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Stress-Related Symptoms and Suicidal Ideation: The Roles of Rumination and Depressive Symptoms Vary by Gender

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Abstract

There is a growing body of literature suggesting that reactions to stressful life events, such as intrusive thoughts, physiological hyperarousal, and cognitive/behavioral avoidance (i.e., stress-related symptoms) may increase risk for thinking about and attempting suicide. Cognitive vulnerability models have identified rumination (i.e., perseverating on a negative mood) as a maladaptive response that may increase risk for suicidal behavior, as it has also been linked to depression. The present study examined the direct and indirect effects of stress-related symptoms on suicidal ideation through rumination and depressive symptoms. Participants were 1375 young adults, primarily non-White (78 %) females (72 %), recruited from a public university in the Northeastern U.S., who completed measures of stress-related symptoms (as a response to a stressful event), rumination, depressive symptoms, and suicidal ideation. The relation between stress-related symptoms and suicidal ideation was accounted for by the brooding subtype of rumination and depressive symptoms among females. Depressive symptoms, but not rumination, better accounted for suicidal ideation among males. These findings suggest that the role of brooding and depressive symptoms in the relationship between stress-related symptoms and suicidal ideation may vary by gender.

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Compliance with Ethical Standards

Conflict of Interest Lillian Polanco-Roman, Judelysse Gomez, Regina Miranda and Elizabeth Jeglic declare that they have no conflict of interest.

Ethical Standards All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual subjects participating in the study.

Animal Rights No animal studies were carried out by the authors for this article.

Keywords

Suicidal ideation; Stress-related symptoms; Rumination; Depression; Gender

Introduction

Suicide, a deliberate and fatal act of self-directed harm, is the 2nd leading cause of death for people ages 15–24 in the U.S. (Centers for Disease Control and Prevention 2013). Suicidal ideation and attempts are among the most reliable predictors of suicide (Nock et al. 2008), and young adulthood is a particularly vulnerable period for thinking about and attempting suicide (Kessler et al. 2005). Given that depression is a well-documented risk factor for suicidal behavior (Kessler et al. 2005; Nock et al. 2008), cognitive models of depression have expanded to elucidate risk for suicidal thoughts and behavior by suggesting that cognitive vulnerabilities interact with stressful events to yield a suicidal crisis (Wenzel and Beck 2008). Indeed, research suggests that cognitive vulnerabilities, such as rumination, which increases risk for depressive symptoms (Nolen-Hoeksema et al. 2008), may also increase risk for suicidal ideation and attempts (for a review, see Morrison and O'Connor 2008). There is also growing evidence to suggest that stressful life events and subsequent reactions, such as recurrent intrusive thoughts, physiological hyperarousal, and cognitive/behavioral avoidance (i.e., henceforth referred to as stress-related symptoms) may also elevate risk for suicidal ideation and attempts (King et al. 2001; Nock et al. 2008; Wang et al. 2012; Marshall et al. 2001; Mazza 2000; Selaman et al. 2014). Despite this growing evidence, the mechanisms by which stress-related symptoms may increase risk for suicidal thoughts and behavior remain unclear. The present study sought to address this gap in the literature by examining rumination as a potential cognitive mechanism through which stress-related symptoms may increase risk for suicidal ideation, independently of and in combination with depressive symptoms, among young adults.

Stress-Related Symptoms and Suicidal Behavior

Stressful life events have been consistently identified as a reliable risk factor for suicidal behavior, as they often precede a suicide attempt (Nock et al. 2008; King et al. 2001; Wang et al. 2012). In a review of the suicide literature, Nock et al. (2008) posit that biological and psychological factors, in combination with stressful life events, may place individuals at risk. For instance, in a nationally representative sample of adults in the U.S., Wang et al. (2012) reported that stressful life events, particularly financial distress and violent assaults, were associated with suicide attempts, independently of mental health disorders, including PTSD and mood disorders. Furthermore, dysfunction in the stress response system (i.e., the hypothalamic–pituitary–adrenal axis) has been identified as a biomarker for suicide risk (Oquendo et al. 2014). While the evidence linking stressful life events to suicidal behavior is well-documented, less information is known about the mechanisms through which such events may increase risk. Considering that previous research has demonstrated that the recurrence of intrusive thoughts, hyperarousal, and cognitive/behavioral avoidance (i.e., stress-related symptoms) may increase risk for suicidal thoughts and behaviors, particularly in trauma-exposed individuals (Marshall et al. 2001; Mazza 2000; Selaman et al. 2014), perhaps more general stressful life events may similarly elicit these stress-related symptoms.

