The Moderating Role of Emotion Regulation on Longitudinal Associations between Stress and Mental Health in College Students

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LOYOLA UNIVERSITY CHICAGO

THE MODERATING ROLE OF EMOTION REGULATION ON LONGITUDINAL ASSOCIATIONS BETWEEN STRESS AND MENTAL HEALTH IN COLLEGE STUDENTS

A THESIS SUBMITTED TO THE FACULTY OF THE GRADUATE SCHOOL IN CANDIDACY FOR THE DEGREE OF MASTER OF ARTS

PROGRAM IN CLINICAL PSYCHOLOGY

BY

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ABSTRACT

Emotion regulation is consistently linked to subsequent wellbeing, but little research has examined the moderating role of emotion regulation in associations between mental health and other relevant factors. Patterns of gender differences in emotion regulation also remain somewhat unclear. The present study targets these gaps by examining two specific emotion regulation strategies in interaction with stress and gender in predicting internalizing symptoms among college students, a population for whom emotion regulation may be particularly important given the high-stress nature of the college transition. A large sample of students (N = 1,130) provided self-report data at three time points over their first year of college. Results indicated that cognitive reappraisal functioned as a buffer against the negative effects of stress, whereas expressive suppression did not interact with stress in predicting subsequent symptoms but instead functioned as an independent risk factor for internalizing symptoms. Finally, assessments of gender differences indicated that men may engage in expressive suppression more often and cognitive reappraisal less often than do women. These findings underscore the importance of emotion regulation, both by identifying cognitive reappraisal as a protective factor against stress and highlighting the direct negative impacts of expressive suppression. Results also suggest that men tend to regulate their emotions in less healthy ways than do women, in turn suggesting that men may be a population for whom emotion regulation is an area of particular concern.
CHAPTER ONE
INTRODUCTION

Overview

Emotion regulation is the range of processes by which people influence the nature and course of their emotional experience (Nolen-Hoeksema, 2012). One useful conceptualization of emotion regulation is Gross and John’s (2003) process model, which categorizes emotion regulation processes based on the time point in an unfolding emotion response at which they intercede. Past research has linked effective emotion regulation to subsequent psychological adjustment (e.g., Berking, Orth, Wupperman, Meier, & Caspar, 2008) and maladaptive emotion regulation to various forms of psychopathology (e.g., Aldao, Nolen-Hoeksema, & Schweizer, 2010). However, little research has examined the interaction between emotion regulation and other predictors of mental health. Additionally, while the literature hints at some gender differences in emotion regulation, this pattern has yet to be fully understood.

Emotion regulation changes across development, and may be particularly important in emerging adulthood, a developmental period characterized by major changes and increased rates of mental health problems, but also with the potential to function as a springboard into a well-adjusted adult life (Masten, Obradović, & Burt, 2006; Schulenberg, Samaroff, & Cicchetti, 2004). The transition to college has become an increasingly prevalent component of this developmental period and is especially fraught
with increased severity of stress, which can lead to psychological problems (Chang, 2001; Kitzrow, 2003). However, certainly not every emerging adult who enters college subsequently develops mental health problems, and it is unclear what other factors determine these outcomes. Considering the importance of emerging adulthood and its potential for significant impact on life trajectories, it is important to identify factors that influence both adaptive and dysfunctional psychological trajectories in this developmental period. The present study aims to expand our knowledge in these areas by investigating (a) whether specific emotion regulation strategies can impact the relationship between stress and mental health in college students, either by buffering against or increasing vulnerability to the deleterious effects of stress, and further (b) whether these patterns may differ between men and women.

**What is Emotion Regulation?**

Emotion regulation is a topic that has come under increased scrutiny in the past 15 years, becoming one of the fastest growing research areas within psychology (Gross, 2013; Koole, 2009). Broadly, emotion regulation is understood as the array of processes by which people modulate their emotional responses—that is, which emotions they have, when they have them, and how they respond to them (Gross & John, 2003; Nolen-Hoeksema, 2012). Emotion regulation processes—or “strategies”—can be conscious or unconscious, and often occur with little or no thought, deliberation, or intention (Gross, 2013; Gross & John, 2003). These strategies are typically focused on one’s own emotions, although some theorists argue that emotion regulation can also refer to attempts to influence the emotions of others (Gross & Thompson, 2007; Zaki &
Williams, 2013). In keeping with the focus of most research in this area, the term *emotion regulation* as it is used here will refer specifically to the self-focused variety.

At their most basic level, emotional responses are direct reactions to emotion-eliciting stimuli, which can be external (e.g., the appearance of a dangerous snake; LeDoux, 2000) or internal (e.g., reliving pleasant memories; Williams, 2010). Emotional responses can involve experiential, behavioral, and physiological components (Gross & John, 2003). In general, the purpose of emotion regulation in any particular instance of an emotional response tends to fall into one or more of three categories: (a) to make personal experience more pleasurable, (b) to facilitate an individual’s pursuit of his or her goals, or (c) to allow for appropriate responses to environmental demands (Koole 2009; Nolen-Hoeksema, 2012). Emotion regulation strategies largely accomplish these aims by up- or down-regulating the intensity or duration of an emotional response (Gross, Sheppes, & Urry, 2011). As one might expect, people display a typical pattern of emotion regulation consisting of attempts to decrease their experience of negative emotions and increase their experience of positive emotions (Gross, Richards, & John, 2006; Quoidbach, Berry, Hansenne, & Mikolajczak, 2010). However, this is not always the case; in fact, it can sometimes be useful to increase negative emotion (as in the case of a debt collector cultivating increased personal feelings of anger in order to be more effective; Sutton, 1991), or to decrease positive emotion (like a businessperson might intentionally decrease amusement in order to remain serious during an important meeting; Gruber, Mauss, & Tamir, 2011). Clearly, emotion regulation behaviors can be useful and appropriate to
different extents depending on the context in which they are employed (Phillips & Power, 2007).

Whatever their immediate goals, people do a variety of things in attempt to regulate their emotions (Parkinson & Totterdell, 1999). Gross and John’s (2003) process model of emotion regulation advances one possible conceptual organization of the wide array of emotion regulation strategies, and has been influential in this burgeoning field (Koole, 2009). This model postulates that emotion responses unfold over time, and as such, that emotion regulation strategies can be categorized by the point in the emotion-response process at which they intervene. The process model defines two key families of emotion regulation strategies: (a) antecedent-focused strategies, which intervene before an emotion response is fully activated, and (b) response-focused strategies, which take effect once an emotion response is already underway. Importantly, due to the different points at which they intervene, antecedent-focused strategies are able to modify the overall emotional course of a response, whereas response-focused strategies change the resulting behavior without altering the experience of the emotion itself. Gross and John (2003) have described two specific emotion regulation strategies that serve as exemplars of these two families. The first is cognitive reappraisal, an antecedent-focused strategy that entails reinterpreting a potentially emotion-inducing situation in a way that changes or negates its emotional impact (e.g., reinterpreting an insult as saying more about the character of the insulter than about one’s own character). The classic response-focused counterpart of this strategy is expressive suppression, which involves inhibiting the outward expression of emotion while still experiencing it internally (e.g., maintaining a
pleasant expression on one’s face despite seething internally over the very same insult).

Generally, cognitive reappraisal is thought of as an adaptive strategy, while expressive suppression is considered to be an unhealthy emotion regulation pattern (John & Gross, 2004; Nezlek & Kuppens, 2008).

The process model, with its focus on the specific strategies of reappraisal and suppression, has both strengths and drawbacks. One major strength of this model is its simplicity; in developing their theory, the researchers intentionally focused on a smaller, more manageable number of well-defined strategies rather than attempting to study all types of emotion regulation at once (Gross, et al., 2006). Further, they identified strategies that are common to everyday life, lend themselves easily to both experimental manipulation and individual difference studies, and exemplify both antecedent- and response-focused strategies. As such, the process model is highly salient, relatively easy to study scientifically, and comprehensive in terms of representing both effective and maladaptive emotion regulation strategies. Furthermore, this model is useful in that it is quite straightforward and uncomplicated, making it more accessible and easily understood.

On the other hand, there are a few areas in which the process model falls short. It has received criticism for failing to differentiate successfully between emotion regulation and emotion itself, leading some theorists to argue that no clear distinction can be made between the two phenomena (Kappas, 2011; Mesquita & Frijda, 2011). Gross and Barrett (2011) suggest in response that the ability to distinguish between these two processes depends on one’s point of view regarding emotion itself. In their breakdown of theories
of emotion, they find that social construction models do not leave room for a distinction between emotion regulation and emotion, whereas other models do to varying extents. Since social construction models do not consider emotions to be self-contained units at all, but rather social artifacts, the argument that emotion regulation does not exist independently of emotions seems to be rather pointless, since emotions themselves are not considered to be independent entities either.

