



Interactions of emotion regulation and perceived stress in predicting emerging adults' subsequent internalizing symptoms

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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 longitudinal associations between mental health and other relevant factors. This study examines two specific emotion regulation strategies interacting with perceived stress to predict subsequent internalizing symptoms among emerging adults transitioning to college, a population for whom emotion regulation may be particularly important. A sample of 1130 college students provided data at three time points. Results indicated that cognitive reappraisal buffered against negative effects of stress, whereas expressive suppression was an independent risk factor for internalizing symptoms. Findings underscore the importance of emotion regulation, highlighting cognitive reappraisal as a protective factor against stress and further demonstrating the direct negative impacts of expressive suppression.

Keywords Emotion regulation · Emerging adults · Internalizing symptoms · Longitudinal design

Introduction

Emotion regulation and wellbeing

Emotion regulation has become one of the fastest growing research areas within psychology over the past 20 years (Gross 2015). 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 and John 2003; Nolen-Hoeksema 2012). In developing his influential *process model* of emotion regulation, Gross (1998; Gross and John 2003) introduced *cognitive reappraisal* and *expressive suppression*, two particular emotion regulation strategies that have received a great deal of research focus. Cognitive reappraisal 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). Expressive suppression, on the other hand, involves inhibiting the outward expression of emotion while still experiencing it internally (e.g., maintaining a pleasant facial expression despite seething internally over the same insult).

The impacts of reappraisal and suppression on psychosocial wellbeing are well documented, with individual differences in these strategies linked to very different outcomes across domains (Brewer et al. 2016; Gross and John 2003; Nezlek and Kuppens 2008). Cognitive reappraisal often tends to be considered an adaptive emotion regulation strategy, and for good reason. Gross and John (2003) found that reappraisal relates positively to desirable outcomes like self-esteem, experience of positive emotion, and peer-rated likeability, and negatively to adverse outcomes including neuroticism, experience of negative emotion, and depression. Other researchers have found similar results, demonstrating that reappraisal is associated with lower levels of depression, anxiety, anger, and stress (Martin and Dahlen 2005). Conversely, Gross and John (2003) find an opposite pattern for expressive suppression, which relates positively to rumination, experience of negative emotions, and depression, and negatively to self-esteem, optimism, and number of close relationships. Further, experimental data show that suppression disrupts interpersonal communication and inhibits relationship formation (Butler et al. 2003). (For comprehensive

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meta-analyses of the many studies examining the effects of emotion regulation on psychosocial outcomes, a review of which is beyond the scope of this study, see Aldao et al. (2010; Webb et al. 2012).

Importantly, emotion regulation processes of various types can be useful and appropriate to different extents depending on the context in which they are employed (Gross 2015; Phillips and Power 2007). For example, although cognitive reappraisal is largely thought of as an adaptive emotion regulation pattern, Freund and Staudinger (2015) remind readers that this pattern can have negative outcomes in the long term if it interferes with one's ability to internalize negative emotional states as feedback about undesirable events, environments, and social relationships. Likewise, expressive suppression can be quite adaptive in certain circumstances, such as the example provided by Gruber et al. (2011) of a businessperson intentionally suppressing outward signs of amusement so as to remain serious during an important meeting, thus promoting effective workplace functioning. Still, the vast bulk of the research on cognitive reappraisal and expressive suppression has identified these strategies as largely leading to desirable and undesirable outcomes, respectively, these counterexamples notwithstanding.

It is clear that emotion regulation behaviors—including reappraisal and suppression in particular—have meaningful impacts across domains of psychosocial functioning. At the same time, less is known about how emotion regulation may interact with other predictors of mental health and wellbeing. One such other factor is stress, a variable that has long been documented to have important impacts on psychosocial functioning (e.g., Dohrenwend and Dohrenwend 1974, 1981), and with which emotion regulation strategies might be expected to interact in influencing psychosocial health. Emotion regulation would not be the only affect-related factor to play a moderating role in this context; for example, research has shown that stress impacts mental health (e.g., depression) differently depending on levels of emotional intelligence, a construct related to emotion regulation that encompasses awareness of one's own emotions and accuracy of perceptions of others' (Ciarrochi et al. 2002). Thus, there is reason to think that emotion regulation strategies such as reappraisal and suppression may be important beyond their direct impacts on mental health, potentially interacting with stress—another major predictor of psychosocial wellbeing—in meaningful ways.