For instance, in a nationally representative sample of adults in the U.S., Selaman et al. (2014) found that among individuals with a history of PTSD, symptoms of hyperarousal and avoidance, but not intrusive thoughts, were significantly associated with future suicide attempts, even after adjusting for sociodemographics and mood disorder. These findings suggest a unique relationship between stress-related symptoms and suicidal thoughts and behaviors that may be independent of depression; however, this literature has largely focused on more severe stressful life events, or traumatic events. A better understanding of the relation between stress-related symptoms resulting from more general stressful life events—including the role of depression—and risk for suicidal behaviors is needed.

Rumination, Depression, and Suicidal Behavior

The cognitive vulnerability model prevails in elucidating risk for depression (Abramson et al. 1999) and suicidal behavior (Abramson et al. 1998; Pettit and Joiner 2006). Specifically, Wenzel and Beck (2008) propose that maladaptive and distorted cognitions, combined with acute stressors, activate suicide-related schemas during a suicidal crisis. Over time, suicidal schemas become more automatic as they continue to be activated and strengthened with the frequency, intensity, and chronicity of these negative cognitive biases. Thus, maladaptive cognitive response styles, such as rumination, may increase vulnerability to thinking about and attempting suicide by facilitating the activation of a suicide-related schema. Rumination—a well-documented predictor of depressive symptoms—is a cognitive response style characterized as a perseveration on the causes, meanings, and consequences of a dysphoric mood (Nolen-Hoeksema et al. 2008). Rumination has been identified as a significant contributor to the higher levels of depressive symptoms among women relative to men (Nolen-Hoeksema et al. 1999). More recently, it has been linked to risk for suicidal thoughts and behavior (Morrison and O'Connor 2008). Nolen-Hoeksema et al. (2008) propose that this emotion-focused preoccupation is a maladaptive avoidant strategy that interferes with problem solving and renders the individual helpless in effectively abating a dysphoric mood. Rumination thus increases an individual's risk for depression, and ultimately, suicidal thoughts and behavior by impeding the generation of more adaptive alternatives to suicide, including problem-solving (Burke et al. 2015).

There is growing evidence suggesting that rumination increases vulnerability to suicidal ideation and behavior (Morrison and O'Connor 2008). For instance, in a longitudinal study of college students, Smith et al. (2006) found that rumination was associated with increased duration of suicidal ideation over a 2.5-year follow-up period. Researchers have identified two subtypes of rumination: brooding, which is characterized as passively dwelling on a negative mood, and reflection, which is characterized as actively exploring the meaning and causes of a negative mood (Treyner et al. 2003). Moreover, there is evidence to suggest that brooding is less adaptive than reflection, and thus, a more reliable predictor of suicidal behavior, although evidence is mixed (Polanco-Roman et al. 2015; Surrence et al. 2009; Chan et al. 2009). For instance, in a community sample of adults, Miranda and Nolen-Hoeksema (2007) found that higher levels of both brooding and reflection prospectively predicted increases in risk for suicidal ideation over a 1-year follow-up period, but while the relationship between brooding and suicidal ideation was explained by depressive symptoms, depressive symptoms did not explain the relationship between reflection and ideation.

Similarly, Chan et al. (2009) reported that brooding, but not reflection, partially mediated the concurrent relation between negative life events and suicidal ideation. Given the relationship between brooding and depressive symptoms, perhaps stress-related symptoms arising in response to stressful life events increase vulnerability to suicidal ideation through their associations with brooding and depressive symptoms.