However, there are some more legitimate capacities in which the process model is lacking. While its focus on a small number of strategies is a strength in terms of simplicity and accessibility, it also is limiting and makes for a less exhaustive model. Other theorists have identified additional notable emotion regulation strategies that may have important implications for mental health but are ignored by the process model, such as rumination, acceptance/non-acceptance of emotions, catastrophizing, and tolerance of negative emotions, among others (Berking, Orth, Wupperman, Meier, & Caspar, 2008; Garnefski, Kraaij, & Spinhoven, 2001; Gratz & Roemer, 2004). The process model’s focus on two strategies at the expense of all others may limit its ability to comprehensively examine all facets of emotion regulation.

Conversely, these other strategies referenced above are pulled together piecemeal, with no one conceptualization of emotion regulation representing all of them. Further, other models of emotion regulation tend to be more heavily focused on the dysfunction side (or, at best, a lack of dysfunction; e.g., Gratz & Roemer, 2004), while failing to consider the beneficial effects of truly adaptive strategies. The process model, while certainly not exhaustively representative of emotion regulation strategies of all types,
strikes a helpful balance between simplicity and ease of analysis on the one hand, and representing both adaptive and dysfunctional types of emotion regulation strategies on the other. Overall, it is a useful model that quite adequately captures the construct of emotion regulation as it will be examined here.

**The Impact of Emotion Regulation**

Emotion regulation has long been considered an essential feature of mental health, promoting the abilities to work productively, develop and maintain healthy interpersonal relationships, and experience a meaningful inner life (Gross & Muñoz, 1995). Effective emotion regulation has been linked to subsequent emotional adjustment (Berking, Orth, Wupperman, Meier, & Caspar, 2008), mindfulness (Desrosiers, Vine, Klemanski, & Nolen-Hoeksema, 2013; Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007; Roemer et al., 2009), and adaptive coping strategies (Gross & John, 2003). Conversely, ineffective emotion regulation has been linked to stress, anger, and other negative emotions (Martin & Dahlen, 2005), and further, difficulties in emotion regulation appear to contribute to various forms of psychopathology, particularly internalizing disorders (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Bradley, 2000; Desrosiers et al., 2013; Kring & Werner, 2004). As such, it is no surprise that many treatments for mental disorders include adaptive emotion regulation components (Aldao et al., 2010; Berking et al., 2012; Linehan, 2015).

In particular, individual differences in cognitive reappraisal and expressive suppression have been linked to very different types of outcomes across cognitive, affective, and social domains (Gross et al., 2006). As noted above, cognitive reappraisal
tends to be considered an adaptive emotion regulation strategy, and for good reason. Gross and John (2003; 2004) have consistently found that reappraisal relates positively to variables such as self-esteem, experience of positive emotion, and peer-rated likeability, and negatively to outcomes including neuroticism, experience of negative emotion, and depression, among others. Other researchers have found similar results, demonstrating that reappraisal significantly predicts lower levels of depression, anxiety, anger, and stress (Martin & Dahlen, 2005).

On the other hand, Gross and John (2003; 2004) find an entirely opposite pattern for expressive suppression, which relates directly to outcomes such as rumination, experience of negative emotions, and depression, and negatively to variables including self-esteem, optimism, and number of close relationships, to name a few. Further, experimental data shows that suppression disrupts interpersonal communication and inhibits relationship formation, as conversation partners of participants instructed to suppress emotions after viewing an emotion-eliciting video clip reported feeling less rapport and less willingness to form a relationship with their emotion-suppressing companion (Butler et al., 2003).

Research with the present study’s sample also demonstrates similar patterns (Brewer, Zahniser, & Conley, in preparation). In research drawn from a larger, ongoing project examining trajectories of college student mental health, cognitive reappraisal was found to predict increased self-efficacy, hope, resilience, positive automatic thoughts, adaptive coping, social support, and relationship satisfaction, and decreased depression, anxiety, and stress, all above and beyond baseline levels of these outcomes. Conversely,
expressive suppression directly predicted dysfunctional attitudes, and negatively predicted satisfaction with life, relationship satisfaction, and adaptive coping, again above and beyond outcome baseline levels. These data lend further support to the emotion regulation literature’s consistent findings relating to reappraisal and suppression.

Clearly, emotion regulation behaviors—including reappraisal and suppression in particular—have meaningful impacts on adjustment across domains of psychosocial functioning. The relationships between emotion regulation and mental health outcomes are well documented; however, very little is known about the interaction between emotion regulation and other predictors of mental health. In other words, while we know how emotion regulation impacts mental health directly, we don’t know much about how it affects other factors’ ability to impact mental health. Consider stress, a factor well documented to lead to psychological problems (e.g., Dixon, Rumford, Heppner, & Lips, 1992; Dyson & Renk, 2006; Ragsdale, Beehr, Grebner, & Han, 2011; Segrin, 1999).

Given its notable influence on mental health, adaptive emotion regulation could conceivably act as a protective factor by buffering against psychological dysfunction in the face of stress. On the other hand, dysfunctional emotion regulation might potentially serve as a vulnerability factor, actually increasing susceptibility to mental health problems in the same circumstances, particularly among populations in which these types of problems are common. In sum, emotion regulation may be important beyond its direct impacts on mental health, potentially interacting with other predictors of adjustment in meaningful ways.
Gender Differences in Emotion Regulation

Also notable in the literature are consistently present gender differences in patterns of emotion regulation. In general, women are widely viewed as being more emotional than men, with greater propensities for emotional experience and expression (Barrett & Bliss-Moreau, 2009; Brody, 1993; Nolen-Hoeksema, 2012). Conversely, men are generally viewed as often suppressing or avoiding emotions (or both). Interestingly, research shows that people tend to interpret women’s emotions as being representative of their character—deeper, more meaningful, and more stable—whereas men’s emotions are attributed more to the situations they experience (Barrett & Bliss-Moreau, 2009).

When it comes to emotion regulation, gender role theory suggests that women may be more likely to regulate their emotions passively and internally, whereas men’s more active gender role may lead them to actively suppress or avoid their emotions outright (Tamres, Janicki, & Helgeson, 2002). Overall, women appear to endorse using most emotion regulation strategies, including cognitive reappraisal, to a greater extent than do men (Nolen-Hoeksema & Aldao, 2011; Tamres et al., 2002). However, results are less conclusive when it comes to expressive suppression; while some studies do not report gender differences at all in this strategy (e.g., Nolen-Hoeksema & Aldao, 2011), Gross and John (2003) found that, across four different samples, men tended to report significantly higher levels of expressive suppression, with effect sizes averaging in the medium range (Cohen’s $d = .47$). While the existence of gender differences in emotion regulation has received consistent support, it is far from clear what the nature of this pattern might be. A deeper understanding of the different ways men and women strive to
influence their emotional lives will illuminate another facet of this expanding area of study.

**Emotion Regulation Throughout Development**

Typical patterns of emotion regulation vary considerably across the lifespan, with people tending to regulate their emotions to the best of their abilities as determined by the neurological, cognitive, and social constraints of their stage of development (Gross, 2013; Opitz, Gross, & Urry, 2012). As infants, most of our emotion regulating is done for us by parents and other caregivers. Even after the just first few months of life, however, infants begin to display the capacity to self-soothe when distressed using gaze aversion (Crockenberg & Leerkes, 2004). These basic emotion regulation abilities grow with age, with the maturation of the prefrontal cortex during adolescence eventually enabling new, more advanced forms of emotion regulation that are often more cognitive in nature (Casey et al., 2010; McRae et al., 2012).

Much of the research on emotion regulation in development has focused on childhood and adolescence, as these are developmental periods in which much of the foundation is laid for later patterns of emotion regulation (Gross & Thompson, 2007). Importantly, however, emotion regulation does not stop developing after adolescence; instead, there is evidence that people’s patterns of emotion regulation continue to shift throughout adulthood (John & Gross, 2004). Changes in emotion regulation are even found among older adults, and are often implicated in the relatively high levels of wellbeing that tend to be reported by this age group (Carstensen, Gross, & Fung, 1998; Urry & Gross, 2010). Perhaps unsurprisingly, research using both retrospective and
cross-sectional designs suggests that older adults—who tend to report greater emotional wellbeing than their younger counterparts despite marked deterioration of physical health and social networks—self-report higher levels of reappraisal and lower levels of suppression than do younger adults (John & Gross, 2004). These findings lend further support to the beneficial and detrimental outcomes linked to reappraisal and suppression, respectively. Notably, changes in emotion regulation behaviors are thought to be especially prominent in times of great transition (Gross & Thompson, 2007). As such, major life changes may be times in which healthy patterns of emotion regulation, important throughout the lifespan, can be particularly vital.

