly differ from the self-affirmation ($b = -.14, p = .39$) or expressive writing groups ($b = -0.07, p = .62$). The slope of physical symptoms was not significant for any condition (all $ps > .05$). See Table 11 for models of all physical health outcomes.

Sleep. Condition did not significantly predict the linear trajectory of PROMIS-Sleep. Change in PROMIS-Sleep over time the control condition did not significantly differ from the self-affirmation ($b = .01, p = .99$) or expressive writing group ($b = .22, p = .65$). The slope of sleep disturbance was not significant for any condition (all $ps > .05$).

Moderation Analyses

Dispositional avoidance motivation. There was no significant main effect of BIS on PANAS-NA ($b = -.01, p = .93$), IES ($b = .07, p = .28$), or PILL ($b = -.00, p = .88$). Additionally, there were no significant interactions of BIS with either condition variable on the linear trajectory PANAS-NA (self-affirmation: $b = -.24, p = .27$; expressive writing: $b = .17, p = .51$),

IES (self-affirmation: $b = .03, p = .86$; expressive writing: $b = .18, p = .18$), or PILL (self-affirmation: $b = .02, p = .78$; expressive writing: $b = .07, p = .32$).

Dispositional reward sensitivity. There was no significant main effect of BAS-Rew on the linear trajectory of PANAS-NA ($b = .14, p = .29$) or PILL ($b = -.04, p = .48$). There was a significant main effect of BAS-Rew on the linear effect of IES, such that IES decreased significantly more over time for individuals who were higher in dispositional reward sensitivity ($b = -.19, p = .04$).

BAS-Rew did not significantly moderate the effect of self-affirmation ($b = .29, p = .18$) or expressive writing ($b = .38, p = .11$) on IES. However, BAS-Rew significantly moderated the effect of expressive writing on linear trajectory of PANAS-NA ($b = 1.00, p < .001$), but BAS-Rew did not significantly moderate the effect of self-affirmation ($b = -.07, p = .82$). Displayed in Figure 4, simple slopes tests revealed that the linear trajectory of PANAS-NA decreased significantly more for individuals who were 1 standard deviation below the mean ($b = -3.31, p < .001$) or at the mean ($b = -1.70, p < .001$) in BAS-Rew in the expressive writing group, compared to individuals who were low or at the mean in BAS-Rew in the control condition. However, there was no significant effect of expressive writing on linear trajectory of PANAS-NA compared to the control group for individuals 1 standard deviation above the mean BAS-Rew ($b = -.08, p = .91$). That is, expressive writing produced a greater decrease in negative affect over time for individuals who were low or at the mean in dispositional reward sensitivity, but there was no significant effect of expressive writing on change in negative affect for individuals who were high in dispositional reward sensitivity compared to those in the control group. Effect size estimates indicate that the addition of the interactions between the conditions, the moderator,

and time resulted in a 20% reduction in residual variance of the linear trajectory of PANAS-NA compared to a model with just the conditions and time.

Following the same pattern, dispositional reward sensitivity marginally significantly moderated the effect of expressive writing on the PILL ($b = .19, p = .07$); however, it did not significantly moderate the effect of self-affirmation ($b = -.01, p = .91$). Displayed in Figure 5, simple slopes tests revealed that the linear trajectory of the PILL decreased marginally significantly more for individuals who were 1 standard deviation below the mean in BAS-Rew in the expressive writing group, compared to individuals who are low in BAS-Rew in the control condition ($b = -.42, p = .06$). However, there was no significant effect of expressive writing on the linear trajectory of IES compared to the control group for individuals at the mean ($b = -.12, p = .43$) or 1 standard deviation above the mean on BAS-Rew ($b = .18, p = .39$). That is, expressive writing produced a greater decrease in physical symptoms over time for individuals who were low in dispositional reward sensitivity compared to their counterparts in the control condition, but there was no significant effect of expressive writing on change in physical symptoms compared to the control group for individuals who were at the mean or high in dispositional reward sensitivity. Effect size estimates indicate that the addition of the interactions between the conditions, the moderator, and time resulted in a 12% reduction in residual variance of the linear trajectory of PILL compared to a model with just the conditions and time.

Mediator Analyses

Positive affect.

At 2 weeks. When using change in positive affect from baseline to the two-week follow-up as a mediator, indirect paths for both self-affirmation and expressive writing conditions on PANAS-NA, IES, and PILL were all not significant (all CIs included 0). The effect of each

experimental condition on change in the positive affect at two weeks (a paths) was not significant for either self-affirmation or expressive writing ($ps > .05$). Increases in positive affect over 2 weeks predicted a marginally significant decrease in IES (b path) ($b = -.17, p = .08$). However, change in positive affect did not significantly predict changes in PANAS-NA ($b = -.10, p = .51$) or PILL ($b = -.05, p = .19$).

At 8-weeks. When using change in positive affect from baseline to the eight-week follow-up as a mediator, indirect paths for self-affirmation and expressive writing on all dependent variables were not significant (all CIs included 0). The effect of each experimental condition on change in the positive affect at eight weeks (a paths) was not significant for either self-affirmation or expressive writing ($ps > .05$). Change in positive affect from baseline to the 8-week follow-up did not significantly predict change in PANAS-NA ($b = .07, p = .61$), IES ($b = -.10, p = .28$), or PILL ($b = .01, p = .83$) (b paths).

Self-compassion.

At 2 weeks. When using change in self-compassion from baseline to the two-week follow-up as a mediator, indirect paths for both self-affirmation and expressive writing conditions on PANAS-NA, IES, and PILL were all not significant (all CIs included 0). The effect of each experimental condition on change in the self-compassion at two weeks (a paths) was not significant for either self-affirmation or expressive writing ($ps > .05$). Increases in self-compassion at 2 weeks significantly predicted decreases in IES ($b = -2.82, p = .002$) and PANAS-NA ($b = -3.94, p = .02$) at 8 weeks, but not PILL ($b = .13, p = .44$) (b paths).

At 8-weeks. When using change in self-compassion from baseline to the eight-week follow-up as a mediator, indirect paths for self-affirmation and expressive writing on all dependent variables were not significant (all CIs included 0). The effect of each experimental

condition on change in the self-compassion at eight weeks (a paths) was not significant for either self-affirmation or expressive writing ($ps > .05$). Increases in self-compassion at 8 weeks significantly predicted decreases in IES at 8 weeks ($b = -2.04, p = .002$), but was not significantly related to change in PANAS-NA ($b = -1.54, p = .16$) or PILL ($b = .18, p = .54$) (b paths).

Avoidance Coping.

At 2 weeks. When using change in avoidance coping from baseline to the two-week follow-up as a mediator, indirect paths for both self-affirmation and expressive writing conditions on PANAS-NA, IES, and PILL were all not significant (all CIs included 0). The effect of each experimental condition on change in the avoidance at two weeks (a paths) was not significant for either self-affirmation or expressive writing ($ps > .05$). Change in avoidance from baseline to 2 weeks did not significantly predict change in PANAS-NA ($b = 2.97, p = .26$), IES ($b = 1.90, p = .17$), or (PILL: $b = -.75, p = .39$) (b paths).

At 8 weeks. When using change in avoidance from baseline to the eight-week follow-up as a mediator, indirect paths for self-affirmation and expressive writing on all dependent variables were not significant (all CIs included 0). There was a marginally significant decrease in avoidance coping in the self-affirmation condition ($b = -.25, p = .09$) (a path), but no significant change in avoidance in the expressive writing condition ($b = -.20, p = .20$). Decreases in avoidance coping from baseline to the 8-week follow-up predicted marginally significant decreases in PANAS-NA from baseline to 8 weeks ($b = 4.10, p = .08$), but not IES ($b = 1.12, p = .42$) or PILL ($b = .04, p = .95$) (b paths).

Post Hoc Analyses

Probing main effects on PANAS, GAD, and PHQ. Condition significantly predicted the linear trajectory of PANAS-NA, but not GAD-2 or PHQ-2. The effect on the PANAS-NA appeared due in part to the control condition's significant increase in PANAS-NA over time, but the control condition produced non-significant declines on the GAD-2 and PHQ-2. Post hoc analyses examined PANAS-NA at the item level to determine whether certain items of the subscale were driving the main effects observed. To examine the effect of condition on change in each item of the PANAS-NA over time, multilevel models were fit separately for each of the 10 items (i.e., irritable, afraid, upset, nervous, jittery, scared, distressed, ashamed, hostile, guilty) with conditions, time, and the interaction between time and conditions as predictors.

Examination of the control condition's slopes for each PANAS-NA item revealed that the control condition significantly increased on the items irritable ($b = .14, p = .01$) and jittery ($b = .21, p < .001$) and that the effects of both conditions on the linear trajectory of irritable and jittery were significant. Specifically, the self-affirmation (irritable: $b = -.27, p < .001$; jittery: $b = -.31, p < .001$) and expressive writing (irritable: $b = -.16, p = .05$; jittery: $b = -.25, p < .001$) conditions decreased significantly more than the control group on those two items. Patterns of the effect of conditions on the linear trajectories of these two items parallel the results observed for the overall PANAS-NA scale, suggesting differences on the PANAS could be driven in part by buffering the control condition's increases on the irritable and jittery items.

In the control condition, the slope did not significantly change for the items afraid, upset, nervous, scared, distressed, ashamed, hostile, or guilty ($ps > .05$). There was no significant effect of either self-affirmation or expressive writing on the linear trajectory of hostile or guilty ($ps > .05$). However, the self-affirmation condition decreased significantly more than the control group on the items: afraid ($b = -.20, p = .04$), upset ($b = -.35, p < .001$), nervous ($b = -.19, p$

= .03), scared ($b = .25, p = .01$), distressed ($b = .18, p = .54$), and ashamed ($b = -.21, p = .02$).

The expressive writing condition also decreased marginally significantly more on upset ($b = -.16, p = .06$).