A very modest body of past research with cognitive reappraisal and expressive suppression provides a further basis for this idea. To date, the only research we know of that has directly explored an interaction between emotion regulation and stress was an experimental study by Troy and colleagues (Troy et al. 2010). These researchers demonstrated that participants' ability to implement cognitive reappraisal moderated the cross-sectional association between cumulative life

stress (i.e., a total score reflecting the overall negative impact of a wide range of life stressors over the past 18 months) and depressive symptoms among a community sample of women (Troy et al. 2010). This interaction was such that, among women who had experienced high levels of cumulative life stress, cognitive reappraisal was a strong predictor of fewer depressive symptoms; in contrast, at lower levels of life stress, cognitive reappraisal did not significantly influence depressive symptoms. Thus, cognitive reappraisal served as an important buffer for participants who had experienced high levels of cumulative life stress.

Aside from this research, there has been very limited direct focus on the interactions of emotion regulation and stress. One study provided further impetus for the exploration of these ideas, examining the effects of cognitive reappraisal and expressive suppression on a set of psychological outcomes thought to be associated with stress (including PTSD, depression, and anxiety; Moore et al. 2008). Stress was not directly measured in this study, although the authors quite explicitly conceptualized reappraisal and suppression as factors influencing the development of stress-related psychopathology. Consistent with previous studies of the direct impacts of emotion regulation on mental health, results indicated that reappraisal was associated with lower levels of PTSD, depression, and anxiety symptomology, while suppression was associated with higher levels of these symptoms. The authors conclude that reappraisal and suppression are associated with “stress-related symptoms,” (Moore et al. 2008, p. 997), but the lack of a direct measure of stress precludes true conclusions about interactions of stress and emotion regulation in affecting psychological outcomes. Thus, this study raised the possibility that cognitive reappraisal and expressive suppression may influence the impacts of stress on psychological wellbeing, but did not provide a direct assessment of these hypotheses.

Building on the modest body of literature proposing and, in select cases, directly studying interactions between emotion regulation and stress, the question of how emotion regulation strategies may impact the effects of stress on psychological functioning remains quite open. There is reason to expect that cognitive reappraisal and expressive suppression may function as moderators by buffering against (in the case of reappraisal) or increasing vulnerability to (suppression) negative mental health outcomes associated with stress; however, these ideas remain in need of further study.

Emotion regulation in emerging adulthood and the college transition

Patterns of emotion regulation vary considerably across the lifespan, and though much of the research on emotion regulation in development has focused on childhood and adolescence, there is cross-sectional evidence that

people's patterns of emotion regulation may continue to shift throughout adulthood. For example, one study demonstrated that a cohort of older adults reported greater use of cognitive reappraisal and less use of expressive suppression as compared with a group of younger adults; likewise, older adults reported greater use of reappraisal and less use of suppression as compared with their recollections of the emotion regulation patterns exhibited by their younger selves (John and Gross 2004). Importantly, variations in emotion regulation behaviors are thought to be especially prominent in times of great transition (Gross and Thompson 2007). As such, major life transition periods may be times in which healthy emotion regulation can be particularly vital.

One such major transition period is emerging adulthood, the distinct developmental period spanning the late teens and early twenties that prominently features major changes and extensive personal exploration (Arnett 2000). Increased rates of mental health problems are characteristic of this time period, but at the same time, it has the potential to function as a springboard toward positive trajectories of adult life (Masten et al. 2006; Schulenberg et al. 2004). Thus, development in emerging adulthood helps to plot the trajectories of adjustment that young people will follow into their adult lives. Given the implications for future wellbeing that are inherent to this transitional stage of development, emerging adults are a group for whom effective emotion regulation may be particularly important.

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 reported that over two-thirds of 2016 U.S. high school graduates were enrolled in a college or university within a year of graduation (69.7%; U.S. Department of Labor 2017). Even beyond the challenges of emerging adulthood, the college transition is particularly fraught with an increased level of stress (Pierceall and Keim 2007), which is associated with particularly high rates of mental health problems among this group (Bewick et al. 2010; Kitzrow 2003). However, despite the challenges of these transitions, it is certainly not the case that every emerging adult who enters college later develops mental health problems, and it is important to identify factors that influence both successful and maladaptive development amidst the stress of this transitional period. Research has already effectively demonstrated several factors that affect wellbeing among college students, such as physical activity (VanKim and Nelson 2014), social support (Hefner and Eisenberg 2009), and willingness to engage in help-seeking behavior (Zivin et al. 2009). The present study seeks to evaluate emotion regulation patterns, including both cognitive reappraisal and expressive suppression, as additional possible influencers of wellbeing for emerging adults navigating the stressful transition to college.