**Emerging Adulthood and the College Transition**

If members of one developmental grouping were to be nominated for having the greatest need of effective emotion regulation, emerging adults might be one likely choice. In today’s research literature, emerging adulthood is defined as a distinct developmental period spanning the late teens and early twenties that prominently features major changes and extensive exploration of identity, worldviews, work, and interpersonal relationships (Arnett, 2000; Schulenberg & Zarrett, 2006). Critically, increased rates of mental health problems are characteristic of this time period, but at the same time it also has the potential to function as a springboard toward positive trajectories of adult life (Masten, Obradović, & Burt, 2006; Schulenberg, Samaroff, & Cicchetti, 2004). In short, development in emerging adulthood helps to make or break the trajectories of adjustment that young people will follow into their adult lives.
Furthermore, for an ever-growing proportion of emerging adults this difficult developmental period also features a further challenge: the transition to college. The United States Department of Labor reports that nearly two-thirds of 2013 U.S. high school graduates are enrolled in a college or university within a year of graduation (65.9%; U.S. Department of Labor, 2014). Even beyond the already increased challenges of emerging adulthood, the college transition is particularly fraught with an increased level of stress (Abouerie, 1994; Pierceall & Keim, 2007). College students often report being overwhelmed by stress (Sax, 1997), which unsurprisingly leads to particularly high rates of mental health problems among this group (Bewick, Koutsopoulou, Miles, Slaa, & Barkham, 2010; Chang, 2001; Kitzrow, 2003).

However, it is certainly not the case that every emerging adult who enters college later develops mental health problems, and there is a lack of definitive answers to why it is that some people do and others do not. As such, and considering the significant impact that emerging adulthood and the college transition can have on psychosocial adjustment going forward, it is important to identify factors that influence both successful and maladaptive development during this time period of extreme stress (Li & Lindsey, 2013; Tanner, 2006). Identification of such factors will inform our understanding of one of the major developmental challenges that faces modern American young people in their pursuit of healthy and happy adult lives.

**Emotion Regulation as a Protective and Vulnerability Factor in the College Context**

Given its well-documented direct impacts on mental health, emotion regulation may be one such factor that can affect psychosocial adjustment within the stressful
context of emerging adulthood and the transition to college. In other words, emotion regulation may influence the relationship between stress and mental health in college students, such that this relationship strengthens or attenuates in the context of different patterns of emotion regulation. Certainly emotion regulation is not the only cognitive-affective factor to play a role in this context; for example, research has already shown that stress impacts college students’ mental health differently depending on levels of emotional intelligence, a related construct that encompasses awareness of one’s own emotions and accuracy of perceptions of others’ (Ciarrochi, Deane, & Anderson, 2002).

As suggested above, adaptive and dysfunctional patterns of emotion regulation may have very different impacts on the relationship between stress and mental health. Given its relationship to mental health and adjustment, healthy emotion regulation strategies might be expected to buffer against the development of psychological problems in the stressful context of college life, meaning that the relationship between stress and mental health problems would be weaker in the context of more adaptive emotion regulation than is generally observed.

On the other hand, considering its documented links to psychopathology and maladjustment, dysfunctional emotion regulation patterns might actually increase vulnerability to mental health problems in response to stress. This would mean that the relationship between stress and psychological problems would be even stronger in the context of unhealthy emotion regulation than tends to be observed in the general college student population.
Finally, considering the consistent (but unclear) pattern of gender differences in different forms of emotion regulation, it is possible that the impacts of cognitive reappraisal and expressive suppression on the relationship between stress and mental health may differ for men and women, perhaps functioning as a stronger protective factor (reappraisal) or vulnerability factor (suppression) for one gender or the other. The present study targets gaps in the emotion regulation and human development literatures to examine these possibilities, aiming to shed new light on the ways in which emotion regulation impacts the relationship between stress and psychosocial adjustment outcomes in a critical stage of life.

**Specific Aims and Hypotheses of the Present Study**

**Specific Aim 1**

The first aim of this study is to confirm that this sample of college students does indeed exhibit a relationship between stress and mental health problems, as is described in the literature.

**Hypothesis 1.** I predict that college students’ residualized levels of perceived stress at the end of their first semester of college (calculated by adjusting for baseline levels of perceived stress at the start of college) will significantly predict reported levels of internalizing symptoms at the end of their first year, above and beyond baseline levels of internalizing symptoms at the start of college. Specifically, I predict that greater levels of perceived stress at mid-year will predict higher rates of internalizing symptoms at year’s end.
Specific Aim 2

The second aim of this study is to examine adaptive emotion regulation as a protective factor among college students, potentially buffering against the effects of stress in leading to the subsequent development of mental health problems.

**Hypothesis 2.** I predict that cognitive reappraisal at the end of the first semester will moderate the relationship between residualized perceived stress at the end of the first semester and internalizing symptoms at the end of the year (adjusted for baseline levels of internalizing symptoms at the start of the year), such that the relationship between perceived stress and internalizing symptoms will be weaker (or nonexistent) among participants who report higher levels of reappraisal. This suggested pattern is represented visually in Figure 1, below.

Figure 1. Proposed Moderating Effect of Cognitive Reappraisal.
Specific Aim 3

The third aim of this study is to examine dysfunctional emotion regulation as a vulnerability factor among college students, possibly increasing susceptibility to the effects of stress in leading to subsequent psychological problems.

Hypothesis 3. I predict that levels of expressive suppression reported at the end of the first semester will moderate the relationship between residualized perceived stress at first semester’s end and internalizing symptoms at the end of the school year (adjusted for baseline levels of internalizing symptoms), such that this relationship will be stronger among participants who report greater levels of suppression. Again, this proposed pattern is represented visually in Figure 2, below.

![Diagram](image.png)

Figure 2. Proposed Moderating Effect of Expressive Suppression.
Specific Aim 4

The fourth and final aim of this study is to examine gender differences in emotion regulation and begin exploratory analyses of their effects on the relation between stress and mental health outcomes in college students.

**Hypothesis 4a.** I predict that there will be significant gender differences in reported levels of cognitive reappraisal and expressive suppression, such that men will report lower levels of cognitive reappraisal but higher levels of expressive suppression. I speculate that there may be no overall gender difference in emotion regulation (collapsing across reappraisal and suppression) due to gender differences in reappraisal and suppression being in opposite directions and canceling each other out. Additionally, I speculate that, collapsing across genders, there may be an overall difference in the extent to which reappraisal and suppression are used, although no specific effect is proposed here. Both of these speculative predictions are worth noting, but are tentative and are generally of less interest to the aims of the present study.

**Hypothesis 4b.** While this is an exploratory analysis, I speculate that gender may moderate the effect of cognitive reappraisal on the relationship between perceived stress and internalizing symptoms (i.e., a three-way interaction), such that the protective effects of reappraisal (buffering against mental health problems as a result of stress) may be different for men and women. No specific effect direction is proposed for this hypothesis due to its exploratory nature. This proposed interaction is presented in Figure 3, below.
Hypothesis 4c. Similarly, I speculate that gender may moderate the effect of expressive suppression on the relationship between perceived stress and internalizing symptoms (i.e., a three-way interaction), such that the vulnerability effects of suppression (increasing susceptibility to mental health problems as a result of stress) may be different for men and women. Again, no specific effect direction is proposed for this hypothesis because it is exploratory in nature. This proposed pattern is presented in Figure 4, below.
Figure 4. Proposed Three-way Interaction of Perceived Stress, Expressive Suppression, and Gender.
CHAPTER TWO

METHODS

This research, which was approved by and conducted in compliance with the university’s Institutional Review Board, is part of a larger, ongoing study of college student adjustment. It is drawn from a parent project that is a multi-cohort longitudinal study with survey data collected at various time points before and during college (Conley, Kirsch, Dickson, & Bryant, 2014).

Participants and Procedure

Participants \( N = 1,130; M_{\text{age}} = 18.49; 71.8\% \text{ female; } 72.8\% \text{ White, } 12.0\% \text{ Asian, } 6.8\% \text{ Hispanic, } 2.5\% \text{ Other, } 2.3\% \text{ African American} \) were first-year undergraduate students at a private, midsized Midwestern university. All incoming first-year students at the start of the 2009-10 and 2010-11 school years were invited by email to complete an online survey that comprised various measures of psychosocial health. Participants completed a baseline assessment (Time 1; T1) the week prior to the start of the academic year. Participants who completed the first round were invited to complete the survey again at the end of their first semester (Time 2; T2). All of those who completed the survey at the first time point also were invited to participate at the end of the academic year (Time 3; T3), regardless of whether they had participated at the first semester’s end (T2). Eligible students were entered into a drawing for various prizes at each time point. Of those who were invited and eligible, 67.4\% participated at T1 (2,803 out of 4,161).
69.0% of T1-completers participated at T2 (1,785 out of 2,803), and 63.4% of these students participated at T3 (1,130 out of 1,785), yielding a complete longitudinal sample of 1,130 participants. Exact sample sizes varied slightly across measures due to incomplete data.

The final sample did not differ from the rest of the parent study’s participants (those who did not participate at all three time points and so were not included in the present study) in terms of age, \( t(4096) = 1.55, p = .120 \), estimate of family income, \( t(2878) = 0.52, p = .606 \), or first-generation college status, \( \chi^2(1) = 0.55, p = .459 \). The present sample was, however, more likely to be female, \( \chi^2(2) = 35.70, p < .001 \), White, \( \chi^2(8) = 21.19, p = .007 \), and to have a higher high school GPA, \( t(4139) = -8.27, p < .001 \), than the rest of the parent study’s participants.