Moderated Mediation. Because BAS-Rew significantly moderated the effect of expressive writing on negative affect and physical symptoms, post hoc moderated mediation analyses were performed to determine if BAS-Rew significantly moderated the effect of expressive writing on the three mediators (i.e., positive affect, self-compassion, avoidance coping) under investigation (a paths). No indirect effects with the a path moderated by BAS-Rew were statistically significant (all CIs included 0).

Discussion

The purpose of the present study was to examine the effects of self-affirmation writing and expressive writing on psychological and physical health outcomes over two months in a sample of undergraduates experiencing chronic financial strain. Like other chronic stressors, financial strain places undergraduate students at risk for worse psychological and physical functioning as well as poorer academic performance and greater rates of dropout compared to their peers without financial stress (Corrigan, 2003; Hu & St. John, 2001; Tinto, 2006). Not only does the present study extend previous research by examining the effects of expressive writing in undergraduates with financial strain, but it is also the first study to our knowledge to investigate the effects of repeated self-affirmation writing on physical symptoms and psychological health over time. Identifying brief, cost-effective interventions is critical for improving the well-being of individuals living with chronic financial strain. The direct effects of the writing manipulations on psychological and physical health outcomes were examined as well as the interaction of

writing assignments with theoretically important moderator variables. Finally, potential mediators of the effects of self-affirmation were explored.

To qualify for the present study, participants had to report at least moderate stress in affording basic necessities. Demographic composition of the present study, compared to income distribution of the UCLA undergraduate student body, suggests that the present sample represents students from financially stressed and socioeconomically disadvantaged backgrounds. At UCLA, approximately 41% of undergraduate students come from families with an income of greater than \$107,000 (University of California, 2016), compared 9% of the present sample. Two-thirds of participants (67%) reported a household income of less than \$60,000, while approximately 38% of the undergraduate student body reported a household income of less than \$54,000 (University of California, 2016). Consistent with evidence that financial strain is associated with worse psychological functioning (Lange & Byrd, 1998; Richardson et al., 2013), participants in this study were experiencing negative affect, symptoms of anxiety and depression, and intrusive thoughts at levels that were above norms for the general population or comparable to individuals exposed to chronic or traumatic stressors. However, physical symptoms in this sample were not as impaired as expected, given the established relationship between financial stress and poor physical health outcomes (Northern et al., 2010; Skinner et al., 2004). Rates of physical symptoms were commensurate with undergraduates in other samples and rates of sleep disturbance were slightly above that of the general population.

Main Effects Findings

No past literature to our knowledge has examined the effects of self-affirmation or expressive writing on psychological and physical health in undergraduates with chronic financial strain. Consistent with hypotheses, there was a significant effect of experimental condition on the linear trajectory of negative affect over the course of the study. Specifically,

the linear trajectory of negative affect was significantly more negative over the eight-week study period for individuals in the self-affirmation and expressive writing condition compared to individuals in the control condition. Negative affect in the control condition increased slightly over the study period, whereas it decreased slightly but not significantly for the expressive writing group and decreased significantly for the self-affirmation group. Engaging in repeated expressive writing buffered against the increase in negative affect observed in the control condition in the present study. These findings are in accordance with previous literature that evidenced lower negative mood in individuals who had taken part in expressive writing compared to a control condition (Lepore & Greenberg, 2002; Smyth, Hockemeyer, & Tulloch, 2008; Soliday, Garofalo, & Rogers, 2004). It has been theorized that emotional disclosure through expressive writing can release previously suppressed emotions and help individuals create a coherent narrative around one's experience (Baikie & Wilhelm, 2005; Pennebaker, 1997), both of which could buffer against the increase in negative affect experienced by participants in the control condition over time.

Although the effect of self-affirmation on emotional states over time is understudied, findings from the present study align with one study that suggested a decrease in negative emotions immediately following a laboratory self-affirmation induction (Matz & Wood, 2005). In the present study, repeated self-affirmation not only buffered against the increase in negative affect in the control condition, but it also decreased negative affect significantly over time. These findings are consistent with the literature that suggests self-affirmation buffers against stress responses (Creswell et al., 2013; Creswell et al., 2005; Sherman et al., 2009). Previous literature demonstrated that self-affirmation buffers against a biological stress response to laboratory stressors (Creswell et al., 2005) as well as naturalistic stressors (e.g., exam in school; Sherman et al., 2009). However, findings from the present study indicate that self-affirmation may also buffer against a psychological stress response, specifically increases in negative affect. Although not tested explicitly in the current study, self-affirmation

theory would suggest that participants in the self-affirmation condition benefitted from a bolstered sense of self-integrity, which led to decreases in negative affect despite the numerous stressors the university setting presents for undergraduates with chronic financial stress. However, identification and empirical investigation of pathways through which self-affirmation influences negative affect require further investigation.

It is important to note that although there was a significant effect of condition on the linear trajectory of negative affect, there was no significant effect of condition on the cardinal symptoms of anxiety or depression. Symptoms of anxiety significantly decreased in both the expressive writing and self-affirmation conditions; however, the drop was not significantly different from the decline of anxiety symptoms in the control condition. Similarly, depressive symptoms declined in all groups (significantly so in the self-affirmation group), but the differences between groups were not significant. One possible reason for the discrepancy between the findings for negative affect versus those for anxiety and depressive symptoms is that the measure of negative affect captured constructs not assessed by the measures of anxiety and depressive symptoms. The measure of core symptoms of depression solely assesses depressed mood and loss of interest, and the measure of anxiety symptoms only assesses nervousness and uncontrollable worry. Post hoc analyses revealed that increases in negative affect in the control condition were in part driven by reports of feeling more irritable and jittery over time. Although jittery may have been captured by the item “*Feeling nervous, anxious or on edge*” on the GAD-2, feelings of irritability are not assessed by the two items on the PHQ-2. Irritability is a symptom of many psychological disorders and suggested as a transdiagnostic mood dimension, particularly for children and adolescents (Stringaris, 2011; Stringaris & Goodman, 2009). Because participants in this study were largely in the transition from adolescence to young adulthood,

feelings of irritability may be an important source of mood disturbance in this sample that were accounted for only in the measure of negative affect.

Another reason for the divergent findings on negative affect and symptoms of anxiety and depression could be differences in the measures' sensitivity to change over time. Although the PANAS has evidenced high sensitivity to mood fluctuations over time (Watson & Clark, 1999), and there is preliminary support for the PHQ-2's sensitivity to change (Löwe, Kroenke, & Gräfe, 2005), the GAD-2 does not have established evidence for sensitivity to change (Kroenke, Spitzer, Williams, & Löwe, 2010). Differences in the response scales and time frames of the different measures could also account for the discrepancies in findings. On the negative affect measure, respondents ranked the extent to which they felt each mood state over the past week on a 5-point Likert scale, whereas on the anxiety and depression measures, participants reported how often over the past two weeks they had been bothered by each problem on a 4-point Likert scale. The subtle differences between scales could in part contribute to the disparity in results. It should be noted, however, that effects of condition across the measures of negative affect and cardinal symptoms of anxiety and depression were in the expected direction.

Contrary to hypotheses, condition did not significantly influence finance-specific distress. In the present study, intrusive thoughts declined in all groups, and marginally significantly declined in the self-affirmation group, but the differences between groups was not significant. These findings conflict with theories of expressive disclosure (Baikie & Wilhelm, 2005; Pennebaker, 1989, 1997) and results from previous studies (Klein & Boals, 2001; Park & Blumberg, 2002). In those studies, participants wrote about traumatic and negative experiences that happened in the past; however, in the present study participants' financial strain was ongoing and thoughts about one's financial situation may have been unavoidable or even necessary (e.g., remembering to pay bills). Perhaps expressive writing can reduce intrusive thoughts by facilitating cognitive processing of previous traumas, but it

is less effective for ongoing or anticipatory stressors. For example, in a study of expressive writing about an upcoming graduate entrance exam there was no effect of expressive writing on later intrusive thoughts the exam (Lepore, 1997). In a meta-analysis of expressive writing studies, time since the event did not significantly moderate the effect of expressive writing on psychological health outcomes (Frattaroli, 2006). However, stressor-specific intrusive thoughts were not analyzed specifically, and time since the event had not been manipulated in a single study.

Although self-affirmation has been shown to decrease ruminative thinking about a failure in a laboratory setting (Koole et al., 1999), no literature to our knowledge has examined its effect on intrusive thoughts outside the laboratory or in trauma-exposed or chronically stressed populations. Although the marginally significant decrease in intrusive thoughts observed in the self-affirmation condition was not significantly different from that of the control condition, there is some evidence that self-affirmation may influence levels of intrusive thoughts about a chronic stressor over time.

Also inconsistent with hypotheses, there was no significant effect of either self-affirmation or expressive writing on physical symptoms in the present study (but see the marginally significant moderated finding described below). Meta-analyses of expressive writing revealed a significant effect of expressive writing on physical symptoms (Frisina, Borod, & Lepore, 2004; Smyth, Stone, Hurewitz, & Kaell, 1999). Similarly, self-affirmation has been proposed to improve health outcomes (Harris & Epton, 2009), and in one study of women with breast cancer, higher self-affirmation statements in expressive essays predicted fewer physical symptoms (Creswell et al., 2007). Rates of physical symptoms in the current sample were lower than expected and similar to that of healthy young adults in other samples (Niles et al., 2014). The potential for improvement in physical symptoms following the writing tasks may have been limited due to low levels of physical symptoms at baseline.

Similar to the non-significant effects on physical symptoms, the experimental conditions did not significantly improve sleep disturbance. These results are in line with findings that suggest expressive writing is not effective for health behaviors (Baikie & Wilhelm, 2005; Smyth, 1998). On the other hand, meta-analysis reveals that although self-affirmation has been shown to have a small effect on increasing acceptance of health-risk information, intention to change behavior, and health behavior change (Epton et al., 2015). However, no other study to our knowledge has examined the effect of self-affirmation on sleep. Many competing factors contribute to undergraduates' sleep disturbance (e.g., social demands, academic stress, irregular daily schedules, increased autonomy) (Kenney, LaBrie, Hummer, & Pham, 2012), and improving sleep in this population may require multi-pronged intervention strategies not offered through brief writing paradigms.