Stress-Related Symptoms and Rumination

Gold and Wegner (1995) propose that rumination is an avoidant coping response to a stressful experience employed in an attempt to suppress the resulting psychological sequelae. A cognitive vulnerability model of PTSD may thus be used as a framework to better understand the effects of stress-related symptoms (for a review, see Elwood et al. 2009). Ehlers and Clark (2000) suggest that maladaptive cognitive response styles like rumination may impede the cognitive processing of extremely stressful events, namely traumatic events. Perhaps this model extends to mild or moderate stressful life events as well. There is evidence that rumination employed in response to these events may prolong stress-related symptoms and ultimately compromise physical and mental health (Brosschot et al. 2006; Zetsche et al. 2009). For instance, in an experimental study with healthy adults, Zetsche et al. (2009) presented participants with a video of road traffic accidents and found that individuals instructed to ruminate were less likely to recover from the resulting sad mood and more likely to report intrusive memories compared to individuals instructed to distract themselves from the video and individuals instructed to integrate the experience into their memory. These findings suggest that rumination in response to stress may maintain stress-related symptoms. Considering the well-documented relation between rumination and suicidal ideation, rumination may provide some insight into the relation between stress-related symptoms and risk for suicidal thoughts and behavior.

The Present Study

The present study sought to examine the mechanisms through which stress-related symptoms may increase risk for suicidal ideation by examining the explanatory roles of rumination and depressive symptoms. We theorize that the dysfunction of inhibitory control that is characteristic of rumination results as a maladaptive cognitive response to stress. This, in turn, may increase susceptibility to suicidal ideation to the degree that it increases depressive symptoms. Thus, we hypothesized that stress-related symptoms would be associated with higher levels of rumination, specifically brooding, which, in turn, would be associated with higher depressive symptoms, and ultimately greater risk for suicidal ideation. We expected this relation to be moderated by gender, given that rumination is a well-documented explanatory factor for the higher prevalence of depressive symptoms among women than men (Nolen-Hoeksema et al. 1999), and since women have a higher prevalence of suicidal thoughts relative to men (Nock et al. 2008; Kessler et al. 2005).

Methods

Sample

Participants ($N = 1375$) were young adults recruited from a public university in the Northeastern U.S. and ranging in age from 18–29 ($M = 19.88$; $SD = 2.25$). The sample was predominantly female, representing 72 % ($n = 991$) of the participants. Further, 76 % ($n = 1045$) of individuals reported they were born in the U.S. The sample was racially and ethnically diverse, with 46 % ($n = 633$) identifying as Hispanic/Latino, 20 % non-Hispanic White ($n = 275$), 18 % ($n = 248$) non-Hispanic Black, 12 % ($n = 165$) Asian, and 4 % ($n = 55$) identifying as other race/ethnicity.

Measures

Stress-Related Symptoms—The Impact of Events Scale-Revised (IES-R; Weiss 2007) is a widely used 22-item self-report scale that measures the subjective distress resulting from a stressful experience. Items correspond directly to the symptoms of PTSD outlined in the DSM-IV-TR (APA 2000), and fall within 3 symptom clusters: hyperarousal (e.g., “I was jumpy and easily startled”), avoidance (e.g., “I felt as if it hadn't happened or wasn't real”), and intrusion (e.g., “Any reminder brought back feelings about it”). Participants were instructed to indicate the degree to which they were distressed or bothered by a stressful life event during the previous 7 days on a Likert-type scale ranging from 0 (“Not at all”) to 4 (“Extremely”). The scale demonstrated excellent internal consistency reliability in the present sample ($\alpha = .96$).

Rumination—The Ruminative Responses scale of the Response Styles Questionnaire (RSQ; Nolen-Hoeksema et al. 1999) is a widely used assessment of rumination, or the degree to which individuals think about the causes, meanings and consequences of their negative mood. Researchers have further disaggregated two subtypes of rumination within the scale (Treynor et al. 2003). The brooding subtype consists of 5 items that assess the degree to which the individual is passively processing the negative mood through perseveration and preoccupation (e.g., “Think about a recent situation, wishing it had gone better”), whereas the reflection subtype consists of 5 items that assess the degree to which the individual is actively processing the negative mood by exploring its meaning and causes (i.e., “Go away by yourself and think about why you feel this way”). Participants were instructed to rate the frequency with which they experienced each item on a Likert-type scale ranging from 1 “almost never” to 4 “almost always.” Total scores were calculated by summing the items. Each subscale demonstrated good internal consistency reliability in the present sample: brooding ($\alpha = .85$) and reflection ($\alpha = .76$).