**Measures**

**Demographic Information**

Participants were asked at T1 to report their gender, age, estimated family income, and whether they were first-generation college students. Additionally, with participants’ permission, school records were used to obtain information on students’ ethnicity and high school GPA.

**Emotion Regulation**

The Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) is comprised of ten items that fall into one of two emotion regulation categories: cognitive reappraisal or expressive suppression. Reappraisal is measured by items such as “I control my emotions by changing the way I think about the situation I’m in,” and suppression is
measured by items such as “I control my emotions by not expressing them.” All items are rated on a scale from 1 (strongly disagree) to 7 (strongly agree). In the present sample, the ERQ had excellent to good internal consistency ($\alpha = .918$ and $\alpha = .708$ for reappraisal and suppression, respectively) across the two subscales when assessed at T2.

**Internalizing Symptoms**

Internalizing symptoms were assessed at T1 and T3 using a composite of the depression and anxiety subscales of the Depression Anxiety Stress Scale (DASS-21; Lovibond & Lovibond, 1995), which are two subscales of seven items pertaining specifically to symptoms of depression (e.g., “I couldn't seem to experience any positive feeling at all”), and anxiety (e.g., “I felt I was close to panic”). Participants report the extent to which they experience symptoms on a scale from 0 (did not apply to me at all) to 3 (applied to me very much, or most of the time); thus, higher scores reflect higher levels of depression and anxiety symptoms. The depression and anxiety subscales of this measure tend to exhibit a large degree of overlap (Lovibond & Lovibond, 1995); as such, these subscale scores were combined to represent a general measure of internalizing symptoms. This combined scale evidenced strong internal consistency at both time points ($\alpha$s = .878 and .922), consistent with previous research on the overall measure (Antony, Bieling, Cox, Enns, & Swinson, 1998; Crawford & Henry, 2005; Lovibond & Lovibond, 1995).

**Perceived Stress**

The Perceived Stress Scale (PSS-10; Roberti, Harrington & Storch, 2006) measures the degree to which life situations are appraised as stressful. Participants rate
ten items based on the degree to which each one reflects the last month of their lives (e.g., “In the last month, how often have you found that you could not cope with all the things you had to do?”). The PSS features a scale that ranges from 0 (never) to 4 (very often). Internal consistency for the present sample was good at T1 and T3 (αs = .857 and .853).

Analytic Approach

Preliminary Analyses

A few brief preliminary analyses were necessary in order to determine the appropriateness of the present study’s planned analytic procedures. First, it was important to confirm that there was a relatively large degree of overlap between the depression and anxiety subscales of the DASS in order to justify using their composite as a measure of general internalizing symptoms. This was assessed using simple correlation analyses for these two subscales at both T1 and T3.

Second, in order to justify the use of residualized perceived stress at T2 (adjusting for T1 levels) as a predictor, it was crucial to confirm that participants tended to differ somewhat in perceived stress levels from T1 to T2. Notably, if participants’ average levels of perceived stress were largely consistent across these two time points, residualized perceived stress at T2 would be an ineffective predictor in that it would have little variability and also not be representative of any meaningful change in stress. This was assessed in two ways: first, a correlation analysis was conducted to examine the strength of the relationship between T1 and T2 levels of perceived stress; and second, a paired-samples t-test was conducted in order to examine whether, on average,
participants’ reported levels of perceived stress tended to differ between these time points.

Finally, it was similarly important to demonstrate that there was some meaningful variation in participants’ reported levels of internalizing symptoms between T1 and T3, in order to justify assessing the outcome of T3 internalizing symptoms (while adjusting for baseline symptom levels) and conceptualizing this as representative of change over time. If participants were largely consistent in their symptom levels over time, there would be no meaningful change in this outcome to predict, rendering the present study’s analyses ineffective and meaningless. This also was assessed in two ways: first, a correlation analysis was conducted to examine the strength of the relationship between T1 and T3 levels of internalizing symptoms; and second, a paired-samples t-test was conducted in order to examine whether, on average, participants’ symptom levels tended to differ between these time points.

**Overview of Primary Analyses**

Most of the hypotheses in the present study were addressed by one of two multiple regression analyses. The first analysis (Regression 1) examined the three-way interaction of residualized perceived stress at the end of the first semester of college (calculated by adjusting for perceived stress at the start of the first semester, as per the procedure outlined in Rogosa, 1995), levels of cognitive reappraisal at first semester’s end, and gender in predicting internalizing symptoms at the end of the first year of college (above and beyond baseline levels of internalizing symptoms). This was done with a hybrid hierarchical-simultaneous regression predicting T3 levels of internalizing
symptoms in which T1 (baseline) levels of internalizing symptoms were entered in the first block; T2 residualized levels of perceived stress (adjusted for T1 perceived stress), T2 cognitive reappraisal, and gender were entered in the second block; the three two-way interactions of T2 residualized perceived stress, T2 cognitive reappraisal, and gender were entered in the third block; and finally the three-way interaction of these three predictors was entered last (as per Aiken & West, 1991). All continuous variables were centered for this regression model. The second analysis (Regression 2) was nearly identical, except with levels of expressive suppression substituted for cognitive reappraisal in all relevant steps.

These analyses were useful in several ways. First, by initially accounting for baseline levels of internalizing symptoms, this design allowed for examining the three predictors’ ability to affect this outcome above and beyond the levels of internalizing symptoms with which participants entered college. This yields the strongest statistical basis for inferring causal influence, outside of a true experimental design (Cohen & Brook, 1987). Second, with baseline (T1) levels of perceived stress accounted for within the T2 residualized predictor, these analyses allowed for the assessment of the predictive power of perceived stress at the end of the first semester of college above and beyond the stress students already had when they entered college, isolating the particularly stressful nature of the college transition. This type of analysis is designed to examine whether a change in a risk factor is associated with a change in a given outcome (Cohen & Brook, 1987). In this case, it assessed the ability of additional stress to predict subsequent
increases in internalizing symptoms, regardless of the general levels of perceived stress students were experiencing before entering college.

Third, as in any moderation analysis (as per Baron & Kenny, 1986; Holmbeck, 1997), entering the predictors of perceived stress, reappraisal or suppression, and gender first, followed by their two-way interaction terms, allowed for the interpretation of significantly predictive two-way interaction terms as indicating the presence of moderation. Notably, the theoretical model outlined in this study is such that perceived stress was looked at as an initial predictor of internalizing symptoms, followed by emotion regulation (reappraisal or suppression) as a moderator of that relationship, and finally gender as a moderator of that interaction. As such, the two-way interaction of perceived stress and reappraisal or suppression was the predictor of interest in this step, with the other interactions (perceived stress–gender and emotion regulation–gender) being of less interest. Finally, the three-way interaction term entering the model last allowed for any increase in overall predictive power beyond the already-accounted for single predictors and two-way interactions to be interpreted as representative of a significant three-way interaction in predicting internalizing symptoms (Aiken & West, 1991).

**Hypothesis 1**

To test Hypothesis 1, which predicted that greater residualized perceived stress at the end of the first semester will predict higher levels of internalizing symptoms at first year’s end, the significance and direction (positive or negative) of the regression coefficient for T2 residualized perceived stress was evaluated (note: this could be
assessed in either regression analysis, since they were identical up to this point). If T2 residualized perceived stress were a significant and positive predictor, this would be interpreted as suggesting that greater stress at the end of the first semester of college does indeed predict higher levels of internalizing symptoms at the end of the first year above and beyond baseline levels of perceived stress and internalizing symptoms.

**Hypothesis 2**

To test Hypothesis 2, which predicted that cognitive reappraisal will buffer against the effects of stress in leading to internalizing symptoms, the significance of the regression coefficient for the perceived stress–cognitive reappraisal interaction in Regression 1 was evaluated. A significantly predictive interaction term would indicate that cognitive reappraisal does indeed moderate the perceived stress–internalizing symptoms relationship, and would be probed using conditional moderators and simple slopes so as to compare the strength and direction of this relationship under the conditions of high and low levels of reappraisal (as per Aiken & West, 1991). A weaker positive relationship between perceived stress and internalizing symptoms in the high cognitive reappraisal condition would be interpreted as indicating that reappraisal does indeed serve as a protective factor against developing internalizing symptoms in the face of increased stress in college.

**Hypothesis 3**

To test Hypothesis 3, which predicted that expressive suppression will amplify the vulnerability to internalizing symptoms as a result of greater levels of perceived stress, the significance of the regression coefficient for the perceived stress–expressive
suppression interaction in Regression 2 was evaluated. As with Hypothesis 2, a significantly predictive interaction term would indicate that expressive suppression does indeed moderate the perceived stress–internalizing symptoms relationship, and would be probed using conditional moderators and simple slopes so as to compare the strength and direction of this relationship under the conditions of high and low levels of suppression. A stronger positive relationship between perceived stress and internalizing symptoms in the high expressive suppression condition would be interpreted as indicating that suppression does indeed serve as a vulnerability factor, increasing susceptibility to internalizing symptoms in the face of increased stress.