One unexpected and important finding to note is the improvement on psychological health measures across all groups. Although the control group significantly increased in negative affect on the PANAS, on all other psychological health outcomes (i.e., symptoms of anxiety, depressive symptoms, and intrusive thoughts) all three groups decreased over the eight-week study period, even if the decreases were not significant. The improvement across all groups could contribute to the lack of significant differences observed. Although it is possible that the decreases observed in all groups on most outcomes represent regression to the mean and not benefit from the writing, it is also possible that simply participating in this study benefitted all participants in some way. Through the completion of questionnaires, participants in all groups shared aspects of their financial strain and how they coped with it. It may be that this experience of participating in a study for undergraduates with financial stress validated participants in all conditions' challenges with financial strain. Additionally, 21% attrition occurred by the eight-week follow-up in the current study. Although there were no significant differences between groups on demographic factors or study variables at

baseline, it could be that the individuals who were the most motivated or doing the best psychologically and physically at the follow-up assessments were the ones who participated.

The present study's inconsistent findings for different outcome variables highlight the need for future research to disentangle for which outcomes self-affirmation is effective. Previously, the majority of studies that examined the effects of self-affirmation over time found significant effects of values affirmation on academic performance (Borman, Grigg, & Hanselman, 2016; G. L. Cohen et al., 2006; Sherman et al., 2013) and some health behaviors (Cooke, Trebaczyk, Harris, & Wright, 2014; Epton et al., 2015). The present study found support for the effectiveness of self-affirmation in reducing negative affect over time, but there was no statistically significant effect for the other measures of psychological (i.e., symptoms of anxiety, depressive symptoms, and intrusive thoughts) or physical health (i.e., self-reported physical symptoms and sleep). More nuanced analysis of the effect of self-affirmation on subtypes of emotions is warranted. For example, results from the present study suggest irritability might be particularly important for undergraduates with chronic financial strain. Similarly, although the present study found no effect of condition on self-compassion and positive affect as mediators (see below for discussion), investigation of other theoretically-relevant positive indicators of emotional well-being is warranted (e.g., social connectedness, stressor-related growth, meaning and purpose).

Just as for psychological outcomes, future research should seek to specify which physical health outcomes self-affirmation can improve over time. Previous studies found reductions in cortisol, but not heart rate or blood pressure following a laboratory self-affirmation manipulation (Creswell et al., 2005). Perhaps self-affirmation can buffer against some physiological stress responses, but the present study and the findings of Niles et al. (2016) suggest a concomitant effect on self-reported physical symptoms might not occur. More research is needed to understand the effect of self-affirmation on various health

outcomes, including additional indicators of physical health that have yet to be studied (e.g., medical visits, days with restricted activity).

Although disentangling the effect of expressive writing for various outcome variables was done in Frattaroli's (2006) seminal meta-analysis of expressive writing studies, over a decade of research has been conducted since then. At the time, expressive writing had an effect on all outcomes except health behaviors. An updated meta-analysis could verify whether those results still stand and could clarify for which outcomes the effects of expressive writing are largest.

Moderator Findings

Dispositional reward sensitivity and dispositional avoidance were examined as moderators of expressive writing and self-affirmation to determine for whom the writing conditions are most beneficial. Inconsistent with hypotheses, dispositional reward sensitivity did not significantly moderate the effect of self-affirmation on any outcome. However, dispositional reward sensitivity significantly moderated the effect of expressive writing on negative affect and physical symptoms. There was a greater decrease in negative affect over time for individuals in the expressive writing condition who were at the mean or low in dispositional reward sensitivity compared to their counterparts in the control condition. Following the same pattern, there was a marginally significant greater decrease in physical symptoms over time for individuals in the expressive writing condition who were low in reward sensitivity compared to those who were low in reward sensitivity in the control condition. At high and mean levels of dispositional reward sensitivity, there was no difference between the expressive writing and control groups in change in negative affect and physical symptoms over the study period. These findings are consistent with previous findings that expressive writing is more beneficial for individuals who have dispositional deficits in emotional processing (Baker & Berenbaum, 2008; Paez et al., 1999). Ability to anticipate and appreciate rewarding stimuli in the environment has been proposed as an

important dispositional resilience resource, such that individuals fare better when they have a robust reward processing system (Pizzagalli, 2014; Southwick & Charney, 2012; Southwick, Vythilingam, & Charney, 2005). Additionally, low reward motivation has been linked to withdrawal behaviors and disengagement from one's environment (Southwick et al., 2005). Expressive writing could impose engagement and processing of one's situation for individuals low in reward processing and offset a tendency to withdraw. Another possibility is that scoring low in reward sensitivity could represent individuals who are at risk for depressive disorders and maladaptive emotion regulation strategies typical of depression (Pizzagalli, 2014; Southwick & Charney, 2012). In that case, findings would align with previous findings of benefits of expressive writing for depression-vulnerable individuals (Gortner et al., 2006). Additional research examining how individual differences in reward processing influences the effectiveness of expressive writing is needed.

Unlike the expressive writing condition and contrary to hypotheses, reward sensitivity did not moderate the effect of self-affirmation on outcomes. Although recent literature has revealed that neural reward regions activate during self-affirmation tasks (Dutcher et al., 2016), present findings suggest that the effects of self-affirmation are not dependent on an individuals' dispositional levels of reward sensitivity. It was hypothesized that either a deficits model could exist, where self-affirmation would benefit individuals with low reward sensitivity more, or a strengths model could occur in which self-affirmation would build on the pre-existing strengths of individuals high in reward sensitivity; however, neither of those models were born out. It is possible that reward sensitivity does not function as a moderator of self-affirmation, but rather as a mediator. That is, self-affirmation might not be more beneficial for individuals high or low in reward processing, but could produce benefits for people by improving reward-related processing. This investigation contained a measure of dispositional reward sensitivity, and future studies could use measures of reward that are

more sensitive to change over time to determine whether individuals evidence improvements in reward sensitivity after self-affirmation compared to a control condition.

Also discordant with hypotheses, no moderating effect of dispositional avoidance motivation was found for either expressive writing or self-affirmation. Although examination of dispositional avoidance as a moderator of self-affirmation was exploratory, findings regarding expressive writing diverge from several studies demonstrating that expressive writing is more beneficial for individuals who are low in avoidance-oriented emotion regulation processes (Baker & Berenbaum, 2007, 2008; Jensen-Johansen et al., 2013; Moreno et al., 2017; Paez et al., 1999). One important difference between the current study and previous investigations is the measure of dispositional avoidance used in the present study is thought to capture avoidance motivation in personality broadly (Elliot & Thrash, 2010), whereas previous research has chiefly investigated avoidance-oriented emotion regulation processes. Based on findings from the present study, it is likely that expressive writing is dependent more on a person's dispositional avoidance of emotions than avoidance motivation in models of personality.

Although the present study focused on dispositional emotion processing variables, other individual difference factors not investigated in the present study may be important moderators. Previous literature suggests that culture may be important for both self-affirmation (Heine & Lehman, 1997; Hoshino-Browne, Zanna, Spencer, & Zanna, 2004) and expressive writing (Knowles, Wearing, & Campos, 2011; Lu & Stanton, 2010; Tsai et al., 2015). Specifically, previous research suggests that self-affirmation may benefit those from individualistic cultures, but not collectivist cultures (Heine & Lehman, 1997), unless the instructions are tailor to have participants write about values important to “themselves and their family” (Hoshino-Browne et al., 2004). On the other hand, research on expressive writing demonstrates mixed results for individuals of Asian descent (Knowles et al., 2011; Lu & Stanton, 2010). Although a strength of this study is its diverse sample, the study did

not contain measures of cultural identity or acculturation and is not adequately powered to examine the effect of cultural factors on the effectiveness of writing conditions. Culture is an important individual difference to consider in future studies.

Another moderator to consider in future studies is spontaneous self-affirmation. As addressed above, previous research suggests expressive writing most benefits individuals who are low in dispositional emotional expression (Baker & Berenbaum, 2007, 2008; Jensen-Johansen et al., 2013; Moreno et al., 2017; Paez et al., 1999). In a similar way, self-affirmation writing could provide the greatest benefit for individuals who are low in spontaneous self-affirmation. Individuals low in spontaneous self-affirmation are those who respond to naturalistic stressors/threats by reflecting on their values and strengths. It is possible that a self-affirmation intervention could in essence teach individuals who do not spontaneously self-affirm to reflect on their personally-important values and characteristics in the face of stressors (Brady et al., 2016). Continued investigation of individual difference factors that moderate self-affirmation and expressive writing will help determine for whom the writing exercises are most effective.

Mediator Findings

The three mediators investigated in the present study, positive affect, self-compassion, and avoidance coping, were selected based on their potential importance for underlying the effects of self-affirmation. However, no significant mediated effects for any of the proposed mechanisms emerged for any of the primary outcomes (i.e., negative affect, intrusive thoughts, and physical symptoms) for either condition. Although several studies have suggested that self-affirmation can increase positive affect (Koole et al., 1999; Morgan & Atkin, 2016; Schmeichel & Vohs, 2009) that was not evidenced in the present investigation. However, results are consistent with research that found no effect on state positive affect following laboratory self-affirmation manipulations (Fein & Spencer, 1997; Steele & Liu, 1983) as well as research that has compared the effects of self-affirmation

manipulations to positive mood inductions and found that mood manipulations did not produce the same benefits as self-affirmation (Steele, Spencer, & Lynch, 1993). Findings from the present study contribute to the largely mixed literature on the relationship between self-affirmation and positive mood. Additionally, changes in positive affect did not mediate the effects of expressive writing on changes in any of the primary outcomes, which is in accordance with past research that has found no effect of expressive writing on positive affect (Fernández & Páez, 2008; Walker, Nail, & Croyle, 1999).