A limited body of past research provides evidence that emotion regulation may affect psychological wellbeing in this context. One study implemented a longitudinal design to further explore the direct impacts of expressive suppression on social functioning among emerging adults transitioning to college (Srivastava et al. 2009). The authors found that, over time, new college students who relied more heavily on suppression to regulate emotions transitioned to college experiencing lower social support, less closeness to others, and less social satisfaction. A second study utilizing a longer time interval demonstrated similar findings for expressive suppression, and expanded its emotion-regulation focus by indicating that cognitive reappraisal was associated with stronger social connections across the college transition (English et al. 2012). Thus, although these studies focused on the direct effects of reappraisal and suppression rather than their potential as moderators of the impact of stress on psychosocial wellbeing, they nonetheless provide strong evidence of the psychosocial consequences that can result from engagement in these two strategies among emerging adults making navigating the high-stress context of the college transition.

The present study

Given its well-documented direct impacts on mental health, potential to influence reactions to stressful circumstances, and importance to transitional periods of life, emotion regulation may be an important factor that can affect psychosocial adjustment within the stressful context of emerging adulthood and the college transition. As noted above, a modest body of research has provided indirect support for the idea that cognitive reappraisal and expressive suppression may function as moderators of the longitudinal impact of stress on mental health among emerging adults transitioning to college. However, no study that we know of directly targets this idea, either due to reliance on a cross-sectional design (Troy et al. 2010), a focus on direct impacts rather than moderation (English et al. 2012; Srivastava et al. 2009), or a lack of a direct measurement of stress as a predictor of outcomes (Moore et al. 2008). This gap in the literature provides the basis for the present study, which utilizes a three-time point longitudinal design to examine the ways in which cognitive reappraisal and expressive suppression may moderate the impact of stress on psychosocial adjustment outcomes for emerging adults transitioning to college. Three specific objectives were addressed: (a) to test the longitudinal relationship between stress and subsequent mental health problems among emerging adults, (b) to examine cognitive reappraisal as a protective factor in this relationship, and (c) to evaluate expressive suppression as a vulnerability factor in this relationship. For the present study, stress was assessed via measurement of *perceived stress*, or the extent

to which an individual appraises his or her life as stressful. This is an indicator that has been used to examine the role of nonspecific stress in the development of psychological disorders (Cohen et al. 1983). Mental health problems were represented by participants' combined levels of symptoms of depression and anxiety, two forms of psychopathology that have been identified as common among college students (Bewick et al. 2010) and that evidence substantial conceptual overlap (Lovibond and Lovibond 1995). This construct, frequently termed *internalizing symptoms*, has been shown to be significantly associated with perceived stress, such that increases in perceived stress predict higher internalizing symptom levels (Felton et al. 2017).

Several predictions were made regarding expected findings. First, emerging adults' residualized levels of perceived stress at the end of their first semester of college (calculated by statistically adjusting for baseline levels of perceived stress at the start of college) were expected to positively predict levels of internalizing symptoms at the end of their first year, adjusting for baseline levels of internalizing symptoms at the start of college. This method of generating a residualized perceived stress score, representing the “variability due to change” (Castro-Schilo and Grimm 2018, p. 36) in perceived stress from the start of college to the end of the first semester, was selected so that the increases in stress common among first year college students could be directly studied as a predictor of subsequent internalizing symptoms. With this design in place, increases in stress over the first semester were expected to predict increases in internalizing symptoms over the course of the entire first year.

Second, it was predicted that cognitive reappraisal, assessed at the end of the first semester, would function as a buffer in the relationship between residualized changes in perceived stress and subsequent internalizing symptoms (i.e., this relationship would be weaker among participants who reported more use of reappraisal). Finally, it was predicted that expressive suppression, reported at the end of the first semester, would function as a vulnerability factor in this relationship (i.e., first-semester changes in perceived stress would be a stronger predictor of subsequent internalizing symptoms among participants who reported more use of suppression). For clarity, a conceptual model representing these moderation analyses is presented in Fig. 1.

Method

Participants and procedure

Participants ($N = 1130$; $M_{age} = 18.49$; 71.8% female; 72.8% White, 12.1% Asian or Pacific Islander, 6.8% Hispanic or Latino/a, 2.3% Black, 1.5% Puerto Rican, 0.4% American Indian or Alaska Native, 0.5% Multiracial, 2.5%

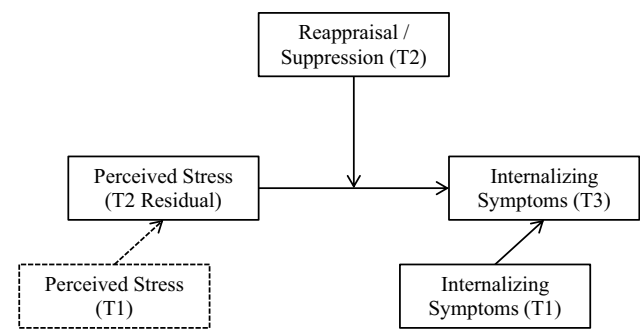


Fig. 1 Conceptual model: emotion regulation (cognitive reappraisal or expressive suppression) moderating the impacts of residualized perceived stress on subsequent internalizing symptoms (adjusting for baseline symptom levels). Dashed lines for perceived stress at T1 represent its use in generating the residualized T2 perceived stress predictor

Other) were first-year undergraduate students at a private, midsized Midwestern university. Two waves of incoming first-year students were invited to complete an online survey that comprised various measures of psychosocial health, with data collection occurring during the 2009–10 and 2010–11 school years. Students who completed the survey were entered in prize drawings as compensation for participating.