**Hypothesis 4a**

Hypothesis 4a, which predicted that there will be gender differences in emotion regulation such that men report lower levels of cognitive reappraisal but higher levels of expressive suppression, was the only one that would require additional (but simpler) analyses to examine. First, a two-by-two repeated measures MANOVA was used to simultaneously compare males and females on their levels of cognitive reappraisal and expressive suppression (with emotion regulation type serving as the within-subjects variable). This analysis enabled an assessment of a main effect of gender (e.g., it could be that one gender tends to regulate emotions more often, collapsing across emotion regulation type), a main effect of emotion regulation type (e.g., people may tend to use reappraisal or suppression more often, collapsing across genders), and an interaction of these two dichotomous categorical variables. A significant interaction of gender and emotion regulation type would be interpreted as indicating that gender differences in
emotion regulation depend on the specific emotion regulation strategy being examined, and would be further probed with post-hoc independent-samples t-tests comparing males and females on cognitive reappraisal and expressive suppression separately.

**Hypothesis 4b**

To examine Hypothesis 4b, which speculated that gender might moderate the effect of cognitive reappraisal on the perceived stress–internalizing symptoms relationship, the significance of the regression coefficient for the three-way perceived stress–cognitive reappraisal–gender interaction in Regression 1 was evaluated. A significantly predictive interaction term would indicate that gender does indeed moderate the effect of reappraisal on the perceived stress–internalizing symptoms relationship, and will be probed using two sets of simple slopes (one each for males and females) to examine the patterns of strength and direction of this relationship under the conditions of high and low levels of reappraisal, and see how those patterns differ between genders (as per Aiken & West, 1991). If one gender or other exhibited a greater difference in the perceived stress–internalizing symptoms relationship between the high and low cognitive reappraisal conditions, this would be interpreted as suggesting that reappraisal serves as a stronger protective factor for that gender against developing internalizing symptoms in the face of increased stress.

**Hypothesis 4c**

To examine Hypothesis 4c, which speculated that gender might moderate the effect of expressive suppression on the perceived stress–internalizing symptoms relationship, the significance of the regression coefficient for the three-way perceived
stress–expressive suppression–gender interaction in Regression 2 was evaluated. A significantly predictive interaction term would indicate that gender does indeed moderate the effect of suppression on the perceived stress–internalizing symptoms relationship, and would again be probed using two sets of simple slopes so as to compare the patterns of strength and direction of this relationship under the conditions of high and low levels of suppression, and see how those patterns differ for males and females. If one gender or other exhibited a greater difference in the perceived stress–internalizing symptoms relationship between the high and low expressive suppression conditions, this would be interpreted as suggesting that suppression serves as a stronger vulnerability factor to internalizing symptoms in the face of increased stress for that gender.
CHAPTER THREE

RESULTS

Preliminary Analyses

As noted, the present study’s preliminary analyses included three steps. First, in assessing the suitability of the composite internalizing symptoms score, correlation analysis results demonstrated that the depression and anxiety subscales of the DASS were very highly correlated at both T1, $r = .62, p < .001$, and T3, $r = .73, p < .001$. As such, the composite of these two subscales was used as a measure of general internalizing symptoms in all subsequent analyses as planned.

Next, in confirming that participants’ levels of perceived stress did not hold constant between T1 and T2, correlation analysis results demonstrated that, while participants’ levels of perceived stress tended to be strongly correlated between these two time points, $r = .53, p < .001$, a meaningful amount of variance in T2 perceived stress remained unexplained (approximately 72%, given $r^2 = .28$ for this correlation effect). In support of this, mean comparison results demonstrated that participants’ T2 levels of perceived stress ($M = 16.83$) tended to be significantly higher than their T1 levels ($M = 15.31$), $t(1114) = -8.13, p < .001, d = 0.24$. This effect was in the small range according to Cohen’s (1988) conventions, but is described by Cohen (1992) as “not no small as to be trivial” (p. 156). As such, it was determined that participants tended to differ meaningfully in their levels of perceived stress over time, and therefore that this could be
used as an effective predictor. Notably, the finding that participants’ perceived stress levels tended specifically to increase over time was further support of the theoretical impetus for this study, in that it suggests that the college transition does witness an increase in students’ stress levels.

Finally, in confirming that participants’ levels of internalizing symptoms were not entirely consistent over time, a correlation analysis demonstrated that, while there was significant overlap between internalizing symptom levels at T1 and T3, \( r = .47, p < .001 \), a meaningful amount of variance in T3 symptom levels remained unexplained by baseline symptoms (78%, given \( r^2 = .22 \) for this correlation effect). Similarly, mean comparison results demonstrated that participants’ T3 levels of internalizing symptoms (\( M = 6.79 \)) tended to be significantly higher than their baseline levels (\( M = 4.58 \)), \( t(1121) = -10.74, p < .001, d = 0.34 \). This effect also was in the small but meaningful range according to Cohen’s (1988; 1992) conventions. Given these two findings, it was determined that participants’ levels of internalizing symptoms tended to vary meaningfully over time, and as such that variations in this outcome could be predicted meaningfully as proposed by the present study. Additionally, the finding that participants’ internalizing symptom levels tended specifically to increase over time once again provided further support for the theoretical foundation for this study, in that it confirms that students do indeed experience increases in mental health problems over the course of their transition to college. (Note: All descriptive statistics, correlations, and \( t \)-test comparisons among study variables, including those described as part of preliminary analyses, are presented in Table 1.)
Table 1. Descriptive Statistics and Correlations for Study Variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<tbody>
<tr>
<td>1. Time 1 Internalizing Symptoms</td>
<td>1,129</td>
<td>4.58</td>
<td>5.35</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>2. Time 1 Perceived Stress</td>
<td>1,127</td>
<td>15.31</td>
<td>6.37</td>
<td>.58*</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>3. Time 2 Perceived Stress</td>
<td>1,116</td>
<td>16.84</td>
<td>6.41</td>
<td>.36*</td>
<td>.53*</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>4. Time 2 Cognitive Reappraisal</td>
<td>1,102</td>
<td>28.07</td>
<td>7.18</td>
<td>-.14*</td>
<td>-.17*</td>
<td>-.21*</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5. Time 2 Expressive Suppression</td>
<td>1,112</td>
<td>15.24</td>
<td>5.11</td>
<td>.13*</td>
<td>.11*</td>
<td>.11*</td>
<td>-.03</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Time 3 Internalizing Symptoms</td>
<td>1,122</td>
<td>6.79</td>
<td>7.47</td>
<td>.47*</td>
<td>.40*</td>
<td>.42*</td>
<td>-.11*</td>
<td>.15*</td>
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<td></td>
</tr>
<tr>
<td>7. Gender</td>
<td>1,130</td>
<td>----</td>
<td>----</td>
<td>-0.95</td>
<td>-4.51*</td>
<td>-3.58*</td>
<td>-3.86*</td>
<td>4.30*</td>
<td>-0.96</td>
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</tr>
</tbody>
</table>

Note. *p < .001. For rows 1-6, values are rs. For row 7, values are ts.
Primary Analyses

Hypothesis 1

In order to test the hypothesis that greater residualized perceived stress at the end of the first semester would predict higher levels of internalizing symptoms at first year’s end (adjusting for baseline symptom levels), the significance and direction of the Step 2 regression coefficient for T2 residualized perceived stress was evaluated. Results demonstrated that residualized perceived stress was significantly and positively predictive of T3 internalizing symptoms above and beyond baseline symptom levels, $B = 1.55$, $\beta = .21$, $t = 7.83$, $p < .001$. This indicated that, as hypothesized, greater residualized perceived stress at the end of the first semester predicted higher levels of internalizing symptoms at first year’s end, above and beyond baseline levels of internalizing symptoms and perceived stress with which students entered college.

Hypothesis 2

To test the hypothesis that cognitive reappraisal would buffer against the effects of stress in leading to internalizing symptoms, the significance of the Step 3 regression coefficient for the perceived stress–cognitive reappraisal interaction in Regression 1 was first evaluated. Results demonstrated that this interaction was a significant predictor of T3 internalizing symptoms, $B = -0.08$, $\beta = -.08$, $t = -3.05$, $p = .002$, above and beyond the main effects of these two predictors separately. This indicated significant moderation, such that the relationship between residualized perceived stress and subsequent internalizing symptoms differed significantly depending on participants’ use of cognitive reappraisal.
However, this result does nothing to identify the specific nature of this relationship under different conditions of cognitive reappraisal; as such, this moderation effect was further probed using conditional moderators (+1 and -1 standard deviation for high and low levels of cognitive reappraisal, respectively) and simple slopes. Results of this post-hoc probing indicating that T2 residualized perceived stress was a weaker predictor of T3 internalizing symptoms in the high reappraisal condition, $B = 1.01, \beta = .13, t = 3.77, p < .001$, than in the low reappraisal condition, $B = 2.12, \beta = .28, t = 7.86, p < .001$. Notably, the predictive effect of residualized perceived stress on subsequent internalizing symptoms was less than half (47.5%) as strong among participants reporting high levels of cognitive reappraisal as among those reporting low levels. This indicated that, as hypothesized, cognitive reappraisal significantly buffered against the effects of perceived stress in leading to subsequent internalizing symptoms. This interaction is represented in Figure 5, below.
Hypothesis 3

To test the hypothesis that expressive suppression would amplify the vulnerability to developing internalizing symptoms as a result of perceived stress, the significance of the Step 3 regression coefficient for the perceived stress–expressive suppression interaction in Regression 2 was evaluated. Results indicated that this interaction was not a significant predictor of T3 internalizing symptoms, $B = -0.03$, $\beta = -0.02$, $t = -0.84$, $p = .403$. This indicated that, contrary to predictions, expressive suppression did not affect the
relationship between residualized perceived stress and subsequent internalizing symptoms in any way.