Self-compassion did not emerge as a mediator of the effects of either self-affirmation or expressive writing on any outcomes. Findings are inconsistent with a recent study in which increases in state self-compassion following a laboratory self-affirmation task mediated the effect of the self-affirmation manipulation on later pro-social behaviors in a laboratory shelf-collapse incident (Lindsay & Creswell, 2014). An important difference between the present study and that study is that the present study assessed changes in self-compassion over 8 weeks as opposed to immediate changes in state self-compassion. Further research is needed to disentangle the effect of self-affirmation on self-compassion over shorter and longer time spans.

Similarly, the present study did not find any changes in self-compassion over time following expressive writing. This is consistent with one previous study that found no effect of expressive writing on self-compassion two weeks later (Johnson & O'Brien, 2013). Although the present results suggest that expressive writing does not produce changes in self-compassion, some previous research has identified changes in other self-resources (e.g., self-esteem) following expressive disclosure (Donnelly & Murray, 1991; O'Connor et al., 2011). More research is needed to understand the relationship between expressive writing and various self-resources.

Last, inconsistent with hypotheses, avoidance coping did not mediate the effects of either self-affirmation or expressive writing on health outcomes. There was, however, a marginally significant decrease in avoidance coping in the self-affirmation group compared to the control group. Reducing defensiveness in the face a threat is a central facet of self-affirmation theory (Sherman & Cohen, 2006; Steele, 1988), and the present findings provide some initial support for self-affirmation's capacity to reduce avoidance of naturalistic stressors. Interestingly, the marginal decrease in avoidance was only marginally significantly related to the decrease in negative affect and was not related to changes in intrusive thoughts or physical symptoms, which is contrary to a large body of literature demonstrating the deleterious psychological and physical effects of avoidance (M. R. Bauer et al., 2016; Carver et al., 1993; Moskowitz et al., 2009; Penley et al., 2002; Roesch & Weiner, 2001; Stanton & Snider, 1993). Future research should extend findings from the present study and continue to investigate the effects of self-affirmation on avoidant and defensive responding to threats and stressors outside of the laboratory setting. The present study used a measure of avoidance coping. Measures of other types of avoidance (e.g., behavioral, emotional) might provide a more detailed understanding of the effect of self-affirmation on avoidance.

Although expressive writing is theorized to decrease the frequency of avoidance (Pennebaker, 1989), literature examining the effects of expressive writing on changes in avoidance coping is surprisingly limited. In a study of undergraduates following a break-up and in a study of community-residing gay men, expressive writing significantly decreased avoidance coping over time (Lepore & Greenberg, 2002; Swanbon, Boyce, & Greenberg, 2008); however, that was not found in the present study. Many investigations have examined stressor-specific avoidance coping as a moderator of expressive writing (Baikie, Geerlings, & Wilhelm, 2012; Lepore & Greenberg, 2002; Moreno et al., 2017; Stanton et al., 2002), but further empirical investigation of the effect of expressive writing on changes in avoidance coping over time is needed.

Mechanisms of self-affirmation remain largely understudied and poorly understood. It is possible that self-affirmation operates through pathways that were not examined in the present study. A recent study found that self-affirmation not only closed the academic achievement gap for first generation college students, but also found that students had more confidence about their academic background for challenging courses by the end of the study (Harackiewicz et al., 2014). Similarly, one study found that following a self-affirmation manipulation students had more confidence in their ability to handle future academic stressors (Brady et al., 2016). Taken together, these studies suggest that coping self-efficacy could be a potential mediator of self-affirmation.

In the present study 89% of the sample ranked relationships with friends and family as one of their top values. It is possible that by reflecting on meaningful relationships, self-affirmation bolsters social support or improves valued relationships. Along those lines, one study found ethnic minority middle school students who completed self-affirmation tasks had a greater sense of belonging in their school compared to minority students in a control condition (Cook, Purdie-Vaughns, Garcia, & Cohen, 2012). It is possible that self-affirmation improves people's social networks, their perception of their social world, or their place in it. These potential changes could serve as a self-affirmation mechanism by having positive consequences for downstream health outcomes.

Sherman (2013) recently specified three theoretically-relevant mechanisms of self-affirmation: (1) enhancing individuals' psychological resources to manage self-threats, (2) distinguishing the self from the threat, and (3) broadening the perspective through which individuals view threats in their life. However, to date, research has largely struggled to operationalize these theoretical mediators and identify which psychological resources and which aspects of a broaden perspective (e.g., cognitive, temporal) may act as mechanisms (Sweeney & Freitas, 2016). Careful consideration of how mediators are operationalized and

selected will be important in future research. Additionally, attention to whether there are different mediators of self-affirmation for distinct outcomes is essential.

Strengths and Limitations

Findings from the present study should be interpreted in light of several limitations. Although the study was well-powered to detect moderate to large effects, it was underpowered to detect small effects. The relatively small sample could have obscured smaller effects of self-affirmation and expressive writing. Attrition due to an optional 8-week follow-up also limits the study; however, it was addressed using a missing data model. Additionally, findings from the present study may not generalize to socioeconomically disadvantaged community samples. This study also relies on self-reported outcomes, which could diverge from more objective measures of emotional and physical health. Strengths of this study include the longitudinal design, inclusion of an ethnically diverse sample of socioeconomically disadvantaged students, and the integration of the self-affirmation and expressive writing literatures.

Conclusions and Future Directions

The present study provides mixed evidence for the influence of repeated self-affirmation on the psychological well-being of individuals managing a chronic stressor. Although self-affirmation decreased negative affect over time as compared to the control condition, there were no significant group differences on intrusive thoughts about finances, anxiety, or depressive symptoms. No physical health benefit was observed, perhaps due to a small sample or evaluation of self-reported physical health outcomes. Based on results from the present study, the effects of self-affirmation are not dependent on dispositional reward sensitivity and avoidance motivation. Continuing to investigate for whom self-affirmation is most effective will be important for tailoring self-affirmation interventions in the future. Other individual difference factors, including culture and dispositional engagement in spontaneous self-affirmation, may be important moderators. Additionally, this study was

unable to identify significant mediators of self-affirmation, but other potential mechanisms that have yet to be investigated include increased coping self-efficacy, sense of belonging, social support, and reward processing. This study expanded the current literature on expressive writing by suggesting its benefit on negative affect for undergraduates with chronic financial strain and identifying a new potentially important moderator, reward sensitivity.

Despite the positive findings for negative affect, null findings for all other outcomes suggest that improving the power of both self-affirmation and expressive writing interventions is necessary. Many laboratory studies of self-affirmation include one, short affirmation task and then evaluate immediate changes in behaviors, attitudes, and cognition. The large body of work examining the effects of repeated self-affirmation on academic achievement, often have multiple, short self-affirmation exercises spaced over the course of a multi-year study period (e.g., Borman et al., 2016; G. L. Cohen et al., 2006; Sherman et al., 2013). In order to keep self-affirmation procedures similar to expressive-writing procedures in the present study, the delivery of self-affirmation differed. The present study had participants write for 20 minutes, four times over a 48-72 hour period. In order administer self-affirmation interventions in the most powerful way, features of the delivery (e.g., spacing, duration) need to be empirically tested, as has been done in expressive writing (Burton & King, 2004; Chung & Pennebaker, 2008).

Timing of the follow-up assessments is another important factor in considering the power of these writing interventions. Several studies of self-affirmation on academic achievement of minority students have found that the effects of self-affirmation strengthen over one year (Brady et al., 2016; G. L. Cohen et al., 2006; Sherman et al., 2013). In the present study, all psychological outcomes continued to improve over time in the self-affirmation condition. It is possible that, like the effect for academic achievement, the effect of self-affirmation on

psychological outcome strengthens over time. Perhaps inclusion of an even longer-term follow-up in the present study would have allowed significant differences in symptoms of anxiety, depressive symptoms, and intrusive thoughts to emerge between the self-affirmation and control conditions.

Finally, the present study examined self-affirmation and expressive writing in parallel. An important next step will be to combine self-affirmation and expressive writing in one condition. It is possible that the combination of emotional disclosure with reflection on personally-important values could produce greater benefits for psychological well-being than each alone. Empirically-based interventions that involve both the identification of important values and expression of emotion, such as Acceptance and Commitment Therapy (Hayes, Luoma, Bond, Masuda, & Lillis, 2006), have been shown to reduce a range of psychological symptoms and negative behaviors (Powers, Maarten, & Emmelkamp, 2009). Combining self-affirmation and expressive writing instructions could be even more powerful than either alone. Self-affirmation might not only provide direct psychological benefits to individuals, but also self-affirmed individuals may be less defensive and more open to threatening information, which might allow them to engage more deeply in expressive writing.

Results from the present study suggest that expressive writing and self-affirmation may be able to buffer against increases in negative affect for undergraduates with chronic financial strain over time, but also underscore the need for future research to ascertain how to harness the power of self-affirmation and expressive writing beyond the laboratory. With additional research, self-affirmation and expressive writing could develop into useful, brief interventions. Understanding for which outcomes and individuals these writing tasks are most effective as well as their mechanisms of action will help improve interventions and refine their underlying theories. Future research should continue to examine the unique and combined effects of values affirmation and emotional disclosure. Incorporation of these

processes into interventions could carry benefit for socioeconomically disadvantaged individuals as well as individuals confronting other serious stressors.

