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Preventing Stress Among Undergraduate Learners: The Importance of Emotional Intelligence, Resilience, and Emotion Regulation

Christopher Thomas* and Staci Zolkoski

School of Education, University of Texas at Tyler, Tyler, TX, United States

In the current investigation, we examined the association among emotional intelligence, emotional regulation tendencies, resilience, and perceived stress within a sample of undergraduate students. Participants ($N = 277$, 71% Female, 55% White) completed the Brief Emotional Intelligence Scale, Emotion Regulation Questionnaire, Brief Resilience Scale, and Perceived Stress Scale. Using path analysis techniques, we demonstrated that resilience was a negative predictor of perceived stress. Additionally, our results indicated that the use of cognitive reappraisal exerted an indirect influence on perceived stress through resilience. Finally, the current investigation provided evidence that emotional intelligence exerts an indirect influence on stress through both cognitive reappraisal and resilience. We believe the results of the current understanding expand our understanding of the determinants of effective emotional information processing and have implications for intervention efforts designed to reduce perceived stress within university-based samples.

Keywords: perceived stress, emotional intelligence, resilience, emotion regulation, path analysis

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*Correspondence:

Christopher Thomas
cthomas@uttyler.edu

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INTRODUCTION

There is little disagreement that individuals are often required to cope with feelings of stress following maladaptive appraisals of internal and external stimuli (Lazarus and Folkman, 1984; Folkman and Moskowitz, 2004). The prevailing view of coping views stress as a specific imbalance between an individual's assessment of situational demands and the resources—both external and internal—available to manage the demands (Hodzic et al., 2016). Stated another way, stress occurs when individuals appraise situations as having the potential to overload coping resources and interfere with the attainment of goals of high personal importance (Lazarus and Folkman, 1984). Generally speaking, exposure to stress is associated with various negative outcomes including increased anxiety and depression, post-traumatic stress disorder, and decreased well-being (Troy and Mauss, 2011). More relevant to the current investigation is evidence suggesting stress shares a strong negative association with important academic outcomes including overall academic achievement and persistence (e.g., Hartley, 2011; Beiter et al., 2015). Interestingly, a review of the available literature highlights that not all university students who must work to navigate prolonged periods of stress experience negative outcomes. Instead, some empirical research indicates that a subset of university students experience positive academic outcomes despite considerable adversity in their lives—or demonstrate resilience despite exposure to stressful events (e.g., Luthar et al., 2000; DeRosier et al., 2013).

RESILIENCE, STRESS, AND HIGHER EDUCATION

Individuals are considered to be resilient when positive outcomes occur despite challenges they face (Masten, 2011). Dominant theoretical frameworks describing the determinants of resilience emphasize the importance of risk and protective factors in the successful management of environmental stressors (Alvord and Grados, 2005; Benzie and Mychasiuk, 2009; Martinez-Torteya et al., 2009). Risk factors can include biological (e.g., congenital defects) or environmental [e.g., poverty, education level of parents; (Zolkoski and Bullock, 2012)] factors with the potential to interfere with optimal functioning. It is important to note that individuals encounter “risk factors” throughout life, but the severity of risk is the result of a complex interplay between personal, environmental, and behavioral occurring at a particular time and place. Moreover, available evidence highlights the influence of risk factors is additive in nature such that the accumulation of risk is associated with poor outcomes across the developmental trajectory (e.g., mental health disorders, school dropout; Brooks, 2006). Protective factors are conceptualized within the literature as factors altering a person’s response to environmental risks commonly resulting in the experience of negative outcomes (Ahern and Norris, 2011). Critically, a large body of empirical evidence has demonstrated various individual-level characteristics (e.g., self-regulation), family conditions (e.g., support), and community supports (e.g., relevant support services; Benzie and Mychasiuk, 2009) can reduce the impact of risk factors allowing individuals to achieve success and thrive when confronted with adverse conditions.