Notably, however, in addition to the main effect of T2 residualized perceived stress, there was a significant main effect of T2 expressive suppression on T3 internalizing symptoms, $B = 0.11$, $\beta = .07$, $t = 2.82$, $p = .005$, such that higher levels of suppression predicted subsequent higher levels of internalizing symptoms. These main effects are represented in Figure 6, below.

![Figure 6. Main Effects of Expressive Suppression and Perceived Stress on Internalizing Symptoms.](image)
**Hypothesis 4a**

In order to test the hypothesis that there would be gender differences in emotion regulation such that men would report lower levels of cognitive reappraisal but higher levels of expressive suppression, a two-by-two repeated measures MANOVA was used to simultaneously compare males and females on their levels of cognitive reappraisal and expressive suppression. Results of this analysis demonstrated a significant interaction of gender and emotion regulation style, $F(1,1089) = 33.45, p < .001, \eta_p^2 = .03$, indicating that gender differences in emotion regulation depend on the specific emotion regulation strategy being assessed.

This finding was followed up with post-hoc independent-samples $t$-tests in order to assess the specific nature of gender differences in cognitive reappraisal and expressive suppression separately. First, results demonstrated that men ($M = 26.75$) reported significantly less cognitive reappraisal than did women ($M = 28.58$), $t(1101) = -3.84, p < .001, d = .26$. Conversely, men ($M = 16.28$) reported significantly more expressive suppression than did women ($M = 14.83$), $t(1111) = 4.30, p < .001, d = 0.29$. Both of these differences were in the small range according to Cohen’s (1988) conventions, but again not so small as to be considered meaningless (Cohen, 1992). These results indicated that, as hypothesized, men report significantly lower levels of cognitive reappraisal but higher levels of expressive suppression than do women.

Also worth mentioning in this analysis was a significant main effect of emotion regulation type, $F(1,1089) = 6.04, p = 0.14, \eta_p^2 = .006$, such that, collapsing across genders, people reported using slightly more reappraisal than suppression. However, as
this difference was below the acceptable cutoff for even a small effect (Cohen, 1988), it is not interpreted as being meaningful. Finally, as speculated, there was no gender difference in overall levels of emotion regulation (collapsing across reappraisal and suppression), $F(1,1089) = 0.12, p = .735, \eta_p^2 < .001$, likely due to the opposite directions of specific gender differences in reappraisal and suppression. These results are represented in Figure 7, below.

Figure 7. Gender Differences in Cognitive Reappraisal and Expressive Suppression.

*Note.* *Group mean difference significant at the $p < .001$ level.*
Hypothesis 4b

To test the exploratory hypothesis that gender might moderate the buffering effect of cognitive reappraisal on the perceived stress–internalizing symptoms relationship, the significance of the Step 4 regression coefficient for the three-way perceived stress–cognitive reappraisal–gender interaction in Regression 1 was evaluated. Results indicated that this three-way interaction was not a significant predictor of T3 internalizing symptoms, $B = 0.06, \beta = .05, t = 1.11, p = .265$. This indicated that, contrary to speculation, the protective effect of cognitive reappraisal did not differ between men and women.

Hypothesis 4c

This hypothesis was tested by evaluating the significance of the Step 4 regression coefficient for the three-way perceived stress–expressive suppression–gender interaction in Regression 2. Results demonstrated that this three-way interaction was not a significant predictor of T3 internalizing symptoms, $B = -0.07, \beta = -.04, t = -0.92, p = .358$, indicating that, contrary to speculation, there was no three-way interaction between gender, expressive suppression, and residualized perceived stress in predicting subsequent internalizing symptoms.
CHAPTER FOUR

DISCUSSION

Overview

The present study confirms the stressful and difficult nature of the college transition, further underlines the importance of emotion regulation for mental health in this period of development, and pinpoints gender differences in emotion regulation while beginning to assess their potential impacts. Using two hybrid hierarchical-simultaneous regression models, I tested several pieces of the three-way interactions of both cognitive reappraisal and expressive suppression with perceived stress and gender in predicting subsequent internalizing symptoms among first-year college students. These analyses also were supplemented with a direct assessment of gender differences in reappraisal and suppression.

First and foremost, results reinforced the idea that the college transition is often a time of increased stress for emerging adults, and further that this intensified stress can lead to deteriorations in mental health. As predicted, results also indicated that cognitive reappraisal can function as a buffer in this context, weakening the relationship between stress and subsequent internalizing symptoms. On the other hand, and contrary to hypotheses, expressive suppression did not increase vulnerability to internalizing symptoms in the face of increased stress; instead, suppression served as its own independent predictor of subsequent increases in symptoms. Finally, gender differences
in cognitive reappraisal and expressive suppression were as expected, such that men reported less reappraisal but more suppression than did women. However, these differences in overall use of the two emotion regulation strategies did not seem to change the way these behaviors impacted stress and subsequent internalizing symptoms, as neither the reappraisal–stress nor suppression–stress interactions differed between genders. Each of these findings has important implications, and merits deeper discussion.

**Stress and the College Transition**

Consistent with the abundant research literature on stress among college students (e.g., Abouserie, 1994; Pierceall & Keim, 2007), the present study further demonstrates the stressful experience that many young people have as they transition to college. As noted, preliminary analyses indicated that, on average, this sample of college students tended to increase meaningfully in stress over the course of their first semester of college. It is likely that, as found in other studies, these students’ stress levels may decrease gradually from their first-semester peak as students become acclimated to college, but will never return to their pre-college lows (Bewick et al., 2010). Instead, greater stress is likely to become part of college students’ ongoing daily lives, which can lead students to report feeling overwhelmed and overburdened (Sax, 1997).

This is important because, as we know, too much stress can be a cause of mental health problems in general (e.g., Dyson & Renk, 2006; Ragsdale et al., 2011), and specifically for college students (e.g., Chang, 2001). In accordance with past research, the present study also further highlights the negative mental health consequences that can arise from the aforementioned increases in stress. Preliminary analyses indicated that this
sample of college students tended to experience meaningful increases in internalizing symptom levels over the course of their first year. Crucially, adjusting for the symptom levels with which students entered college, upswings in stress over the course of the first semester were significantly and positively predictive of symptom levels at first year’s end. In other words, this suggests that the more students’ stress levels rise over the course of their first semester of college, the more they can expect to face increased symptoms of depression and anxiety by the end of their first year, regardless of the extent to which they experienced these symptoms prior to college. This especially does not bode well for at-risk students (i.e., those who already had problems with depression and anxiety before college), who may develop increasingly severe symptoms—and even cross into the realm of clinically diagnosable mental illness—as their stress levels rise during their first year.

As more and more young people step into their independent and autonomous lives by beginning college, this contextual transition becomes an increasingly important component of the larger picture of emerging adulthood, a deeply formative developmental stage that the research tells us can have meaningful consequences for the rest of adult life (Arnett, 2000; Masten, Obradović, & Burt, 2006; Schulenberg, Samaroff, & Cicchetti, 2004). In short, mental health problems resulting from college stress can cause damage that lasts far beyond the college years. The present study reaffirms the real risks for mental health associated with the stressful nature of the college transition. This also further underscores the importance of identifying other factors that can affect mental health for students in the high-stress college context, granting additional importance to
the impacts of cognitive reappraisal and expressive suppression that will be discussed in the following sections.

**Cognitive Reappraisal**

As an exemplar of healthy emotion regulation, cognitive reappraisal was hypothesized in the present study to serve as a buffer against developing internalizing symptoms in the face of stress—that is, an emotion regulation strategy that could help college students to combat the deleterious effects of stress and thus aid them in avoiding subsequent symptoms of depression and anxiety. This seemed a reasonable supposition based on what the literature says about the effects on mental health of adaptive emotion regulation in general (e.g., Berking et al., 2008) and cognitive reappraisal in particular (e.g., Gross & John, 2003; Martin & Dahlen, 2005). In other words, since the beneficial effects of reappraisal on mental health are well documented, it seemed likely that reappraisal might also interact with other predictors of mental health—in this case stress—in positive ways.