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 within the final 2 weeks of their first semester (time 2; T2). All of those who completed the survey at the first time point also were invited to participate within the final 2 weeks of the academic year (time 3; T3), regardless of whether they had participated at the first semester's end. Of those who were invited and eligible, 67.4% participated at T1 (2803 out of 4161). 69.0% of T1-completers participated at T2 (1785 out of 2803), and 63.4% of *these* students participated at T3 (1130 out of 1785), yielding a complete longitudinal sample of 1130 participants.

The final sample did not differ from the rest of the study's participant pool (those who did not participate at all three time points and so were not included) in terms of age or estimate of family income. The present sample was, however, more likely to be female and White. The final sample also did not differ from the rest of the study's participant pool in terms of internalizing symptoms (at either T1 or T3), cognitive reappraisal or expressive suppression (assessed at T2), or T1 perceived stress. Participants included in the final sample only differed from the rest of the study's participant pool in one of four primary study variables, and at only one time point: included participants reported lower levels of T2 perceived stress as compared with those who provided T2 data but did not participate at T3.

Measures

Demographic information

Participants were asked to report their gender, age, and estimated family income. 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 and John 2003) measures cognitive reappraisal (six items) and expressive suppression (four items). Participants are instructed to consider two distinct aspects of their overall "emotional lives," indicating the extent to which they agree with statements about their emotion regulation (e.g., "I control my emotions by changing the way I think about the situation I'm in") on a scale from 1 (strongly disagree) to 7 (strongly agree). Past study of the ERQ has demonstrated strong psychometric properties, including construct validity and reliability (Gross and John 2003). In the present sample, the ERQ subscales had excellent to good internal consistency at T2 ($\alpha = .918$ and $.708$ for reappraisal and suppression, respectively). Descriptive statistics for this measure are presented in Table 1. Average engagement in expressive suppression at T2 among the present study's sample was similar to that identified in previous studies, while use of reappraisal at T2 was somewhat higher than has been observed in other mixed-gender college student samples (e.g., Gross and John 2003).

Internalizing symptoms

Internalizing symptoms were assessed using a composite of the depression and anxiety subscales of the Depression Anxiety Stress Scale (DASS-21; Henry and Crawford 2005), which are two subscales of seven items pertaining specifically to symptoms of depression and anxiety. Participants rate the extent to which a series of statements applied to them over the past week using a scale from 0 (did not apply to me at all) to 3 (applied to me very much, or most of the time). These two subscales of this measure tend to exhibit a large degree of overlap (Lovibond and Lovibond 1995); as such, they were combined to make a composite measure of internalizing symptoms. Thus, total scores for internalizing symptoms can range from a minimum of 0 to a maximum score of 42. The DASS-21 has evidenced strong psychometric properties in past research, including excellent reliability and concurrent validity with other measures of depression and anxiety (Henry and Crawford 2005; Osman et al. 2012). This combined scale evidenced strong internal consistency at both time points ($\alpha s = .878$ and $.922$). Descriptive

statistics for this measure are presented in Table 1. At T1, participants' overall internalizing symptom levels tended to be similar to those observed among general adult populations (Henry and Crawford 2005); T3 internalizing symptom levels tended to be higher than those observed among the general population (Henry and Crawford 2005), but were similar to those of other college student samples (e.g., Osman et al. 2012).

Perceived stress

The Perceived Stress Scale (PSS-10; Roberti et al. 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, utilizing a scale from 0 (never) to 4 (very often). Thus, total scores can range from a minimum of 0 to a maximum of 40. Past study of this measure has demonstrated that it provides a reliable and valid measure of perceived stress, and has particularly emphasized its applicability for use with college students (Roberti et al. 2006). Internal consistency for the present sample was good at T1 and T2 ($\alpha s = .857$ and $.853$). Descriptive statistics for this measure are presented in Table 1. Average perceived stress levels at T1 tended to be somewhat lower than those observed among undergraduate populations in other studies, while perceived stress levels at T2 were more similar to those of other undergraduate samples (e.g., Roberti et al. 2006).