Within the field of higher education, one of the most prominent risk factors contributing to negative life outcomes is the prolonged experience of elevated levels of stress (Beiter et al., 2015). For instance, available evidence suggests that university students experiencing high-stress report an increased incidence of problematic levels of anxiety and depression, significant impairments in academic functioning, and lower likelihood of degree completion (Felsten and Wilcox, 1992; Shields, 2001; Ahern and Norris, 2011; Hartley, 2011; Beiter et al., 2015). However, research in the domain of higher education has identified that students who possess certain individual differences are characterized as “resilient” and are able to manage everyday academic stressors. Although investigations have identified numerous mechanisms contributing to resilience in children (e.g., Werner, 1993) and at-risk adolescents (e.g., Zolkoski et al., 2016), much less is known about factors that promote resilience and protect against the experience of stress among college students (Ahern and Norris, 2011).

EMOTIONAL INTELLIGENCE, RESILIENCE, AND STRESS

The concept of emotional intelligence has guided numerous investigations over the past 25 years. The outcomes of these empirical inquiries have resulted in the formulation of distinct theoretical perspectives detailing mechanisms that contribute to

variation in the ability to process emotional information (i.e., trait models Petrides et al., 2016; ability models; Mayer and Salovey, 1997). Although numerous theoretical orientations exist, we endorse an ability-based orientation and suggest that emotional intelligence consists of a constellation of abilities allowing individuals to process and use emotional-laden information in a manner that facilitates effective problem-solving (Mayer and Salovey, 1997; Mayer et al., 2008, 2016). Logically, the ability to appraise, process, and utilize emotional information is associated with numerous adaptive outcomes among students within higher education settings. For instance, a review of the literature highlights that learners with higher levels of emotional intelligence often experience increased psychological well-being (Salami, 2011), persistence and retention (Qualter et al., 2009), and academic achievement (MacCann et al., 2011; Fernandez et al., 2012). Most important to the current investigation; however, is a large body of literature suggesting emotional intelligence influences individuals’ responses to stress and contributes to resilience when confronted with adverse life events. Given that stress response fundamentally involves the processing of emotional information, investigations have demonstrated the ability to implement executive control processes, supporting emotion interpretation and regulation when confronted with stress supports resilience (Armstrong et al., 2011; Schneider et al., 2013). The association between emotional intelligence and resilience is established in the literature; however, the causal pathway through which emotional intelligence supports resilience is not well understood. However, recent work has provided preliminary evidence suggesting emotion regulation preferences—which are often fundamentally tied to overall levels of emotional intelligence—often have a dramatic influence on resilience. As suggested above, the term emotional intelligence refers to a person’s ability to monitor his/her own and other’s feelings, to differentiate between them, and use the information to guide thoughts and actions (Salovey and Mayer, 1990). On the other hand, emotional regulation refers to a person’s ability to influence which emotions they have, when they have them, and how the emotions are expressed (Gross, 1998). Emotional intelligence appears to account for variability in why some individuals are able to regulate their emotions (Mikolajczak et al., 2008). Logically, the use of adaptive emotion regulation strategies—such as cognitive reappraisal—has been linked to the ability to better manage stressful situations (Carlson et al., 2012). Although the impact of emotional intelligence, emotion regulation, and resilience on perceived stress is well-established, few empirical investigations have examined the collective influence of these variables on the stress response of undergraduate students.

THE CURRENT STUDY

Undergraduate students are routinely confronted with situations both within and outside traditional learning environments that contribute to the experience of prolonged stress. It is critical that empirical investigations attempt to identify factors that can protect learners from stress given that students who experience

an extended period of stress often are at an increased risk for academic underperformance and emotional distress (Ahern and Norris, 2011; Beiter et al., 2015). Therefore, the current study was designed to systematically examine how emotional intelligence, emotional regulation tendencies, and resilience influence stress perceptions among a sample of undergraduate students.