Results supported this hypothesis, such that that the interaction of stress and reappraisal added additional predictive power to the regression model above and beyond any main effects of stress or reappraisal. This means that the predictive effect of mid-semester stress levels on subsequent internalizing symptoms depended on participants’ reported use of cognitive reappraisal as a typical emotion regulation strategy—or in other words, the strength of the stress–symptoms relationship differed based on how often participants reported using reappraisal to manage their emotions. More specifically, participants who reported frequent use of reappraisal exhibited a relationship between
stress and subsequent symptoms that was significantly weaker than the same relationship for participants who reported infrequent reappraisal. This is a classic buffering (or “protective”) effect, wherein a negative factor (stress) leads to a negative outcome (internalizing symptoms) to a lesser degree in the presence of a protective factor (reappraisal). Moreover, this is a notably sizeable buffering effect, such that the predictive power of stress on subsequent symptom levels is less than half as strong among participants who report frequent use of reappraisal than among infrequent reappraisers. This adds something new to our understanding of the impact of cognitive reappraisal: not only does reappraisal have beneficial effects on mental health, it also can serve to protect against the deleterious effects of other factors, maintaining adjustment and decreasing the likelihood of negative mental health outcomes in the face of stress.

Interestingly, contrary to the aforementioned research on the impacts of reappraisal on mental health, reappraisal itself had no significant main effect on subsequent internalizing symptoms in the present study’s sample. This may indicate that reappraisal has more meaningful effects as a protective factor, aiding students in coping with their stressful environments, than as a promotive factor, fostering adjustment in isolation without regard to other influences. As such, in addition to the various treatments for mental illness that have incorporated training in effective emotion regulation (e.g., Linehan, 2015; see also Aldao et al., 2010; Berking et al., 2012), programs aimed at prevention of mental health problems would be well served to integrate reappraisal and other healthy emotion regulation behaviors in their curriculum. If instituted in the context of colleges and universities, programs of this sort might help students to manage their
emotions in more healthful ways, thus combating stress before it has its negative impacts on mental health. In sum, these findings lend further support to the importance of effective emotion regulation as an essential feature of mental health, and particularly as a way to foster wellbeing for emerging adults despite the stress that is seemingly inherent to the college transition.

**Expressive Suppression**

In direct contrast with cognitive reappraisal, expressive suppression functions here as an exemplar of unhealthy emotion regulation, and thus was hypothesized to serve as a vulnerability factor in the college context, leading stress to be an even stronger predictor of subsequent internalizing symptoms. This prediction is an extension of what we already know about suppression: that this emotion regulation strategy is associated with negative outcomes across domains of psychosocial wellbeing (Gross & John, 2003; Brewer et al., in preparation; Butler et al., 2003). In other words, since suppression seems to lead to negative outcomes on its own, it seemed likely that, when interacting with stress, another predictor of negative mental health outcomes, the two might work together to affect even less desirable outcomes than result from either predictor on its own.

Contrary to this hypothesis, however, results indicated that the interaction of stress and expressive suppression did not add additional predictive power to the regression model above and beyond the main effects of these two predictors. In other words, the effect of stress in predicting subsequent internalizing symptoms was consistent regardless of how frequently participants report suppressing their outward emotional expression. Notably, however, there also was a significant and positive main effect of
suppression. This means that, regardless of how much stress participants reported, the more frequently participants reported engaging in expressive suppression, the higher their subsequent internalizing symptom levels were likely to be.

A useful interpretation of this finding is that, rather than functioning as a vulnerability factor by increasing susceptibility to the negative effects of stress, expressive suppression instead functions as a risk factor, having its own consistent negative effects regardless of what else is going on in a student’s life. This is further support for an idea that is already prominent in the emotion regulation literature: that suppression of emotions is an unhealthy way of managing one’s emotional experience. This has important implications for clinical work, as research of this nature should reinforce for clinicians the importance of their clients’ emotional expression in therapy, and also the need to help clients learn to express their emotions openly in their daily lives. Helping clients to openly express their emotions and thus avoid the negative consequences of suppressing such emotional expression is one way in which clinicians can profoundly change their clients’ lives.

**Gender Differences in Emotion Regulation**

The present study reaffirms the importance of emotion regulation for mental health and, furthermore, illuminates new ways in which healthy emotion regulation can lead to positive outcomes. However, the question remains of whether the patterns identified here are the same regardless of gender—and, notably, there is reason to think they might not be. The literature suggests that women, who are traditionally viewed as possessing a greater capacity for emotion in general (Barrett & Bliss-Moreau, 2009;
Nolen-Hoeksema, 2012), are more likely to engage in most internally-focused emotion regulation behaviors than are men (Nolen-Hoeksema & Aldao, 2011; Tamres et al., 2002). However, gender role theory also suggests that men’s more active gender role may make them more likely to actively suppress their outward emotional expression, or avoid their emotions altogether (Tamres, Janicki, & Helgeson, 2002). Thus, it was predicted here than men would report more suppression of their emotions than women, but less engagement in cognitive reappraisal.

As noted, results were consistent with this hypothesis: male students reported engaging in more expressive suppression but less cognitive reappraisal than did female students. Both of these differences were statistically significant and constituted small but meaningful effects according to Cohen’s (1988) conventions. These findings are troubling because, considering what we know about the impacts of reappraisal and suppression, they suggest that men tend to regulate their emotions in much less adaptive ways than do women. This idea is consistent with other research in this area, which shows that men are also less likely to engage in many other healthy emotion regulation strategies, such as seeking social support, problem-solving, and acceptance of emotions (Nolen-Hoeksema & Aldao, 2011), and are more likely to turn to substances to avoid emotions (Tamres et al., 2002). This inability to regulate emotions effectively may help to explain the consistent finding that men tend to abuse substances more often in general (Brady & Randall, 1999). In sum, the present study’s findings add further credence to the idea that healthy emotion regulation is a particularly urgent need for men, who may be lacking in this area.
In theorizing about why such gender differences in emotion regulation may exist, Nolen-Hoeksema (2012) astutely leans heavily on gender role theory, which suggests that men and women learn to think and act in particular (and often distinct) ways based on societal expectations and norms. Since women are widely expected to be the gender that is more comfortable with emotions, they are encouraged to experience their emotions fully and share their emotions with others in ways that facilitate healthy emotion regulation. Men, by contrast, are often taught, implicitly or explicitly, that their emotions are bad and dangerous, and should be kept inside or avoided altogether. This pattern of socialization can certainly account for some of the pattern of gender differences in emotion regulation behaviors that is described both in the present study and elsewhere in the research literature.

Given the idea that men tend to regulate their emotions differently, and in less healthy ways, than do women, I speculated that the emotion regulation strategies discussed here might interact differently with stress for men and women, perhaps having distinct implications for stress as a predictor of subsequent internalizing symptoms. For example, the idea that men are less likely to engage in cognitive reappraisal might suggest that this strategy would be a particularly strong buffer in the face of stress for those men who do practice this emotion regulation behavior. On the other hand, perhaps the buffering effect of reappraisal might be particularly strong for women, who have more practice engaging in this strategy and who may utilize it more naturally. It was difficult to say exactly how gender differences in emotion regulation strategies might
impact their interactions with stress, but it seemed a reasonable supposition to think there might be some sort of three-way interaction(s) at work here.

However, as noted, results were not in support of this speculation; neither the three-way interactions of (a) gender, reappraisal, and stress nor (b) gender, suppression, and stress added any predictive power to their respective regression models above and beyond the simpler main effects and two-way interactions that were already accounted for. These findings indicate that, despite the observed gender differences in the frequency with which male and female students engage in these two emotion regulation strategies, the way these behaviors interact with stress in predicting subsequent mental health is the same for both genders. In other words, reappraisal is an equally effective protective factor against stress for both men and women—when they use this strategy, that is. Similarly, since the two-way interaction of gender and expressive suppression also was nonsignificant, the harmful effects of suppression on subsequent mental health seem to be similar for men and women—again, only to the extent that a person engages in this behavior. If reappraisal were a less useful buffer for men than women, or comparably, suppression had less powerful negative effects for men than women, then perhaps we would have less cause to worry about men’s emotion regulation, since their ostensibly harmful suppression and less frequent reappraisal does not seem to damage them much anyway. However, this is not the case; reappraisal is an effective buffer for men the same as for women—men just use this strategy less often. Similarly, suppression has similar harmful effects on men’s mental health as it does for women, and unfortunately, men actively suppress their emotions more frequently. Again, the takeaway message here is
that men often may be at a disadvantage when it comes to managing their emotional experience effectively—and that this can have meaningful consequences for their mental health.

**Limitations of the Present Study**

The present study’s findings have important implications for our understanding of stress among college students, the impacts of emotion regulation in this context, and the nature of gender differences in these factors. Nevertheless, there are a few limitations of this research that merit mention in order to properly appreciate the contributions it makes to the literature. The first of these limitations is methodological: all of the data in this study were collected using the same self-report survey methodology, which could be potentially problematic for two related reasons. First, as we know from methodology research, data collected using the same method and from the same reporter can be subject to common method variance, wherein variable covariances are due to the shared measurement method rather than true relationships between constructs (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Additionally, self-report data may be particularly subject to these biases because, in contrast to objective measurements (e.g., performance scores) or third-party reports, self-reports are more likely to be influenced by factors such as social desirability effects, which occur when participants respond in explicitly culturally acceptable ways in order to achieve social approval (Adams, Soumerai, Lomas, & Ross-Degnan, 1999; Crowne & Marlowe, 1964; Podsakoff et al., 2003). It is important to keep these potential biases in mind when interpreting the present study’s findings that include relationships between separate constructs (e.g., that stress predicts subsequent
internalizing symptoms). It is possible that some of the shared variance between these constructs is due to common method bias, and not to an actual predictive relationship between the two constructs.