Results

Descriptive statistics and correlations among all study variables are presented in Table 1. Examination of study variables for nonnormality revealed that most study variables were quite normally distributed (i.e., skewness and kurtosis values between -1 and 1), including the T2 residualized perceived stress predictor variable. Skewness values for internalizing symptoms at T1 and T3 were beyond these values; however, they did not exceed an absolute value of 2.3 at either time point (a cut-off used to represent severe nonnormality; Lei and Lomax 2005). This variable was also leptokurtic at both time points (kurtosis values of 6.79 and 2.65 for T1 and T3, respectively). However, as tests of normality become increasingly stringent with larger sample sizes such as the one used for the present study, and departures from normality in the cases of positive kurtosis can begin to be mistakenly identified in samples as small as 100 participants (Tabachnick and Fidell 2007), it was determined that data transformations to correct for these few cases of positive kurtosis were not necessary in the present study.

Table 1 Descriptive statistics and correlations for study variables

Variable	<i>N</i>	<i>M</i>	<i>SD</i>	1	2	3	4	5	6
1. Time 1 internalizing symptoms	1129	4.58	5.35	–					
2. Time 1 perceived stress	1127	15.31	6.37	.58*	–				
3. Time 2 perceived stress	1116	16.84	6.41	.36*	.53*	–			
4. Time 2 cognitive reappraisal	1102	4.68	1.19	–.14*	–.17*	–.21*	–		
5. Time 2 expressive suppression	1112	3.81	1.28	.13*	.11*	.11*	–.03	–	
6. Time 3 internalizing symptoms	1122	6.79	7.47	.47*	.40*	.42*	–.11*	.15*	–

For cognitive reappraisal and expressive suppression, table means and standard deviations represent item-averages. For all other variables, table means and standard deviations represent total scores

* $p < .001$

Primary analyses included two separate multi-step hybrid hierarchical-simultaneous regression models predicting T3 internalizing symptoms, one each to test the interactions of cognitive reappraisal or expressive suppression with T2 residualized perceived stress. The residualized T2 perceived stress predictor was calculated according to the procedures outlined by Rogosa (1995). Analyses followed accepted guidelines for testing longitudinal effects (Cohen and Brook 1987) and moderation (Baron and Kenny 1986). Both models featured a first step wherein T1 internalizing symptoms were entered as an initial predictor, thus statistically adjusting for baseline symptom levels. Both T2 residualized perceived stress and T2 emotion regulation (either reappraisal or suppression) were entered in the corresponding model's second step, with the interaction of the two predictors entered in a third and final step.

A statistical summary of the first regression model, which tested the interaction of cognitive reappraisal with residualized perceived stress in predicting subsequent internalizing symptoms, is presented in Table 2. Results from this model's second step demonstrated that T2 residualized

perceived stress was significantly and positively predictive of T3 internalizing symptoms, adjusting for baseline (T1) symptom levels, $\beta = .21$, $p < .001$. This indicated that greater increases in perceived stress across the first semester predicted higher levels of internalizing symptoms at first year's end. The independent impact of T2 cognitive reappraisal on T2 internalizing symptoms, tested at the same step, was not statistically significant, $\beta = -.02$, $p = .460$.

In the final step of this model, T2 residualized perceived stress and cognitive reappraisal demonstrated a significant interaction in predicting T3 internalizing symptoms, $\beta = -.08$, $p = .002$, above and beyond the main effects of these two predictors separately. Post-hoc probing of this interaction, conducted via conditional moderators and simple slopes, indicated that T2 residualized perceived stress was a significantly weaker predictor of T3 internalizing symptoms at high levels of reappraisal (one SD above the mean), $\beta = .13$, $p < .001$, than at low levels of reappraisal (one SD below the mean), $\beta = .28$, $p < .001$. This interaction was such that the predictive effect of residualized perceived stress on subsequent internalizing symptoms was less than half as

Table 2 Results of regression model testing interaction of cognitive reappraisal and perceived stress in predicting internalizing symptoms

Model step	Coefficient statistics					Model statistics			
	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>	<i>R</i>	<i>R</i> ²	<i>F</i> -change	<i>p</i>
1 (constant)	3.76	0.26	–	14.33*	<.001	.47	.23	312.96*	<.001
T1 IS	0.66	0.04	.47	17.69*	<.001				
2 (constant)	3.68	0.40	–	9.23*	<.001	.52	.27	21.80*	<.001
T1 IS	0.63	0.04	.46	17.30*	<.001				
T2 RPS	1.55	0.20	.21	7.83*	<.001				
T2 CR	–0.02	0.03	–.02	–0.74	.460				
3 (constant)	3.67	0.40	–	9.11*	<.001	.53	.28	3.57*	.014
T1 IS	0.63	0.04	.45	17.17*	<.001				
T2 RPS	1.29	0.36	.17	3.64*	<.001				
T2 CR	0.01	0.05	.01	0.02	.983				
T2 RPS × T2 CR	–0.08	0.03	–.08	–3.05*	.002				

IS internalizing symptoms, RPS residualized perceived stress, CR cognitive reappraisal, × denotes interaction term

* $p < .05$

strong among participants reporting high levels of cognitive reappraisal (47.5% as strong, given comparison of β s). Thus, cognitive reappraisal significantly buffered against the effects of perceived stress in leading to subsequent internalizing symptoms (see Fig. 2).