HYPOTHESES

H1: Prior investigations have demonstrated that “resilient” learners are better able to manage common academic stressors (e.g., Wilks and Spivey, 2010; Ahern and Norris, 2011). Therefore, it is predicted that resilience will be negatively associated with perceived stress among undergraduate learners.

H2: Recent work in the domain of emotion regulation has suggested that the use of effective emotion regulation strategies (i.e., cognitive reappraisal) supports resilience (Armstrong et al., 2011; Schneider et al., 2013). As such, it is predicted that the use of cognitive reappraisal will be positively associated with resilience.

H3: Emotional intelligence has been identified as an individual difference variable that supports adaptive emotional information processing and influences attempts to alter emotional experience (MacCann et al., 2020). Specifically, the available literature provides converging evidence that emotional intelligence is associated with the increased use of adaptive emotional regulation strategies and decreased reliance on maladaptive emotion regulation strategies. Therefore, it is predicted that emotional intelligence will be positively associated with the use of cognitive reappraisal and will be negatively associated with the use of suppression.

H4: Relatively little is known about the combined influence of emotional intelligence, emotion regulation, and resilience on perceived stress. However, dominant theoretical orientations highlight the influence of dispositional constructs (e.g., cognitive-emotional processing abilities) on “downstream” processes (i.e., emotion regulation) that are fundamentally tied to stress and academic outcomes (Matthews et al., 2006). Therefore, it is predicted that the relationship between emotional intelligence, cognitive reappraisal, suppression, and perceived stress will be fully mediated by resilience.

METHOD

Participants

Participants ($N = 277$, 71% Female, 55% White) were undergraduate students attending a small regional university located in the Southern United States. A portion of the participants were recruited through a standard undergraduate research pool and received partial course credit in exchange for their participation in the current study. The remaining participants were recruited through campus-wide solicitation and were entered into a drawing for a \$20 Amazon gift card following the completion of the experimental materials. Of those participants who opened the Qualtrics link and viewed the informed consent document, four chose not to complete

the study materials. A series of independent samples t -tests—with the Bonferroni correction—were used to determine if there were significant differences in the constructs of interest between participants recruited using the two methods. These analyses indicated that participants did not differ in terms of emotional intelligence [$t_{(242)} = -0.16, p > 0.05$], resilience [$t_{(247)} = -0.31, p > 0.05$], perceived stress [$t_{(242)} = -0.18, p > 0.05$], use of suppression [$t_{(243)} = 0.01, p > 0.05$], or use of cognitive reappraisal [$t_{(247)} = -0.81, p > 0.05$].

Measures

Emotional Intelligence

We measured undergraduate students’ emotional intelligence using the Brief Emotional Intelligence Scale (BEIS; Davies et al., 2010). The BEIS is a 10-item instrument designed to assess individuals’ ability to appraise internal and external emotional cues, regulate emotional states, and use emotional information to solve problems (Davies et al., 2010). Participants reported their level of agreement with each item on the instrument using a 5-point Likert Tyler scale ($1 = Strongly disagree, 5 = strongly agree$). Sample items include: “I know why my emotions change,” “I have control over my emotions.” Prior investigations have provided evidence of the factorial validity of the instrument when applied to undergraduate samples, and the BEIS exhibited acceptable internal consistency in the current examination (Cronbach’s $\alpha = 0.81$, McDonald’s $\omega = 0.82$).