However, for other findings, common method bias likely does not pose the same problem. In particular, it is difficult to imagine how the buffering effect of cognitive reappraisal found in the present study could be due to common method variance, because of the way this interaction effect is statistically tested. In relatively simple terms, what the test of the interaction between stress and cognitive reappraisal does is test the question: How does the strength of the relationship between stress and subsequent internalizing symptoms compare at different levels of cognitive reappraisal? In other words, this analysis asks: What is this relationship like for people who do not engage in much reappraisal? What about for people who do a lot of it? Are these “conditions” different? If the strength of the stress–symptom relationship is statistically different in these disparate conditions of cognitive reappraisal, this results in a significant interaction. Crucially, if common method variance is at work in the relationship between stress and subsequent symptoms, this will almost certainly be the case in both “levels” of reappraisal, high and low. As such, with common method variance consistent across levels of cognitive reappraisal, any difference in the strength of the stress–symptom relationship is due to reappraisal itself. Testing interactions is actually a useful way of circumventing the problem of common method variance, since an interaction pits two (or more) conditions against each other, all of which are likely to be subject to common method bias to similar extents. This lends extra weight to the present study’s finding that
cognitive reappraisal can serve as a buffer against developing symptoms of depression and anxiety in the stressful context of the college transition.

There is another limitation of the present study that also merits discussion: the matter of attrition. As noted, of the students who were initially invited to participate in the ongoing surveys that constitute the present study’s parent project, nearly three-quarters either failed to initiate the study or had dropped out of participation by the third time point. This meant that the resulting longitudinal sample for the present study was more likely to be white, to be female, and to have a higher GPA than the complete body of eligible participants, which may have limited the observed variability in the present study’s constructs of interest. Due to the self-selecting nature of the present study’s sample, it is also likely to be biased to include people who are conscientious, diligent, reliable, and thorough—in short, the type of young people who will participate in all time points of an ongoing and lengthy survey research project. In other words, the present study’s sample may be constituted disproportionately by students who are generally stable and well-adjusted, and may underrepresent students who struggle with mental illness and other challenges to their ability to effectively manage their lives. Thus, the people for whom stress may be the biggest problem, and for whom healthy emotion regulation may be the most important—in effect, the students for whom this research may be most relevant—are likely to be systematically underrepresented here. In some ways, this makes the present study’s findings even stronger, given that effects were found despite the potentially limited variability and range of stress and internalizing symptoms to be found in its sample. This may mean that effects would be even bigger with greater
variability observed across the entire spectrum of these constructs. Additionally, one major strength of this study that helps to combat this limitation is the very large sample size—with over 1,100 participants sampled, it seems likely that the findings described here are at least somewhat generalizable to the larger population of students at four-year colleges and universities. Nevertheless, the potential issue of sample bias is another limitation that merits consideration for the generalizability of the present study’s results.

Finally, it is important to note a limitation particular to this study’s measurement of expressive suppression. The ERQ is the best measure of this construct in the literature, and indeed was designed explicitly to measure expressive suppression as a trait-level emotion regulation pattern. However, the suppression subscale is notably limited in that it only consists of four somewhat redundant items that, for the most part, all ask variations of the same question about not showing emotions. This subscale of the ERQ also is limited to asking only about emotions in general, failing to discriminate between different emotions or even provide examples of specific emotions within the items. Importantly, the data for expressive suppression was somewhat limited as well, with a mean item score ($M = 3.81$) that was below the midpoint of the response rating scale, and limited variability in total scores among participants. This limited variability in particular may have made it difficult to find significant interaction results with expressive suppression.

**Conclusions and Future Directions**

Despite the limitations discussed in the previous section, the results of this research have meaningful implications for scientific understanding on several fronts. First and foremost, the present study adds further support to the idea that the college transition
often features increased stress for emerging adults, and that this can lead to problems for mental health. For American young people, the transition to college is becoming an increasingly prevalent component of emerging adulthood, a developmental stage that we know can have important implications for trajectories of adjustment throughout adult life. This identifies a critical challenge that many American young people will face as they strive to become happy, healthy, and successful adults.

Additionally, the present study uses a robust longitudinal design to assess previously untested ways in which emotion regulation can influence mental health. This study is among the first to move beyond the main effects of emotion regulation on adjustment, and instead evaluate possible interactions with other predictors of mental health. Importantly, results indicated that cognitive reappraisal can function as a buffer against developing internalizing symptoms in the face of increased stress during the transition to college. This finding is noteworthy for two reasons: first, because this illuminates a novel way in which healthy emotion regulation can affect positive mental health outcomes, and second, because this identifies a protective factor that can help emerging adults to flourish in a formative developmental stage. Similarly, although expressive suppression was not found to interact with stress as hypothesized, the present study further emphasizes the negative impacts of this maladaptive emotion regulation style, highlighting the importance of emotional expression for mental health.

Finally, this research adds a piece to the puzzle that is our understanding of gender differences in emotion regulation, further supporting the idea that men tend to regulate their emotions less effectively and in less adaptive ways than do women. Despite
these gender differences in typical emotion regulation patterns, the ways in which
cognitive reappraisal and expressive suppression interacted with stress in predicting
subsequent internalizing symptoms were no different for men and women. This suggests
that men may be at particular risk for negative mental health outcomes as a result of their
unhealthy emotion regulation tendencies. Taken together, the present study’s findings add
clarity to the research literature in several ways and, perhaps most importantly, provide
new information on the ways in which healthy emotion regulation can promote
wellbeing.

Beyond the present study, there are several useful directions that future research
can take in order to add to the emotion regulation literature. Notably, the vast majority of
emotion regulation research features self-report measures of trait-level emotion
regulation—that is, participants are asked about the ways they typically manage their
emotional experience, and then researchers assess how this may affect their lives in other
ways. However, we also know that people can be taught how to regulate emotions more
effectively, as this is a major component of dialectical behavior therapy (Linehan, 2015),
among other clinical approaches. Further, there is some research precedent for short-term
experimental manipulations of emotion regulation behaviors and assessments of related
outcomes (e.g., Butler et al., 2003; Goldin, McRae, Ramel, & Gross, 2008). What we can
take from this is the idea that emotion regulation styles are not stable, and instead can be
altered—and improved—relatively easily. With this idea in mind, one future direction for
emotion regulation research might be the evaluation of prevention-focused programs that
train at-risk people in healthy emotion regulation. Perhaps emerging adults, college
students, and particularly men would be a likely group of candidates for such targeted programs.

Alternatively, given what we know about the direct impacts of emotion regulation on mental health, another novel direction of study in this field could be to attempt to answer the question of precisely how emotion regulation behaviors affect their outcomes. For example, although cognitive reappraisal has been conceptualized as a buffer here—that is, a factor that can intervene in the face of stress—it could be informative to suppose instead that cognitive reappraisal in fact causes decreases in stress, which in turn lead to better mental health outcomes. Mediation analyses using longitudinal data would be an appropriate way to test this competing model. If this understanding proved to be a good fit to the way these constructs interrelate, this could be an even stronger argument in favor of teaching healthy emotion regulation as an approach to promoting adjustment, particularly among those who might be at risk for adverse mental health outcomes. In conclusion, the present study adds to our understanding of emotion regulation, a critical component of mental health, and as one would hope, also illuminates future directions in which research in this field can further our understanding of how we navigate our emotional worlds.
REFERENCE LIST


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Evan Zahniser is a doctoral student studying clinical psychology at Loyola University Chicago. He received his B.A. in Cognitive Science from Pomona College of Claremont, CA in 2012. During his time at Pomona, Mr. Zahniser participated in several different research endeavors, including an undergraduate thesis project, for which he received Cognitive Science departmental distinction. He was also awarded summer research funding through the Cognitive Science department on two occasions, and his involvement in a clinical psychology research lab culminated in contributions to a project that was presented at a national conference in April, 2013.

Since starting graduate school at Loyola, Mr. Zahniser has worked in Dr. Colleen Conley’s Improving Mental Health and Promoting Adjustment through College Transitions (IMPACT) and Dr. Patricia Rupert’s Professional Ethics and Issues Research (PIER) Labs. As part of his involvement in these labs, Mr. Zahniser has contributed to several research projects, such as a meta-analysis of technology-based mental health interventions for college students, a study of profiles of burnout among professional clinical psychologists, and an assessment of relationships between self-care and stress among college students. His work on these projects has resulted in numerous conference presentations, as well as several publications that are in preparation or under review. Mr. Zahniser’s master’s thesis examines the interactions of emotion regulation, stress, and gender in predicting college students’ subsequent mental health.