Results of the second regression model, which tested the interaction of expressive suppression and residualized perceived stress in predicting subsequent internalizing symptoms, are summarized in Table 3. The second step of this model once again demonstrated that T2 residualized perceived stress significantly predicted T3 internalizing symptoms, $\beta = .21, p < .001$. This step also evidenced a significant

main effect of T2 expressive suppression on T3 internalizing symptoms, $\beta = .07, p = .005$, such that higher levels of suppression at mid-year predicted subsequent higher levels of internalizing symptoms. However, a nonsignificant perceived stress \times expressive suppression interaction term in the model's third step evidenced that there was not a significant interaction of expressive suppression with perceived stress in predicting T3 internalizing symptoms, $\beta = -.02, p = .403$.

Finally, the analyses discussed above were also conducted as part of three-way interaction regression models in order to test for possible moderating effects of gender and racial/ethnic background, two demographic variables that were shown

Fig. 2 Buffering effect of cognitive reappraisal on longitudinal perceived stress–internalizing symptoms relationship. $*p < .001$

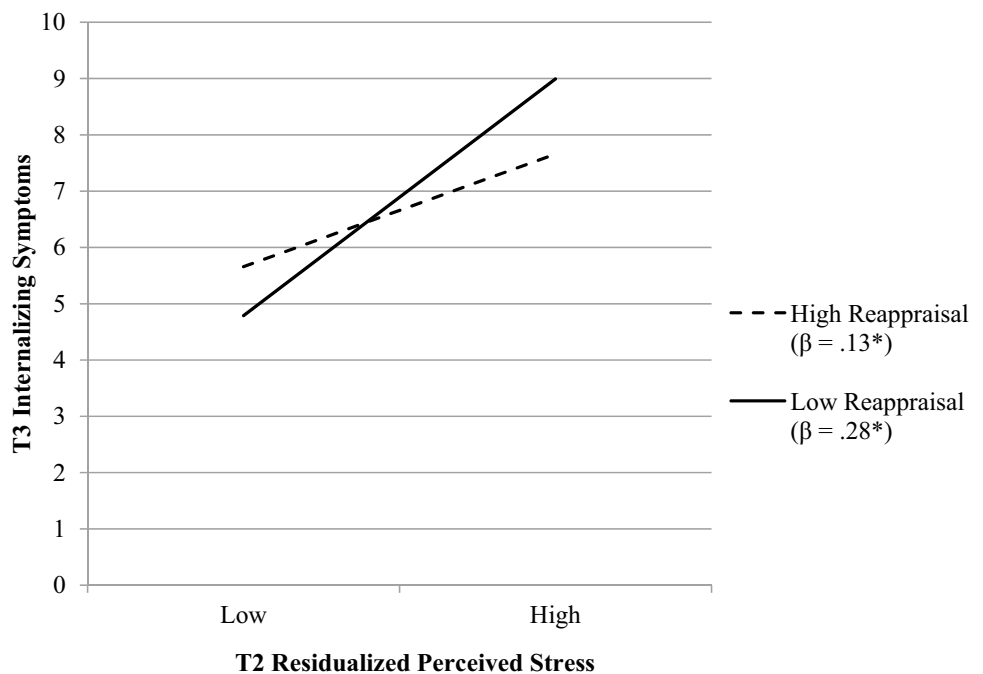


Table 3 Results of regression model testing interaction of expressive suppression and perceived stress in predicting internalizing symptoms

Model Step	Coefficient statistics					Model statistics			
	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>	<i>R</i>	<i>R</i> ²	<i>F</i> change	<i>p</i>
1 (constant)	3.73	0.26	–	14.29*	<.001	.47	.22	311.08*	<.001
T1 IS	0.65	0.04	.47	17.64*	<.001				
2 (constant)	3.66	0.39	–	9.32*	<.001	.52	.28	26.28*	<.001
T1 IS	0.62	0.04	.45	17.05*	<.001				
T2 RPS	1.58	0.19	.21	8.20*	<.001				
T2 ES	–0.02	0.03	–.02	–0.74	.460				
3 (constant)	3.70	0.40	–	9.25*	<.001	.53	.28	0.35	.789
T1 IS	0.61	0.04	.44	16.78*	<.001				
T2 RPS	1.47	0.34	.20	4.35*	<.001				
T2 ES	0.08	0.07	.06	1.12	.263				
T2 RPS \times T2 ES	–0.03	0.04	–.02	–0.84	.403				

IS internalizing symptoms, RPS residualized perceived stress, ES expressive suppression, \times denotes interaction term

* $p < .05$

to be related to attrition in the present sample. Results of these models demonstrated that neither gender nor racial/ethnic background moderated the previously reported results for either cognitive reappraisal or expressive suppression, all $ps > .265$.