Table 1

Writing instructions for each condition

Condition	Writing Task	Instructions
Self-Affirmation	Writing Sample 1	What I would like you to write about for these four writing tasks are some of your most important values. For your first writing sample, I would like you to write about why your top ranked value (the values you ranked #1 on the values ranking sheet you just completed) is important to you. Please describe why this personal characteristic or life domain is important and meaningful to you. You might think about a time in your life when this value was particularly important. You might also write about your thoughts and feelings about this important value. The only rule we have is that you write continuously for the entire time. If you run out of things to say, just repeat what you have already written. Don't worry about grammar, spelling, or sentence structure. Just write. Again, whatever you choose to write, explore why your #1 ranked value is important to you.
	Writing Sample 2	In this writing task, I would like you to write about your second most important value (the value you ranked #2 on your values ranking list). As with last time, please describe why this personal characteristic or life domain is important and meaningful to you. You might think about a time in your life when this value was particularly important or write about your thoughts and feelings about this important value. Please write continuously the entire time, and don't worry about grammar, spelling, or sentence structure. Just write. Again, whatever you choose to write, please write about why your #2 ranked value is important to you.
	Writing Sample 3	In this writing task, I would like you to write about your third most important value (the value you ranked #3 on your values ranking list). As with last time, please describe why this personal characteristic or life domain is important and meaningful to you. You might think about a time in your life when this value was particularly important or write about your thoughts and feelings about this important value. Please write continuously the entire time, and don't worry about grammar, spelling, or sentence structure. Just write. Again, whatever you choose to write, please write about why your #3 ranked value is important to you.
	Writing Sample 4	This is your last writing session. In your writing this time, I would like you to continue writing about any or all of your top three ranked values. As with the last times, please describe why any or all of these personal characteristics or life domains are important and meaningful to you. Remember this is your last day, and so you might want to

wrap everything up. For example, why are these values important to your current life and to your future? But feel free to go in any direction that is most comfortable. You can focus your writing on your first, second, or third ranked value, or give equal space to all of the values. Please write continuously the entire time, and don't worry about grammar, spelling, or sentence structure. Just write. Again, whatever you choose to write, please write about why one or all three of these values are important to you.

Expressive Writing	Writing Sample 1	<p>What I would like you to write about for these four writing tasks are your deepest thoughts and feelings about your experience with chronic financial stress. I realize that individuals with financial stress experience a full range of emotions, and I want you to focus on any and all of them. In your writing, I want you to really let go and explore your very deepest emotions and thoughts. You might think about all the various feelings that you have encountered throughout your experience with financial stress. You might also tie your thoughts and feelings about your experiences with financial stress to other parts of your life---your childhood, people you love, who you are, or who you want to be. The only rule we have is that you write continuously for the entire time. If you run out of things to say, just repeat what you have already written. Don't worry about grammar, spelling, or sentence structure. Just write. Again, whatever you choose to write, explore your deepest emotions and thoughts related to your financial strain.</p>
	Writing Sample 2	<p>In this writing task, I would like you to continue writing about your deepest thoughts and feelings about your experience with chronic financial stress. As with last time, I want you to really let go and explore your very deepest emotions and thoughts. You might think about all the various feelings that you have encountered throughout your experience with financial stress. You might also tie your thoughts and feelings about your experiences with financial stress to other parts of your life---your childhood, people you love, who you are, or who you want to be. Please write continuously the entire time, and don't worry about grammar, spelling, or sentence structure. Just write. Again, whatever you choose to write, explore your deepest emotions and thoughts related to your financial strain.</p>
	Writing Sample 3	<p>In this writing task, I would like you to continue writing about your deepest thoughts and feelings about your experience with chronic financial stress. As with last time, I want you to really let go and explore your very deepest emotions and thoughts. You might think about all the various feelings that you have encountered throughout your experience with financial stress. You might also tie your</p>

thoughts and feelings about your experiences with financial stress to other parts of your life---your childhood, people you love, who you are, or who you want to be. Please write continuously the entire time, and don't worry about grammar, spelling, or sentence structure. Just write. Again, whatever you choose to write, explore your deepest emotions and thoughts related to your financial strain.

Writing Sample
4

This is your last writing session. In your writing this time, I would like you to continue writing about your deepest thoughts and feelings about your experience with chronic financial stress. As with last time, I want you to really let go and explore your very deepest emotions and thoughts. Remember this is your last day, and so you might want to wrap everything up. For example, how is your financial stress related to your current life and to your future? But feel free to go in any direction that is most comfortable. Please write continuously the entire time, and don't worry about grammar, spelling, or sentence structure. Just write. Again, whatever you choose to write, explore your deepest emotions and thoughts related to your financial strain.

Control

Writing Sample
1

What I would like you to write about for these four writing tasks is a detailed account of how you use your time. For each writing task, I will give you different directions to write about the way you spend your time. I am interested in the specifics of exactly what you do throughout your day. Your description should be as objective as possible. I want you to focus only on the objective details of what you did; do not mention your emotions. Feel free to be as detailed as possible. In your first writing task, I want you to describe what you did today from the time you got up. You might start when your alarm went off and you got out of bed up until coming to this experiment. You might include the things you ate, where you went, which buildings or objects you passed by as you walked from place to place. The only rule we have is that you write continuously for the entire time. If you run out of things to say, just repeat what you have already written. Don't worry about grammar, spelling, or sentence structure. Don't worry about erasing or crossing things out. Just write. Again, whatever you choose to write, focus on what you have done since you woke up in as much factual detail as possible.

Writing Sample
2

In this writing task, I want you to describe in detail, what you will do as soon as this experiment is over until you go to bed tonight. As with last time, I am interested in how the specifics of exactly what you will do. Your description should be as objective as possible. Feel free to be as detailed as you can. You might start by noting you will walk out this door, go upstairs, walk across campus, and so forth. Please

write continuously the entire time, and don't worry about grammar, spelling, or sentence structure. Just write. Again, whatever you choose to write, focus on what you will do once you leave until you go to sleep in as much factual detail as possible.

Writing Sample
3

In this writing task, I want you to describe what you did today from the time you got up. As with last time, I am interested in how the specifics of exactly what you did and what things occurred. Your description should be as objective as possible. Feel free to be as detailed as you can. You might start when your alarm went off and you got out of bed up until coming to this experiment. You might include the things you ate, where you went, which buildings or objects you passed by as you walked from place to place. Please write continuously the entire time, and don't worry about grammar, spelling, or sentence structure. Just write. Again, whatever you choose to write, focus on what you have done since you woke up in as much factual detail as possible.

Writing Sample
4

This is your last writing session. In this writing task, I want you to describe in detail, what you will do as soon as the experiment is over until you go to bed tonight. As with last time, I am interested in how the specifics of exactly what you will do. Your description should be as objective as possible. Feel free to be as detailed as possible. You might start by noting you will walk out this door, go upstairs, walk across campus, and so forth. You might include the things you ate, where you went, which buildings or objects you passed by as you walked from place to place. Please write continuously the entire time, and don't worry about grammar, spelling, or sentence structure. Just write. Again, whatever you choose to write, focus on what you will do once you leave until you go to sleep in as much factual detail as possible.

Note. Writing Sample 1 and 2 were completed during Session 1. Writing Sample 3 and 4 were completed during

Figure 1. Session 1 timeline.

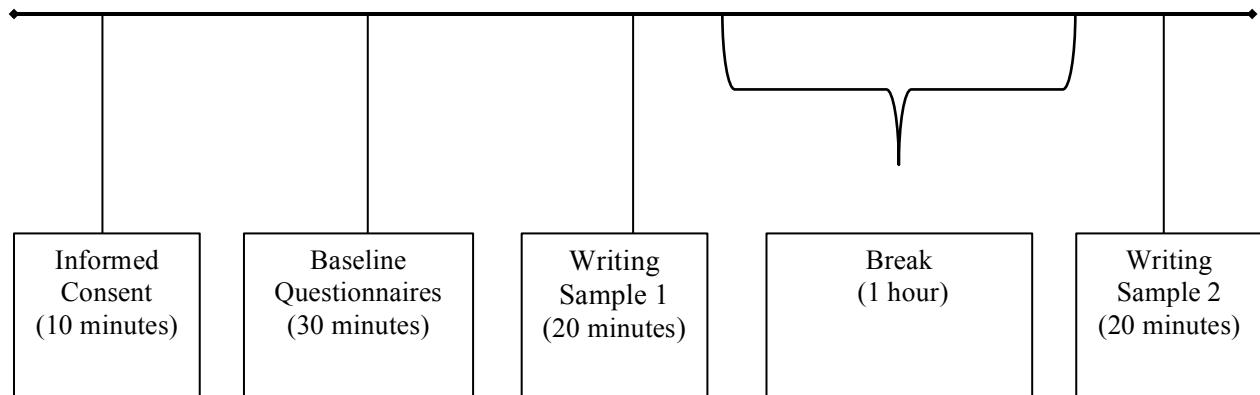


Figure 2. Session 2 timeline.