Emotion Regulation

In the current study, participants’ emotion regulation capabilities were assessed using the Emotion Regulation Questionnaire (Gross and John, 2003). The ERQ is a 10-item instrument designed to measure the extent to which individuals rely on cognitive reappraisal and suppression techniques to modulate their emotional experiences. Within process models of emotion regulation, cognitive reappraisal refers to efforts to manage emotional experience by altering ones’ interpretation of internal and external cues while suppression refers to efforts to inhibit behavioral responses that follow from specific emotion states (Gross, 2015). Participants reported their level of agreement with each of the presented items using a 7-point Likert-type scale ($1 = strongly disagree, 7 = strongly agree$). Prior research has established the factorial and convergent validity of the instrument when applied to university students. Further, reliability analyses indicated that the reappraisal (Cronbach’s $\alpha = 0.84$, McDonald’s $\omega = 0.85$) and suppression (Cronbach’s $\alpha = 0.78$, McDonald’s $\omega = 0.78$) subscales of the ERQ demonstrated acceptable levels of internal consistency in the current investigation.

Resilience

Undergraduate students’ resilience or ability to recover from stressful life events was assessed using the 6-item Brief Resilience Scale (BRS; Smith et al., 2008). Participants reported their level of agreement with each of the presented statements using a 5-point Likert-type scale ($1 = strongly disagree, 5 = strongly agree$). Sample items include: “I tend to bounce back quickly after hard times,” “It does take me long to recover from a stressful event.” Results of a reliability analysis indicated that

the BRS demonstrated acceptable levels of internal consistency when applied to our university sample (Cronbach's $\alpha = 0.84$, McDonald's $\omega = 0.84$).

Perceived Stress

We assessed undergraduate students' perceptions of life stress using the 10-item Perceived Stress Scale (PSS; Cohen et al., 1983). Participants indicated how often they have experienced the situations described in the items within the last month using a 5-point Likert-type scale ($0 = \text{Never}$, $1 = \text{almost never}$, $2 = \text{sometimes}$, $3 = \text{fairly often}$, $4 = \text{very often}$). Sample PSS items include: "In the last month, how often have you been upset because of something that happened unexpectedly?," "In the last month, how often have you felt that you were on top of things?" The PSS was shown to demonstrate acceptable levels of internal consistency in the current examination (Cronbach's $\alpha = 0.82$, McDonald's $\omega = 0.81$).

Procedure

All materials were completed using the Qualtrics online survey management platform. Participants could choose to complete the experimental materials at a time and location of their choosing, but the entire battery of instruments was required to be completed in a single session. The presentation of the questionnaires was counterbalanced to eliminate the potential for order effects. Additionally, all participants provided informed consent before completing the experimental materials. The University of Texas at Tyler Institutional Review Board approved the study materials and procedure.

Analytic Strategy

The association among emotional intelligence, emotion regulation, resilience, and perceived stress was investigated through the estimation of an a priori path analysis model. We assumed the influence of emotional intelligence, suppression, and reappraisal on perceived stress was fully mediated by resilience. A visual representation of the path analysis model is presented in **Figure 1**.

The specification of this model was guided by research suggesting resilience is a mediator between environmental and personal characteristics and stress related outcomes (e.g., DeRosier et al., 2013; Maidaniuc-Chirilă, 2015; Crane and Searle, 2016). The path analysis model was estimated using Diagonally Weighted Least Squares estimation. Our decision to use this robust alternative was guided by prior research suggesting Diagonally Weighted Least Squares is robust to issues with normality and as a result provides more accurate parameter estimates compared to traditional Maximum Likelihood estimation (Míndrila, 2010). We determined the appropriateness of the fully and partially mediated models through the examination of model fit indices including the Root Mean Square Error of Approximation (RMSEA; Steiger, 1990), Comparative Fit Index (CFI; Bentler, 1990), Tucker-Lewis Index (TLI; Tucker and Lewis, 1973), and Standardized Root Mean Square Residual (SRMR). Consistent with best practices, a good fitting path analysis model was indicated by $CFI \geq 0.95$, $TLI \geq 0.95$, $RMSEA \leq 0.06$, and $SRMR \leq 0.08$ (Hu and Bentler, 1999).