Discussion

Building on previous research that used cross-sectional or indirect approaches to examine cognitive reappraisal and expressive suppression as moderators of the impacts of stress on mental health, the present study further underlines the importance of emotion regulation for mental health among emerging adults. Utilizing a three-time point longitudinal design and directly examining the interactions of both cognitive reappraisal and expressive suppression with perceived stress, this research identified cognitive reappraisal as a protective factor against the deleterious effects of perceived stress on mental health across the college transition, and further cemented expressive suppression as a risk factor for psychological wellbeing in the same context.

Results first reinforced the idea that intensified perceived stress can lead to deteriorations in mental health for emerging adults, such that residualized changes in perceived stress over the first semester in college predicted increased internalizing symptoms over the first year. Cognitive reappraisal functioned as a buffer in this context, weakening the relationship between perceived stress and subsequent internalizing symptoms. On the other hand, expressive suppression did not increase vulnerability to internalizing symptoms in the face of increased perceived stress; instead, suppression served as its own independent predictor of subsequent increases in symptoms. The findings for each of these emotion regulation strategies merit deeper discussion.

Cognitive reappraisal

As an exemplar of adaptive emotion regulation, cognitive reappraisal was hypothesized to be a factor that could help emerging adults to combat the deleterious effects of perceived stress and aid them in avoiding subsequent symptoms of depression and anxiety. Since the beneficial effects of reappraisal on mental health and psychosocial adjustment are well documented (e.g., Aldao et al. 2010; Brewer et al. 2016; English et al. 2012; Gross and John 2003), and based on previous cross-sectional research that has demonstrated similar effects (Troy et al. 2010), it seemed likely that reappraisal also might interact with perceived stress, another important predictor of mental health, with positive results. In particular, it was anticipated that cognitive reappraisal

might moderate this relationship by buffering against the negative impacts of stress on mental health.

Results supported this hypothesis, such that the predictive effect of mid-semester perceived stress levels on subsequent internalizing symptoms depended on participants' reported use of cognitive reappraisal. More specifically, participants who reported frequent use of reappraisal exhibited a relationship between perceived stress and subsequent symptoms that was less than half as strong as the same relationship for participants who reported infrequent reappraisal. It is worth noting that, despite this sizable ratio of relationship strengths in the high- and low-reappraisal conditions, the effect size for this interaction was fairly small. Thus, it is likely that there are factors in addition to cognitive reappraisal at work in determining the strength of the association between perceived stress and subsequent internalizing symptoms for college students, and that reappraisal is only a piece of the puzzle. Nonetheless, this finding adds something new to our understanding of the impact of cognitive reappraisal over time: in addition to impacting mental health directly, it also can serve to protect against the deleterious effects of other psychosocial factors, decreasing the likelihood of negative mental health outcomes in the face of stress. Consequently, the ability to implement cognitive reappraisal may be understood as a useful personal resource that can buffer against the demands (e.g., stress) that many emerging adults face as they transition to college.

Given this finding that cognitive reappraisal appears to be a valuable resource for incoming college students, one implication for institutions of higher education is the idea of training incoming college students to develop this ability. Studies of broad emotion regulation skills have shown that emotion regulation training can be incorporated into psychotherapy, with positive results (Berking et al. 2013); likewise, a model of a seminar focused on "psychosocial wellness" for first-year college students already exists and has been shown to affect promising outcomes (Conley et al. 2013). Thus, the framework is there for those invested in the wellbeing of first year college students to implement prevention-focused programming to aid incoming college first-years to develop skills in utilizing cognitive reappraisal to regulate their emotions, a habit that can serve as a protective resource over the course of their first year.

Expressive suppression

In contrast with cognitive reappraisal, expressive suppression is typically considered an exemplar of unhealthy emotion regulation (Butler et al. 2003; Brewer et al. 2016; Gross and John 2003), and thus was hypothesized to serve as a vulnerability factor for emerging adults, leading perceived stress to be an even stronger predictor of subsequent internalizing symptoms. Since suppression contributes directly

to negative outcomes for emerging adults (e.g., Srivastava et al. 2009), it seemed plausible that, when interacting with perceived stress, the two might work together to affect even less desirable outcomes than would result from either predictor on its own.