Depressive Symptoms—The Beck Depression Inventory-II (Beck et al. 1996) is a 21-item Likert-type scale widely used to assess the frequency and intensity of depressive symptoms, including sadness, lack of motivation, social withdrawal, feelings of worthlessness, and changes in sleeping and eating patterns in the past 2 weeks. The scale demonstrated excellent internal consistency reliability in the present sample ($\alpha = .89$).

Suicidal Ideation—The Suicidal Behaviors Questionnaire-Revised (SBQ-R; Linehan and Nielsen 1981) is a 4-item measure to assess risk for suicidal behavior by inquiring about lifetime suicidal ideation and suicide attempts, frequency of suicidal ideation in the past year, disclosure of suicidal ideation, and likelihood of future suicide attempts. The scale has been found to be a reliable and valid measure of risk for suicidal behavior with a nonclinical sample of young adults (Osman et al. 2001). The scale demonstrated good internal consistency reliability in the present sample ($\alpha = .84$). Suicide attempt was assessed with item 1 (i.e., “Have you ever thought about or attempted to kill yourself?”), with responses on a Likert-type scale ranging from 1 (“Never”) to 4 (i.e., “I have attempted to kill myself”). Only response 4 was coded as a lifetime suicide attempt, as responses 2 (i.e., “It was just a passing thought”) and 3 (i.e., “I had a plan”) were coded as lifetime suicidal ideation. Suicidal ideation was assessed with item 2 (i.e., “How often have you thought about killing yourself in the past year?”), with responses on a Likert-type scale ranging from 1 (“Never”) to 5 (“Very often: 5 or more times”).

Procedures

Participants completed a battery of self-report questionnaires online. Informed consent was obtained from each participant before completing the online surveys, and each participant received credit toward partial fulfillment of their introduction to psychology course's research requirement. Study procedures received Institutional Review Board approval from the City University of New York.

Data Analysis

Chi square analyses and independent samples t-tests were used to examine gender differences. One-way ANOVAs with post hoc Bonferroni corrected t-tests were used to examine racial/ethnic differences. Correlation analyses were used to examine bivariate relationships. Multivariate analyses were conducted using hierarchical linear regression models to test the hypothesis that rumination (brooding vs. reflection) and depressive symptoms would help explain the relation between stress-related symptoms and suicidal ideation, adjusting for age. Specifically, following the recommendations of Preacher and Hayes (2008) to test direct and indirect effects, the relation between the independent variable (i.e., stress-related symptoms), the mediators (i.e., rumination, depressive symptoms) and the outcome variable (i.e., suicidal ideation) were examined. Statistically significant relationships among these variables suggest possible mediation, which was further examined using bootstrapping procedures with the SPSS computational tool PROCESS (Hayes 2013), resampling the distribution by 10,000 with 95 % confidence intervals. This facilitated an examination of the change in the effect of stress-related symptoms on suicidal ideation, with rumination and depressive symptoms entered in the model. Interaction terms between gender and the variables (i.e., stress-related symptoms, rumination, depressive symptoms) were entered in the model to explore the possible moderation effect of gender across all three relationships. For interaction terms, continuous variables were centered around their respective means to reduce multicollinearity (Jaccard 2001).

Results

Approximately 2 % of participants reported lifetime history of a suicide attempt, and 20 % reported suicidal ideation in the previous year. There were no statistically significant racial/ethnic group differences in stress-related symptoms, $F(4,1447) = 0.11$, $p = 0.98$, brooding, $F(4,1447) = 0.66$, $p = 0.62$, reflection, $F(4,1443) = 1.93$, $p = 0.10$, depressive symptoms, $F(4,1532) = 0.64$, $p = 0.63$ or suicidal ideation, $\chi^2(4) = 4.35$, $p = .36$. There were statistically significant gender differences in stress-related symptoms, $t(1448) = 3.04$, $p < .01$, brooding, $t(1449) = 2.89$, $p < .05$, depressive symptoms, $t(1539) = 5.26$, $p < .01$, and suicidal ideation, $\chi^2(1) = 6.39$, $p < .05$. Specifically, females reported significantly higher levels of stress-related symptoms ($M = 28.55$; $SD = 21.15$), brooding ($M = 10.84$; $SD = 3.84$), and depressive symptoms ($M = 11.27$, $SD = 8.88$), compared to males (stress-related symptoms: $M = 24.78$, $SD = 21.47$; brooding: $M = 10.20$, $SD = 3.84$; depressive symptoms: $M = 8.73$, $SD = 7.75$). However, there was no significant gender difference in reflection, $t(1445) = 1.62$, $p = .11$. Further, a greater proportion of females (22 %) reported suicidal ideation in the previous year than did males (16 %). For more information about gender differences in study variables, see Table 1.