RESULTS

Descriptive Statistics and Correlational Analyses

Review of our correlational analyses highlights several interesting patterns. For instance, our results revealed emotional intelligence shared a positive association with both reappraisal ($r = 0.33$, $p < 0.05$) and resilience ($r = 0.30$, $p < 0.05$). Further, our findings demonstrated that the use of reappraisal was associated with increased resilience ($r = 0.35$, $p < 0.05$) and reduced perceived stress ($r = -0.25$, $p < 0.05$). Correlational results also indicated that resilience shared a strong association with perceived stress ($r = -0.57$, $p < 0.05$) such that increased ability to bounce back from sources of stress was associated with reduced perceived stress. Notably, our results suggested there were not significant associations between emotional intelligence and suppression, emotional intelligence and perceived stress, suppression and

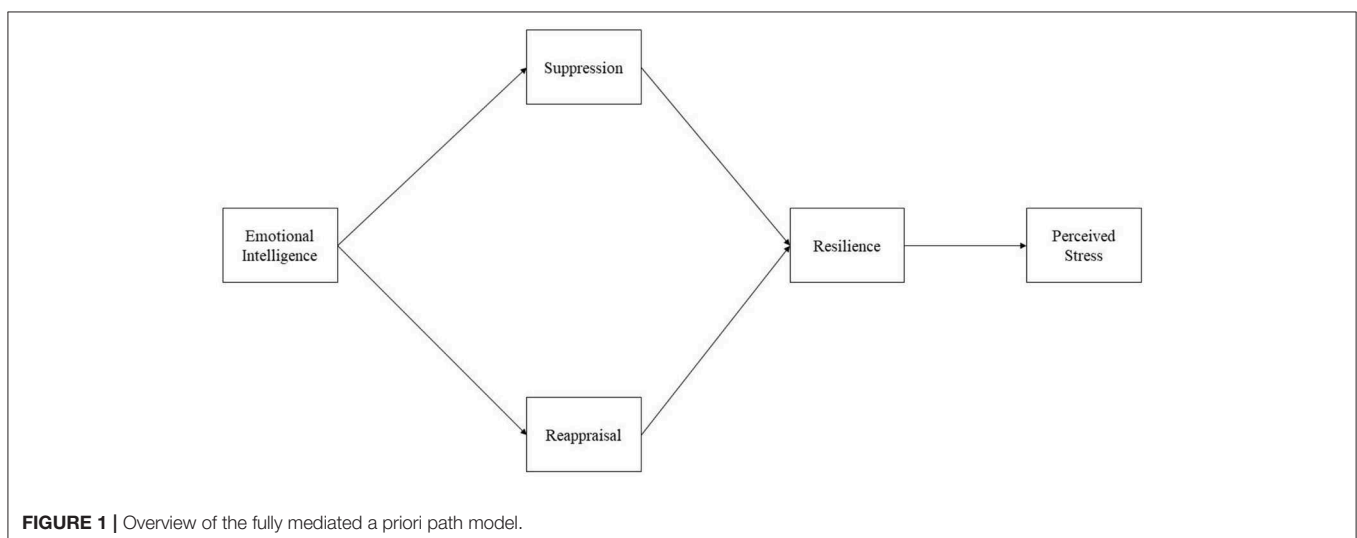


TABLE 1 | Correlation coefficients for emotional intelligence, reappraisal, suppression, resilience, and perceived stress.

Variable	1	2	3	4	5
1 - Emotional intelligence	1	-	-	-	-
2 - Reappraisal	0.33*	1	-	-	-
3 - Suppression	-0.06	0.01	1	-	-
4 - Resilience	0.30*	0.35*	0.10	1	-
5 - Perceived Stress	-0.10	-0.25*	0.02	-0.57*	1

* $p < 0.05$.**TABLE 2** | Descriptive statistics for emotional intelligence, reappraisal, suppression, resilience, and perceived stress.