Contrary to this hypothesis, however, results indicated that the effect of perceived stress on subsequent internalizing symptoms was consistent regardless of participants' use of expressive suppression. Notably, however, there also was a significant and positive main effect of suppression. This means that, regardless of how much perceived stress participants reported, the more frequently participants engaged in expressive suppression, the higher their subsequent internalizing symptom levels were likely to be. Thus, it seems that, rather than functioning as a vulnerability factor by increasing susceptibility to the negative effects of perceived stress, expressive suppression instead functions as a risk factor in its own right, affecting consistent negative impacts regardless of what else is going on in a student's life. As with the interaction effect for cognitive reappraisal, the effect size associated with the direct impact of expressive suppression was modest, suggesting that suppression is only one of many factors that may influence internalizing symptoms among young adults transitioning to college. Still, this finding provides further support for the idea, well documented in the research literature, that suppression of emotions is often an unhealthy way of managing one's emotional experience that can lead to negative consequences for psychosocial adjustment (e.g., Gross and John 2003; Srivastava et al. 2009).

Limitations of the present study

The present study's findings have important implications for our understanding of the impacts of emotion regulation in emerging adulthood. Nevertheless, there are limitations of this research that merit mention. First, all of the data in this study were collected using the same self-report survey methodology, which could be problematic because data collected using the same method and from the same reporter can be subject to common method variance (Podsakoff et al. 2003).

Another limitation of the present study is the matter of attrition. As noted, of the students who were initially invited to participate in the ongoing surveys, a large proportion either failed to initiate the study or had dropped out of participation by T3. This meant that the resulting longitudinal sample for the present study was more likely to be White and to be female than the overall body of eligible participants. Given that past studies have identified gender (Nolen-Hoeksema 2012) and ethnicity (Soto et al. 2011) as factors that can influence emotion regulation patterns and their impacts, this may have affected the observed variability in the present study's constructs of interest and may limit generalizability of findings. With this limitation in mind, future studies

seeking to explore the interactive effects of emotion regulation and stress among college students should seek samples that represent more diverse populations than the primarily White and female sample studied here.

Additionally, due to its self-selecting nature, the present study's sample may underrepresent young people who struggle with mental illness and other challenges to their ability to manage their lives effectively. Thus, the emerging adults for whom stress may be the biggest problem, and for whom healthy emotion regulation may be the most important, are likely to be systematically underrepresented in this sample. This notion is supported by between-group comparisons related to attrition, in that potential participants who completed the survey at T2 but did not participate at T3 reported higher levels of perceived stress than those participants who completed all three time points and were included in the final sample. 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 perceived stress and internalizing symptoms to be found in its sample. This may mean that, were greater variability observed across the entire spectrum of these constructs, the effects demonstrated here would be even more sizable.

Finally, we note that an additional limitation of the present study is the nature of the measure that was used to assess stress levels among this sample of first-year college students. Specifically, the present study utilized self-reported perceived stress, or the extent to which an individual appraises his or her life as stressful, rather than a more objective measure of the quantity and severity of life stressors experienced by participants. While the former method of assessing stress is commonly used in contemporary research (e.g., Dimidjian et al. 2017; Felton et al. 2017), perceived stress has been shown to relate quite strongly to internalizing symptoms (Felton et al. 2017), suggesting some possible conceptual overlap between these variables. With this in mind, the conclusions drawn by the present study would be strengthened by replication of our findings utilizing a more objective measure of life stress. Future research seeking to further elucidate the moderating impacts of emotion regulation within the stressful context of the college transition would be well advised to measure stress more directly via assessment of the quantity and severity of life stressors.

Conclusions

Despite these limitations, the results of this research have meaningful implications for the field's understanding of emotion regulation. The present study used a multi-time point longitudinal design to build upon past research evaluating the interactions of emotion regulation with other predictors of mental health. Importantly, results indicated that cognitive reappraisal can function as a buffer for emerging

adults, protecting against internalizing symptoms in the face of increased perceived stress. This finding is noteworthy for two reasons: first, because this illuminates a pathway in which healthy emotion regulation can affect positive mental health outcomes over time, and second, because this identifies a skill that can help emerging adults to flourish in a formative developmental stage. Similarly, although expressive suppression was not found to interact with perceived stress as hypothesized, the present study further underlines the negative impacts of this emotion regulation style, highlighting the importance of emotional expression for mental health. Taken together, the present study's findings add clarity to the research literature in several ways and, perhaps most importantly, provide additional information on the ways in which healthy emotion regulation can promote wellbeing.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Formal consent For this type of study formal consent is not required.

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