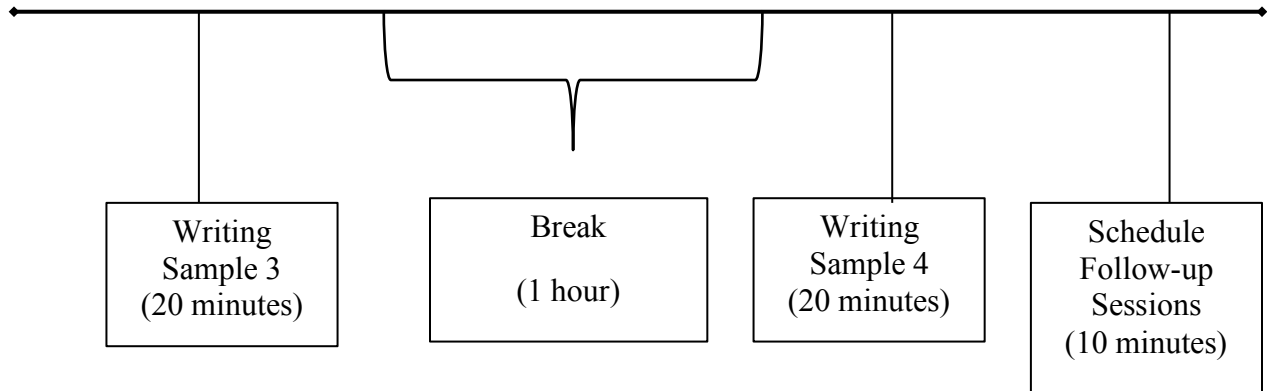


Table 2

Demographic characteristics of the sample

Sample Characteristics	Overall Sample N = 110 M (SD)/N (%)	SA N = 37 M (SD)/N (%)	EW N = 36 M (SD)/N (%)	CTL N = 37 M (SD)/N (%)
Age	19.40 (2.56)	19.65 (3.99)	19.06 (1.26)	19.49 (1.47)
Gender				
Female	92 (83.6)	33 (89.2)	31 (86.1)	28 (75.7)
Male	17 (15.5)	3 (8.1)	5 (13.9)	9 (24.3)
Other/Prefer Not to say	1 (0.9)	1 (2.7)	0 (0.0)	0 (0.0)
Ethnicity				
White	13 (11.8)	6 (16.2)	4 (11.1)	3 (8.1)
Asian	39 (35.5)	10 (27.0)	17 (47.2)	12 (32.4)
Latino/Hispanic	42 (38.2)	15 (40.5)	9 (25.0)	18 (48.6)
Black/African American	4 (3.6)	1 (2.7)	1 (2.8)	2 (5.4)
Middle Eastern	2 (1.8)	1 (2.7)	0 (0.0)	1 (2.7)
Native American	1 (.09)	1 (2.7)	0 (0.0)	0 (0.0)
Biracial/Multiracial	8 (7.3)	2 (5.4)	5 (13.9)	1 (2.7)
Other	1 (0.9)	1 (2.7)	0 (0.0)	0 (0.0)
Household Income				
Less than \$20,000	30 (27.3)	13 (35.1)	9 (25.0)	8 (21.6)
\$20,000 - \$40,000	22 (20.0)	7 (18.9)	8 (22.2)	7 (18.9)
\$40,000 - \$60,000	22 (20.0)	4 (10.8)	8 (22.2)	10 (27.0)
\$60,000 - \$80,000	15 (13.6)	5 (13.5)	6 (16.7)	4 (10.8)
\$80,000 - \$100,000	11 (10.0)	4 (10.8)	4 (11.1)	3 (8.1)
More than \$100,000	10 (9.1)	4 (10.8)	1 (2.8)	5 (13.5)
Pearlin Financial Strain				
Screening Measure	3.73 (0.55)	3.71 (0.56)	3.76 (0.49)	3.73 (0.60)
Relationship Status				
Single	51 (46.4)	19 (52.8)	14 (40.0)	18 (50.0)
In a Relationship	49 (44.5)	15 (41.7)	19 (54.3)	15 (41.7)
Don't Know	7 (6.4)	2 (5.6)	2 (5.7)	3 (8.3)
Missing	3 (2.7)	1 (2.7)	1 (2.8)	1 (2.7)
Year in School				
1	49 (46.2)	17 (45.9)	19 (52.8)	13 (35.1)
2	30 (28.6)	12 (32.4)	7 (19.4)	11 (29.1)
3	20 (16.5)	6 (16.2)	7 (19.4)	7 (18.9)
4	8 (5.5)	1 (2.7)	2 (5.6)	5 (13.5)
5	1 (0.9)	0 (0.0)	0 (0.0)	1 (2.7)
Extension School	2 (1.8)	1 (2.7)	1 (2.8)	0 (0.0)
GPA				
3.7 – 4.0	27 (24.5)	10 (27.0)	7 (19.4)	10 (27.0)
3.1 – 3.6	49 (44.5)	14 (37.8)	20 (55.6)	15 (40.5)
2.7 – 3.0	20 (18.2)	8 (21.6)	6 (16.7)	6 (16.2)

2.1 – 2.6	10 (9.1)	3 (8.1)	1 (2.8)	6 (16.2)
2.0 or Below	4 (3.6)	2 (5.4)	2 (5.6)	0 (0.0)
First Generation Student				
Yes	67 (60.9)	22 (59.5)	20 (55.6)	25 (67.6)
No	43 (39.1)	15 (40.5)	16 (44.4)	12 (32.4)
Job Status				
Works	51 (46.4)	13 (41.9)	17 (47.2)	18 (48.6)
Does Not Work	59 (53.6)	18 (58.1)	19 (52.8)	19 (51.4)
Loans				
Yes	56 (50.9)	19 (52.8)	20 (55.6)	17 (45.9)
No	53 (48.2)	17 (47.2)	16 (44.4)	20 (54.1)
Missing	1 (0.9)	1 (2.7)	0 (0.0)	0 (0.0)
Scholarships				
Yes	90 (81.8)	30 (81.1)	28 (77.8)	32 (86.5)
No	20 (18.2)	7 (18.9)	8 (22.2)	5 (13.5)

Note. CTL = Control condition, SA = Self-Affirmation condition, EW = Expressive Writing condition.

Table 3

Descriptive statistics for outcome variables for the overall sample and each condition

Study Variables	Time point	Overall Sample <i>N</i> = 110 M (SD)	SA <i>N</i> = 37 <i>M</i> (SD)	EW <i>N</i> = 36 M (SD)	CTL <i>N</i> = 37 <i>M</i> (SD)
Intrusive thoughts	Baseline	11.69 (5.65)	12.30 (5.50)	11.08 (5.32)	11.67 (6.2)
	2 weeks	10.40 (5.47)	10.06 (5.76)	10.38 (5.40)	10.77 (5.35)
	8 weeks	10.37 (6.42)	9.96 (5.65)	10.01 (6.48)	11.10 (5.35)
Negative Affect	Baseline	26.24 (8.12)	29.16 (8.20)	24.58 (7.24)	24.92 (8.27)
	2 weeks	25.06 (8.81)	26.14 (9.13)	23.71(9.17)	25.25 (8.18)
	8 weeks	24.21 (8.66)	23.00 (7.98)	22.17 (8.39)	27.73 (8.83)
Anxiety	Baseline	3.42 (1.80)	3.65 (1.93)	3.44 (1.70)	3.16 (1.77)
	2 weeks	3.04 (1.80)	3.54 (1.76)	2.94 (0.94)	3.09 (.84)
	8 weeks	2.50 (2.01)	2.54 (2.14)	2.40 (1.87)	2.58 (2.10)
Depression	Baseline	2.29 (1.78)	2.70 (1.88)	2.17 (1.78)	2.00 (1.63)
	2 weeks	2.12 (1.90)	2.38 (2.07)	1.83 (1.77)	2.14 (1.85)
	8 weeks	1.79 (1.73)	1.77 (1.73)	1.80 (1.71)	1.81(1.83)
Physical Symptoms	Baseline	2.99 (2.19)	3.08 (2.19)	3.07 (2.32)	2.83 (2.11)
	2 weeks	2.75 (2.30)	3.16 (2.49)	2.47 (1.90)	2.60 (2.34)
	8 weeks	2.64 (2.68)	2.67 (2.79)	2.60 (2.50)	2.67 (2.86)
Sleep	Baseline	22.95 (7.45)	23.19 (7.33)	23.86 (7.60)	21.81 (7.49)
	2 weeks	21.77 (7.33)	21.55 (7.42)	22.59 (7.32)	21.22 (7.38)
	8 weeks	21.37 (7.47)	20.73 (7.26)	22.66 (7.75)	20.58 (7.47)

Note. Intrusive thoughts were measured using the IES-intrusions subscale. Negative affect was measured using the PANAS Negative Affect Subscale. Anxiety was measured using the GAD-2 and depression was measured using the PHQ-2. Physical symptoms were assessed using the PILL. Sleep was assessed using the PROMIS-Sleep Disturbance 8a scale. CTL = Control condition, SA = Self-Affirmation condition, EW = Expressive Writing condition. At 8 weeks *n* = 26 in self-affirmation, *n* = 30 in expressive writing, and *n* = 29 in control group.

Table 4

Bivariate correlations between outcome variables at baseline

	1	2	3	4	5	6
1. PANAS-NA	--	.61***	.61***	.45***	.46***	.27**
2. GAD-2		--	.60**	.37**	.31**	.34**
3. PHQ-2			--	.40***	.36***	.24**
4. IES				--	.18	.14
5. PILL					--	.38***
6. PROMIS-Sleep						--

Note. PANAS-NA = Positive and Negative Affect Schedule, GAD-2 = Generalized Anxiety Disorder Scale-2, PHQ-2 = Patient Health Questionnaire-2, IES = Intrusions subscale of the Impact of Events Scale, PILL = Pennebaker Inventory of Limbic Languidness, PROMIS-Sleep = PROMIS-Sleep Disturbance 8a scale.

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 5

Descriptive statistics for moderator variables for the overall sample and each condition

	Overall Sample	SA	EW	CTL
	<i>N</i> = 110	<i>N</i> = 37	<i>N</i> = 36	<i>N</i> = 37
Moderator Variables	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)
Dispositional Avoidance	16.79 (2.47)	16.89 (2.37)	16.61 (2.48)	16.86 (2.63)
Dispositional Reward Sensitivity	18.37 (1.61)	18.11 (1.56)	18.83 (1.32)	18.19 (1.85)

Note. Dispositional avoidance was measured using the BIS subscale of the BIS/BAS.

Dispositional reward sensitivity was measured using the BAS-reward sensitivity subscale of the BIS/BAS. CTL = Control condition, SA = Self-Affirmation condition, EW = Expressive Writing condition.