Variable	Mean	SD	Skewness	Kurtosis
Emotional intelligence	3.94	0.59	-1.04	3.18
Reappraisal	5.04	1.16	-0.35	0.00
Suppression	3.99	1.39	-0.19	-0.30
Resilience	3.34	0.76	0.02	-0.03
Perceived stress	22.25	5.65	-0.22	-0.17

resilience, and suppression and perceived stress. Correlational coefficients are presented in **Table 1**.

Following the correlational analysis, we reviewed descriptive information for each of the constructs of interest to ensure there were no issues with the potential to bias the results of the primary analysis. Specifically, we reviewed skewness and kurtosis values to determine if the data were approximately normally distributed as certain latent variable modeling techniques are not robust to the incorporation of variables that violate the assumption of normality (Kline, 2015). Our review indicated that skewness and kurtosis values for the reappraisal, suppression, resilience, and perceived stress constructs fell within acceptable limits. However, the emotional intelligence variable was found to demonstrate a high level of skewness and a high level of kurtosis—suggesting emotional intelligence scores were not normally distributed. Descriptive information for the variables of interest is presented in **Table 2**.

Path Analysis

The path analysis results indicated that the a priori path analysis model provided an excellent fit to the observed data, CFI = 0.99, TLI = 0.98, RMSEA = 0.03 [0.00, 0.10], SRMR = 0.04. Our review of the standardized path coefficients for the fully mediated a priori model indicated that increases in students' level of resilience was associated ($\beta = -0.57, p < 0.05$) with reductions in perceived stress. Further, our results indicated that the increased use of reappraisal techniques ($\beta = 0.40, p < 0.05$) was associated with increased resilience. Examination of indirect effects indicated reappraisal ($\beta = -0.23, p < 0.05$) influenced perceived stress through resilience. Perhaps most notably, our results indicated that emotional intelligence exerted a small—but statistically significant—influence on undergraduates' perceptions of stress that was mediated by both reappraisal and

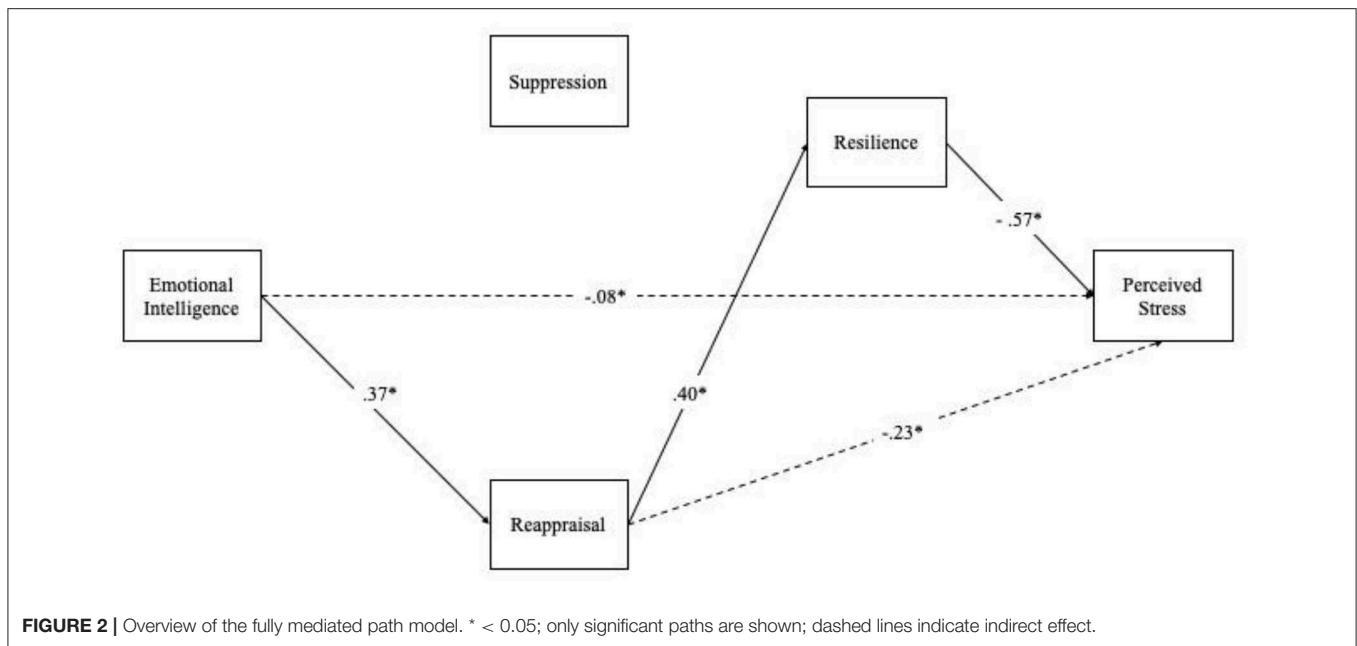
resilience ($\beta = -0.08, p < 0.05$). A visual representation of the final path analysis model is presented in **Figure 2**.