Pearson correlations demonstrated a significant, positive relation between suicidal ideation and stress-related symptoms ($r = .24$, $p < .01$), suicidal ideation and depressive symptoms ($r = .43$, $p < .01$), suicidal ideation and brooding, ($r = .27$, $p < .01$), and suicidal ideation and reflection, ($r = .17$, $p < .01$). There was also a significant, positive relation between stress-related symptoms and brooding ($r = .50$, $p < .01$), stress-related symptoms and reflection ($r = .40$, $p < .01$), stress-related symptoms and depressive symptoms ($r = .47$, $p < .01$), brooding and depressive symptoms ($r = .50$, $p < .01$), and reflection and depressive symptoms, ($r = .31$, $p < .01$). Finally, there was a significant, positive relation between brooding and reflection, ($r = .65$, $p < .01$).

Direct and Indirect Effects of Stress-Related Symptoms on Suicidal Ideation through Brooding and Depressive Symptoms¹

There was a significant direct effect of stress-related symptoms ($b = 0.08$, 95 % CI 0.06–0.09, $p < .001$), and a conditional direct effect of stress-related symptoms and gender ($b = 0.02$, 95 % CI 0.001–0.04, $p < .05$), on brooding. There was a significant direct effect of stress-related symptoms ($b = 0.18$, 95 % CI 0.14–0.21, $p < .001$), but no interaction between stress-related symptoms and gender ($b = 0.02$, 95 % CI –0.03 to 0.06, $p = .45$), on depressive symptoms. There was a significant direct effect of stress-related symptoms on suicidal ideation ($b = 0.008$, 95 % CI 0.006–0.10, $p < .001$). This direct effect was reduced ($b = 0.005$, 95 % CI 0.002–0.007, $p < .001$) after brooding was entered in the second step. There was a significant direct effect of brooding on suicidal ideation ($b = 0.04$, 95 % CI 0.03–0.05, $p < .001$). Depressive symptoms were entered in the third step, and the effect of stress-related symptoms on suicidal ideation was no longer statistically significant ($b = 0.001$,

¹To rule out moderation (vs. mediation), a linear regression analysis was conducted to examine brooding as a potential moderator of the relation between stress-related symptoms and suicidal ideation, adjusting for age and gender. There was a significant main effect of stress-related symptoms ($b = 0.005$, 95 % CI 0.002–0.007, $p < .001$), and a significant main effect of brooding ($b = 0.04$, 95 % CI 0.03–0.05, $p < .001$) on suicidal ideation. However, the interaction between stress-related symptoms and brooding was not significant ($b = 0.0001$, 95 % CI –0.0003 to 0.0006, $p = .46$).

95 % CI -0.001 to 0.003 , $p = .51$). Further, there was a direct effect of depressive symptoms on suicidal ideation ($b = 0.03$, 95 % CI 0.03 – 0.04 , $p < .001$), and the effect of brooding, albeit reduced, remained statistically significant ($b = 0.02$, 95 % CI 0.003 – 0.03 , $p < .05$). In the final step, interaction terms between the variables (i.e., stress-related symptoms, brooding, depression) and gender were entered. There was no direct effect of stress-related symptoms and gender ($b = -0.003$, 95 % CI -0.008 – 0.002 , $p = .22$), brooding and gender ($b = 0.008$, 95 % CI -0.02 – 0.03 , $p = .54$), and depression and gender ($b = 0.009$, 95 % CI -0.004 to 0.02 , $p = .16$) on suicidal ideation. For more details, see Table 2. Finally, bootstrapping analyses indicated there was an indirect effect of stress-related symptoms on suicidal ideation through brooding ($b = 0.002$, 95 % CI 0.002 – 0.003) and depressive symptoms ($b = .007$, 95 % CI 0.005 – 0.009) among females. For more details, see Fig. 1. Meanwhile, there was no indirect effect of stress-related symptoms and suicidal ideation through brooding among males ($b = 0.001$, 95 % CI -0.001 to 0.002), but there was an indirect effect through depressive symptoms ($b = .005$, 95 % CI 0.002 – 0.008). For more details, see Fig. 2.