Table 6

Descriptive statistics for mediator variables for the overall sample and each condition

Study Variables	Time point	Overall Sample N = 110 M (SD)	SA N = 37 M (SD)	EW N = 36 M (SD)	CTL N = 37 M (SD)
Positive Affect	Baseline	27.85 (7.37)	28.78 (7.44)	27.39 (6.85)	27.38 (7.88)
	2 weeks	28.56 (8.22)	30.05 (8.92)	27.43 (8.11)	28.11 (7.55)
	8 weeks	28.63 (8.71)	29.44 (8.78)	26.77 (8.31)	30.00 (9.06)
Self-Compassion	Baseline	2.82 (.97)	2.89 (1.01)	2.75 (1.03)	2.83 (.89)
	2 weeks	2.89 (.92)	3.06 (.94)	2.70 (.95)	2.92 (.86)
	8 weeks	3.03 (1.06)	3.07 (1.03)	2.98 (1.18)	3.03 (1.00)
Avoidance Coping	Baseline	1.97 (.55)	1.94 (.51)	1.87 (.45)	2.08 (.66)
	2 weeks	2.02 (.54)	2.00 (.47)	1.98 (.47)	2.07 (.67)
	8 weeks	2.00 (.56)	1.83 (.51)	1.92 (.36)	2.23 (.70)

Note. Positive affect was measured using the positive affect subscale of the PANAS. Self-compassion was measured using the SCS-SF. Avoidance coping was measured using the composite avoidance scale of the COPE. CTL = Control condition, SA = Self-Affirmation condition, EW = Expressive Writing condition.

Table 7

Descriptive statistics for word use variables for the overall sample and each condition

	Overall Sample	SA	EW	CTL
<i>Essay Content</i>	<i>N</i> = 110	<i>N</i> = 37	<i>N</i> = 36	<i>N</i> = 37
<i>Category</i>	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)
Total Word Count	659.32 (235.39)	622.00 (234.21)	646.77 (275.26)	708.84 (187.47)
Financial Words	1.66 (1.73)	.66 (.44)	3.92 (1.07)	.46 (.32)
Positive Emotion Words	0.46 (2.03)	5.54 (1.44)	2.85 (0.73)	1.26 (0.52)
Negative Emotion Words	0.11 (1.05)	1.65 (0.69)	2.77 (0.74)	.66 (0.33)
Causal Words	2.39 (1.09)	3.32 (0.94)	2.48 (0.66)	1.36 (0.56)
Insight words	2.56 (1.31)	3.64 (0.85)	3.00 (0.74)	1.05 (0.41)

Note. Positive emotion, negative emotion, causal and insight words were measured using LIWC software analysis. CTL = Control condition, SA = Self-Affirmation condition, EW = Expressive Writing condition.

Table 8

Excerpts characteristic of essays from each condition

Self-affirmation

1. "Family and friends are most important to me because they shaped me into the person I am today. Without them I don't know how I would have dealt with many of my stressful moments. Knowing that I have a support system at my reach makes everyday life worth living and encourages me to pursue my goals."
 2. "Independence is a characteristic that I believe is extremely important in my life. Starting from a young age, I was diagnosed with a chronic illness, which caused me to need a lot of assistance from other individuals. This made me feel as if I was different and less independent than my peers and siblings. Since then I feel like I have made an effort to be independent and to turn away help, because I associate it with being inferior."
 3. "For me, having a sense of humor is one of the most necessary things in life. Humor gets you through all of the craziness of daily life. Growing up with my dad who has a fairly intense anxiety disease, the only way to emotionally survive is to have some comic relief and laugh it off. If you don't, your mind becomes a giant stress ball of nervousness, worry, intensity, fear, and ultimately self-destruction."
-

Expressive Writing

1. "The cost of living seems to keep rising and at every cent it increases I become more and more consumed by financial strain. The thought off all of the financial responsibilities that I have sometimes is just too much to think about... a lot of the time I feel alone."
 2. "When it comes to financial stress, it has been a part of my life since I can remember. One of my earliest memories as a child was of my mom sitting on her bed in her room with a stack of bills next to her crying to her friend on the phone about how she didn't know if she would be able to pay them all."
 3. "One thing however that does frustrate me is seeing the privilege that others, especially here on campus, get because they have money. While I am working hard trying to stay afloat in school because I have to worry about other things like the job that I need to maintain so that I can pay for my necessities, other people who do not have that financial strain simply go to school and socialize their entire college career."
-

Control Condition

1. "As I woke up today from the sounds of my alarm, I went straight to the bathroom to brush my teeth and undergo my usual morning routine. I brushed my teeth then headed straight to shower. I typically wash my hair with shampoo and conditioner in the morning and then body wash and rinse following."
 2. "The train arrived and then I took a seat after entering it. After having taken my seat, I took out my study materials and began studying. The train ride takes about 40 minutes so I studied for that period of time. After getting off the train at Westwood station, I walked towards the big blue bus stop and waited."
 3. "Once the study is over I will walk outside the door and take the elevator towards the second floor. I will walk out the elevator toward the doors of Franz Hall Once I am outside I will find a seat somewhere nearby. I was working on an assignment for my English class so I will sit down and submit it into the class website."
-

Table 9.

Percentages of subjects who wrote about each value (N = 37)

Value	N (%)
Relations with friends and family	33 (89.1)
Independence	27 (73.0)
Sense of Humor	16 (43.2)
Religious Values	11 (29.7)
Spontaneity/ Living in the moment	9 (24.3)
Creativity	8 (21.6)
Artistic Skills	3 (8.1)
Athletics	1 (2.7)
Musical ability/ appreciation	1 (2.7)
Politics	0 (0.0)

Table 10

Multilevel models of self-affirmation and expressive writing conditions as predictors of psychological health outcomes

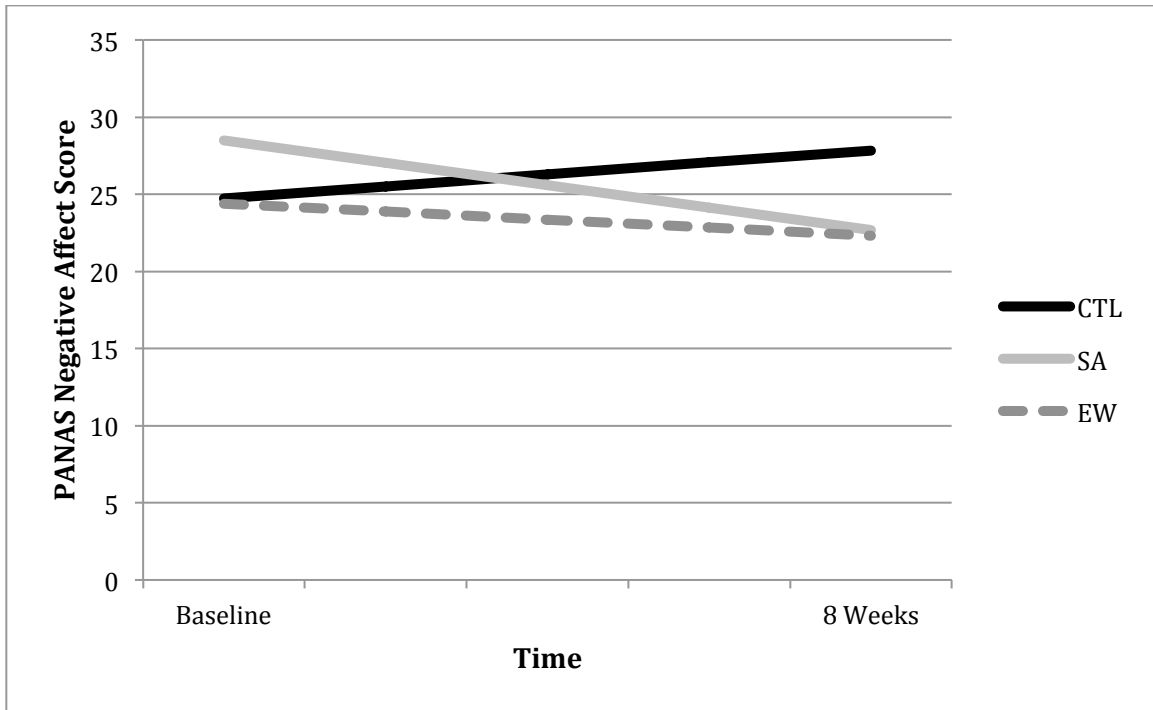
	Dependent Variable			
	PANAS-NA Est. (SE)	GAD-2 Est. (SE)	PHQ-2 Est. (SE)	IES Est. (SE)
Fixed effects				
<i>Intercept</i>				
Intercept	24.73 (1.25) ***	3.12 (0.24) ***	2.09 (0.26)***	11.30 (0.90) ***
Self-Affirmation ^a	3.75 (1.84) *	0.61 (0.37)	0.57 (0.41)	0.22 (1.22)
Expressive Writing ^a	-0.34 (1.84)	0.09 (0.36)	-0.03 (0.38)	-0.46 (1.20)
<i>Linear Trajectory</i>				
Slope	0.78 (0.36) *	-0.14 (0.10)	-0.06 (.08)	-0.06 (0.26)
Self-Affirmation ^a	-2.23 (0.53) ***	-0.16 (0.15)	-0.14 (0.12)	-0.37 (0.35)
Expressive Writing ^a	-1.30 (0.53) *	-0.08 (0.13)	-0.02 (0.10)	-0.07 (0.37)
Random Effects				
$\sigma_{\text{intercept}}$	50.34***	1.32 ***	2.02***	19.29***
$\rho_{\text{intercept, linear}}$	-3.12	--	--	--
σ_{linear}	1.98**	--	--	--

Note. PANAS-NA = Positive and Negative Affect Schedule, GAD-2 = Generalized Anxiety Disorder Scale-2, PHQ-2 = Patient Health Questionnaire-2, IES = Intrusions subscale of the Impact of Events Scale. Random effects for linear slope and covariance with intercept are not presented for models in which random slopes were not included based on deviance change tests.