DISCUSSION

The current study investigated the influence of emotional intelligence, emotion regulation preferences and resilience on perceived stress. In support of H2, the results of our study indicated that the use of cognitive reappraisal techniques was associated with increased resilience within a group of university learners. This pattern replicates past work noting that the ability to alter ones' interpretation of internal and environmental cues in a manner that supports the down-regulation of negative affective states promotes resilience to adverse events (Troy and Mauss, 2011; Carlson et al., 2012). From a process-orientated perspective of stress and coping, the current work supports the well-established notion that the ability to alter the meaning of situational cues often contributes to adaptive responses to stress (Gross, 1998; Folkman and Moskowitz, 2000, 2004; Memedovic et al., 2010)—a facilitative influence identified in the protective factor model of resilience (Steinhardt and Dolbier, 2008; Zolkoski and Bullock, 2012).

In support of our H1, we found that levels of resilience shared a negative association with perceived stress. This finding is consistent with prior literature noting that “resilient” individuals are often better able to manage environmental stressors. Further, and in partial support of our H3, the results indicated that participants high in emotional intelligence were more likely to use cognitive reappraisal during attempts to regulate their emotions. This finding is consistent with a large body of literature noting emotional intelligence supports the implementation of adaptive coping responses (MacCann et al., 2011, 2020). Interestingly, our results demonstrated that levels of emotional intelligence were not associated with the use of suppression-focused strategies during emotion modulation efforts. That finding is largely inconsistent with past work noting that emotional intelligence often reduces the use of maladaptive coping responses—such as suppression (Zeidner and Matthews, 2018). Although these findings are inconsistent with our predictions, recent work has identified a host of individual difference factors that moderate the relationship between emotional intelligence and emotion regulation efforts. For instance, Nozaki (2018) found that levels of emotional intelligence was predictive of suppression in a group of European Americans. However, this association was not detected in a group of Japanese individuals highlighting the importance of culture in emotion regulation efforts. Therefore, it is possible that we did not account for variables with the potential to moderate the association among study constructs.

Further, the results of the current investigation highlight that emotional intelligence contributes indirectly to lower perceived stress through its influence on the use of cognitive reappraisal techniques and resilience. This finding supports our H4 and the broad expectation that emotional intelligence facilitates the use of effective emotion regulation practices (Mikolajczak et al., 2008) and the ability to recover from sources of environmental