Direct and Indirect Effects of Stress-Related Symptoms on Suicidal Ideation through Reflection and Depressive Symptoms ²

There was a significant direct effect of stress-related symptoms ($b = 0.05$, 95 % CI 0.04 – 0.07 , $p < .001$), and a conditional direct effect of stress-related symptoms and gender ($b = 0.02$, 95 % CI 0.002 – 0.04 , $p < .05$) on reflection. There was a significant direct effect of stress-related symptoms on suicidal ideation ($b = 0.008$, 95 % CI 0.006 – 0.10 , $p < .001$). This direct effect was reduced ($b = 0.007$, 95 % CI 0.005 – 0.009 , $p < 0.001$) after reflection was entered in the second step. There was a significant direct effect of reflection on suicidal ideation ($b = 0.02$, 95 % CI 0.008 – 0.03 , $p < .01$). Depressive symptoms were entered in the third step, and the effect of stress-related symptoms on suicidal ideation was no longer statistically significant ($b = 0.001$, 95 % CI -0.001 to 0.003 , $p = .29$). Further, there was a direct effect of depressive symptoms on suicidal ideation ($b = 0.04$, 95 % CI 0.03 – 0.04 , $p < .001$), and the effect of reflection was no longer statistically significant ($b = 0.008$, 95 % CI -0.003 to 0.02 , $p = .16$). In the final step, interaction terms between the variables (i.e., stress-related symptoms, brooding, depression) and gender were entered. There was no direct effect of stress-related symptoms and gender ($b = -0.002$, 95 % CI -0.006 to 0.003 , $p = .51$), reflection and gender ($b = -0.01$, 95 % CI -0.04 to 0.01 , $p = .31$), and depressive symptoms and gender ($b = 0.01$, 95 % CI -0.001 to 0.02 , $p = .07$) on suicidal ideation. For more details, see Table 3. Finally, bootstrapping analyses indicated there was no significant indirect effect of stress-related symptoms on suicidal ideation through reflection among females ($b = 0.0003$, 95 % CI -0.001 to 0.013) or males ($b = 0.001$ 95 % CI -0.0002 to 0.003).

²A linear regression analysis was conducted to examine reflection rumination as a potential moderator of the relation between stress-related symptoms and suicidal ideation, adjusting for age and gender. There was a significant main effect of stress-related symptoms ($b = 0.007$, 95 % CI 0.005 – 0.009 , $p < .001$), and a significant main effect of reflection ($b = 0.02$, 95 % CI 0.01 – 0.03 , $p < .001$). However, the interaction effect between stress-related symptoms and reflection was not significant ($b = 0.0002$, 95 % CI -0.0003 – 0.001 , $p = .48$).

Discussion

There is growing evidence demonstrating that stressful life events and stress-related symptoms increase risk for suicidal thoughts and behaviors (Marshall et al. 2001; Mazza 2000; Nock et al. 2008; Selaman et al. 2014). However, little information is available about the underlying mechanisms in this relation. Thus, the present study examined rumination and depressive symptoms as explanatory factors in the relationship between stress-related symptoms and suicidal ideation among a racially and ethnically diverse group of young adults. Further, we examined gender as a moderator of this relation, given that women are more likely to report suicidal thoughts and suicidal behavior compared to men (Nock et al. 2008; Kessler et al. 2005), and given that rumination has been found to explain the gender difference in the endorsement of depressive symptoms (Nolen-Hoeksema et al. 1999). The present findings suggest that stress-related symptoms are associated with suicidal ideation among men and women, and that depressive symptoms account for this relation, regardless of gender. There was a gender difference, however, in the role that rumination plays in the relation between stress-related symptoms and suicidal ideation.