^a Reference group = control condition. $\sigma_{\text{intercept}}$ = variance of the random intercept. $\rho_{\text{intercept, linear}}$ = covariance of the random intercept and slope. σ_{linear} = variance of the random linear slope.

* $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

Figure 3. Effect of condition on predicted linear trajectory of PANAS Negative Affect



Note. CTL = Control condition, SA = Self-Affirmation condition, EW = Expressive Writing condition.

Table 11

Multilevel Models of self-affirmation and expressive writing conditions as predictors of physical health outcomes

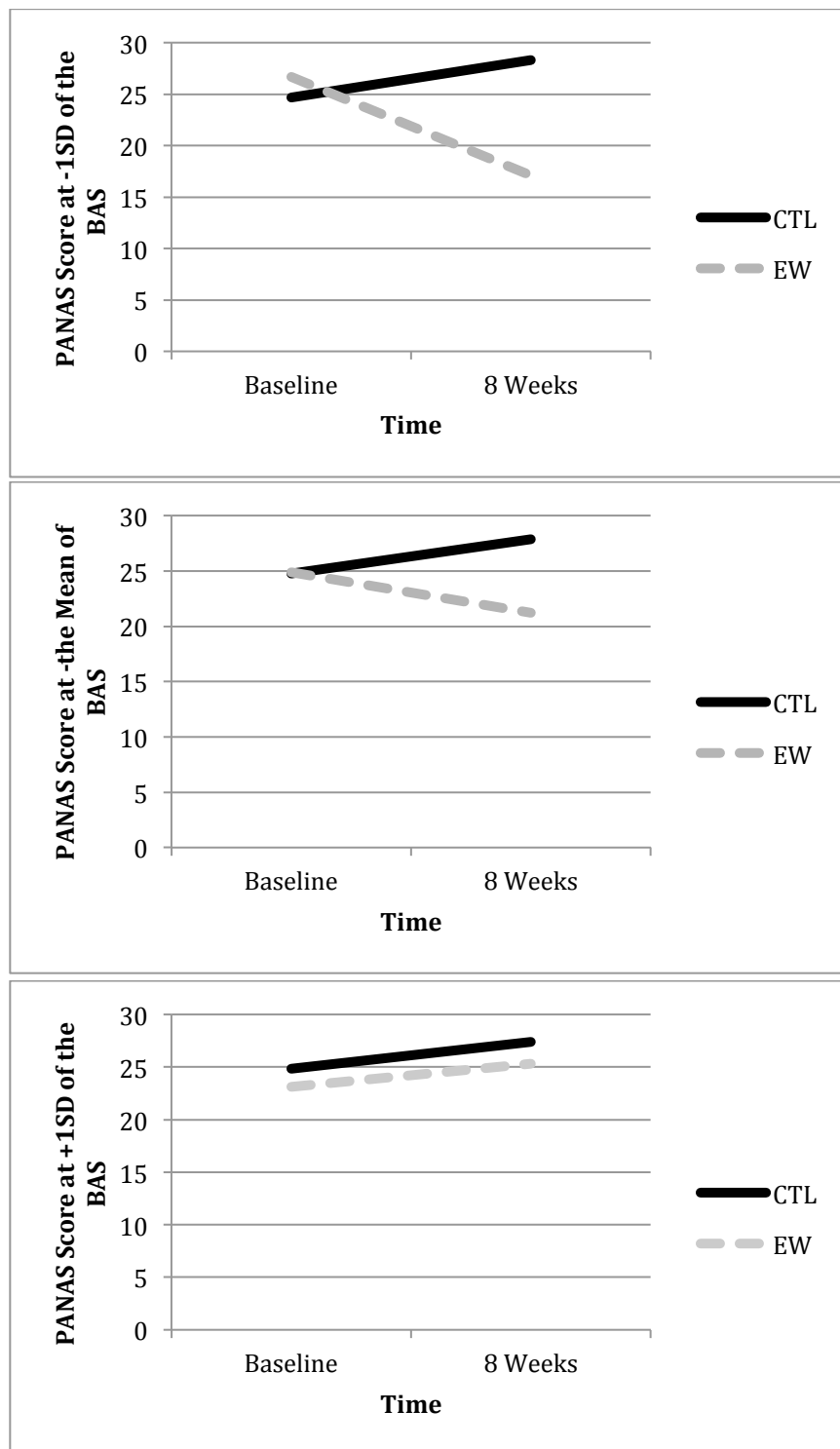
	Dependent Variables	
	PILL Est. (SE)	PROMIS-Sleep Est. (SE)
Fixed effects		
<i>Intercept</i>		
Intercept	2.75 (0.33) ***	21.07 (1.19)***
Self-Affirmation ^a	0.44 (0.50)	0.98 (1.66)
Expressive Writing ^a	0.10 (0.47)	1.67 (1.68)
<i>Linear Trajectory</i>		
Slope	-0.01 (0.02)	-0.27 (0.39)
Self-Affirmation ^a	-0.14 (0.17)	-0.24 (0.53)
Expressive Writing ^a	-0.07 (0.15)	0.21 (0.48)
Random Effects		
$\sigma_{\text{intercept}}$	3.32***	30.48***
$\rho_{\text{intercept, linear}}$	-0.14	--
σ_{linear}	0.18*	--

Note. PILL = Pennebaker Inventory of Limbic Languidness, PROMIS-Sleep = PROMIS-Sleep Disturbance 8a scale. Random effects for intercept or linear slope and their covariance are not presented for models in which random intercepts or slopes were not included based on deviance change tests. $\sigma_{\text{intercept}}$ = variance of the random intercept. $\rho_{\text{intercept, linear}}$ = covariance of the random intercept and slope. σ_{linear} = variance of the random linear slope.

^a Reference group = control condition.

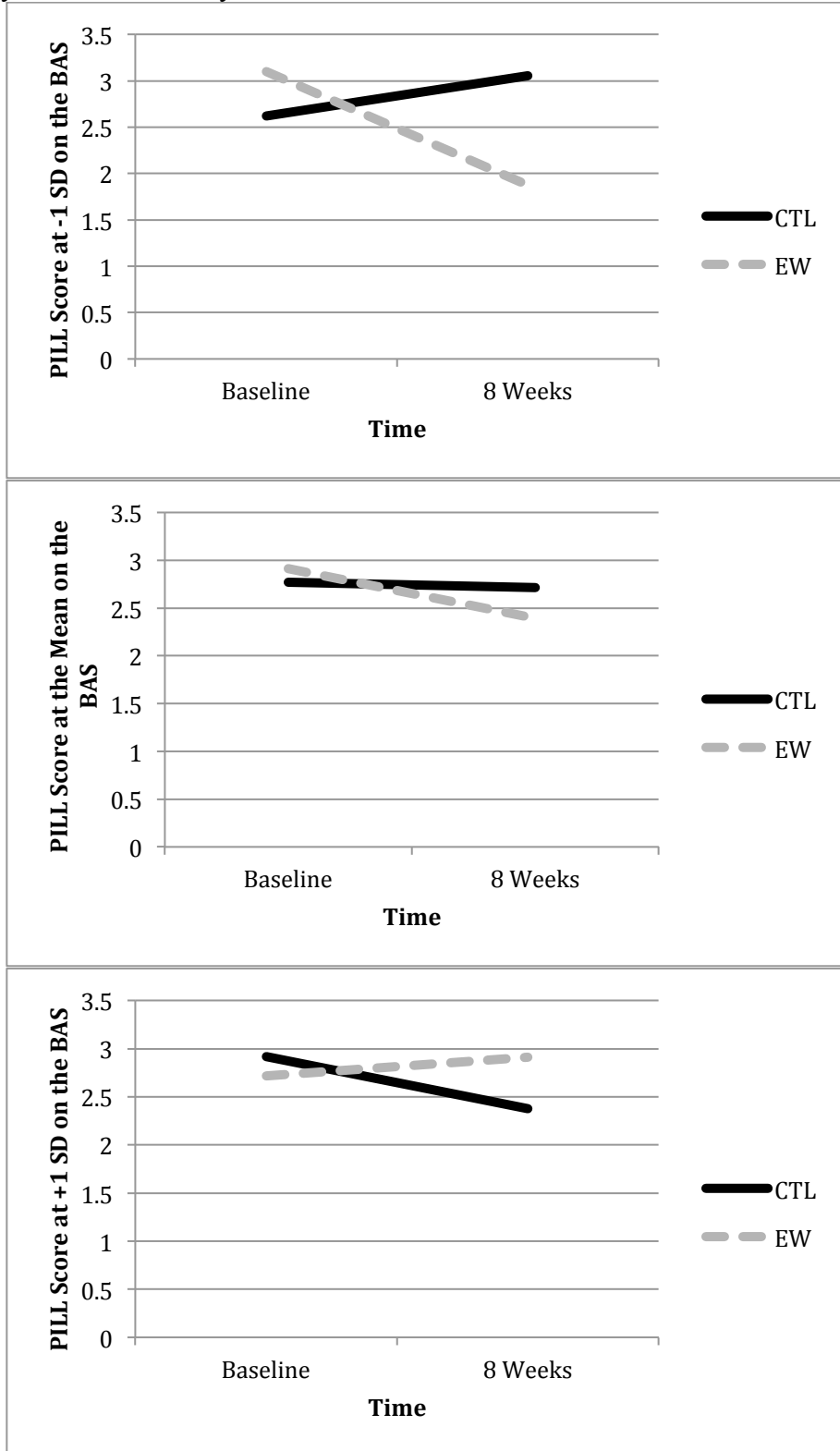
[†] $p = .06$. * $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

Figure 4. Interaction between condition and time predicting PANAS negative affect as moderated by reward sensitivity



Note. CTL = Control condition, EW = Expressive Writing condition.

Figure 5. Interaction between condition and time predicting PANAS negative affect as moderated by reward sensitivity



Note. CTL = Control condition, EW = Expressive Writing condition.

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