stress (Armstrong et al., 2011). But more importantly, we believe this finding further reinforces key propositions of theoretical orientations emphasizing the cascading influence of emotional intelligence on mediating processes contributing directly to individuals' responses to stress (Matthews et al., 2006; Joseph and Newman, 2010). In their articulation of the Emotional Information Processing framework, Cassady and Boseck (2008) highlight effective emotion regulation requires the implementation of specific competencies that support the interpretation of internal and external cues, the articulation of goals, and the ability to implement strategies with the potential to support goal attainment. Logically, the Emotional Information Processing framework suggests that goal articulation and strategy implementation is more effective when learners are able to effectively appraise their emotional states and evaluate the availability of coping resources—a key component of emotional intelligence identified within ability perspectives of the emotional intelligence construct (Mayer and Salovey, 1997; Mayer et al., 2016). Therefore, we believe these findings expanding our understanding of the factors that protect students from the debilitating effects of stress by providing a more nuanced understanding of how emotional intelligence contributes to positive emotional outcomes. Further, we believe our study further solidifies the importance of adopting a multivariate approach in educational research as the impact of key constructs (such as emotional intelligence) can only be attained by considering the influence of numerous factors working in unison to impact student performance.

Practical Implications

Importantly, we believe the results of the current investigation have important implications for those interested in designing interventions with the explicit goal of enhancing resilience and lessening the impact of perceived stress on undergraduate

students. Returning to the Emotional Information Processing framework detailed above, the effectiveness of emotional regulation efforts is fundamentally tied to the content of the learners' existing knowledge base. That is, learners who possess a repertoire of effective emotional regulation strategies and an understanding of when to implement appropriate regulation approaches are often more able to respond in an adaptive manner when confronted with sources of stress. Given evidence suggesting self and emotional regulation strategies can be taught (Bandura, 2005; Boyle et al., 2017; Wimmer et al., 2019), we believe intervention efforts should incorporate explicit training (e.g., direct instruction, modeling of how to respond to emotional stimuli) to help learners accumulate knowledge of effective coping and emotion regulation strategies. Although accumulated knowledge certainly plays an important role in emotion regulation, it is not sufficient to ensure learners will engage with emotional information in an appropriate manner (Hodzic et al., 2018). Therefore, we encourage educators and other practitioners to incorporate structured opportunities to practice modeled strategies to support the transfer of accumulated knowledge regarding effective emotional information processing to new situations.

Limitations

We believe the current study possessed several limitations needing to be addressed. First, the primary constructs of interest in the current investigation were measured solely using self-report instruments. Given that self-report measures rely on individuals' subjective evaluation and are subject to bias, it is possible we did not collect accurate estimates of emotional intelligence, emotional regulation, resilience, and perceived stress. We believe future work could overcome this potential limitation through the use of ability-focused measures (such as the Mayer-Salovey-Caruso Emotional Intelligence Test; Mayer

et al., 2002, 2003) or experiential sampling to identify emotion regulation preferences over an extended period of time. Further, it is important to note that the sample was recruited from a single institution in the Southern United States and is limited in terms of gender and ethnic diversity. Therefore, it is not clear how well the results of the current investigation will generalize to other contexts. Finally, it is important to note that we utilized a cross-sectional design in this investigation which limits our ability to make statements regarding causality. Future work could overcome this limitation through the use of longitudinal data that would better allow researchers to investigate the causal relations among emotional intelligence, emotion regulation, resilience, and perceived stress.

CONCLUSION

Available evidence highlights undergraduate students often report experiencing periods of time that are characterized by high levels of perceived stress. The continued experience of stress has been shown to contribute to a variety of negative outcomes that interfere with optimal academic performance (Shields, 2001; Beiter et al., 2015). However, the association between perceived stress and negative academic outcomes is not universal—suggesting some learners possess factors that protect them from the debilitating influence of stress. As such, we developed the current study to investigate the combined

influence of emotional intelligence, emotional regulation, and resilience on perceived stress. Our results indicate that emotional intelligence and the use of reappraisal contribute to reductions in perceived stress through their influence on resilience. We believe our results highlight the importance of fostering resilience in undergraduate students and suggest resilience-based interventions should focus on increasing the use of cognitive reappraisal and fostering learners' ability to use emotional information processing capabilities.

DATA AVAILABILITY STATEMENT

The datasets generated for this study are available on request to the corresponding author.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by The University of Texas at Tyler Institutional Review Board. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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