As expected, women reported greater stress-related symptoms, brooding (but not reflection), depressive symptoms, and suicidal ideation than men. Moreover, there was a significant, positive relation between stress-related symptoms and suicidal ideation, regardless of gender, in that greater stress-related symptoms were associated with higher frequency of suicidal ideation. These findings support previous research linking stressful life events to risk for suicidal thoughts and behaviors (Nock et al. 2008; King et al. 2001; Wang et al. 2012). Specifically, stressful life events may impact risk for suicidal behavior by eliciting stress-related symptoms. While previous research has demonstrated similar findings, specifically, in relation to traumatic experiences (Marshall et al. 2001; Mazza 2000; Selaman et al. 2014), the present findings suggest that the relation between stress-related symptomatology and suicidal ideation may not be specific to traumatic events, and may also extend to more general stressful life events. The present findings also expand on this research by demonstrating that this relationship exists regardless of gender.

In accordance with our hypothesis, the present findings suggest that rumination, specifically brooding, and depressive symptoms may help explain the relation between stress-related symptoms and suicidal ideation, and that this relation may vary by gender. Specifically, the association between stress-related symptoms and suicidal ideation was partially accounted for by brooding among females, but not among males. Furthermore, reflection did not help to explain the relation between stress-related symptoms and suicidal ideation for males or females. Additionally, the relation between stress-related symptoms and suicidal ideation was also accounted for by depressive symptoms among females and males. Taken together, these findings suggest that, among women, stress-related symptoms may increase risk for suicidal ideation to the degree that they increase brooding and depressive symptoms. Among men, stress-related symptoms may increase risk for suicidal ideation to the degree that they increase depressive symptoms (but not through rumination). This supports previous research demonstrating that brooding is more strongly associated with stress-related symptoms, particularly posttraumatic stress, than is reflection (Wu et al. 2015), and that it is associated with suicidal ideation through depressive symptoms (Chan et al. 2009; Miranda and Nolen-

Hoeksema 2007). Thus, among young adult females, stress-related symptoms may yield ruminative thinking, as suggested in previous literature (Brosschot et al. 2006; Elwood et al. 2009; Gold and Wegner 1995), and also increase suicidal ideation through increases in depressive symptoms. While brooding elucidates the relation between stress-related symptoms and suicidal ideation among women, the pathway among men may be better accounted for by other factors. For example, impulsivity and aggression have been implicated as risk factors for suicide among men with depression (Dumais et al. 2005; Conner et al. 2004). Thus, future research should explore the role of impulsivity and aggression in the relation between stress-related symptoms and risk for suicidal ideation and behavior among young adult males.

The present findings provide additional support for the cognitive vulnerability model of suicide (Wenzel and Beck 2008), which posits that maladaptive cognitive response styles (e.g., rumination) promote suicidal thoughts and behavior. Specifically, rumination may increase risk for suicidal ideation to the degree that it increases depressive symptoms, particularly among young adult females experiencing stress-related symptoms. This may be due in part to rumination impeding problem-solving abilities, as suggested by Nolen-Hoeksema et al. (2008). In support of this idea, Grover et al. (2009) found that at high levels of life event stress, adolescents with poor problem-solving skills were at greater risk for thinking about and attempting suicide than adolescents with improved problem-solving skills. These findings also suggest that the cognitive vulnerability model of PTSD may provide some insight into the psychological sequelae of stressful life events (Ehlers and Clark 2000; Elwood et al. 2009). This model proposes that maladaptive cognitive responses to traumatic events (and perhaps stressful events more generally) such as rumination are motivated by the ongoing perception of threat, maintaining the stress-related symptoms. Moreover, rumination has been posited as an avoidance strategy employed to cope with stress-related symptoms (Gold and Wegner 1995). Thus, there may be an overlap between the pathways for the development and maintenance of stress-related symptoms and risk for suicidal ideation and behavior through avoidant cognitive styles.

Several limitations should be considered when interpreting these findings. There was limited information available about the severity, frequency, and nature of stressful life events preceding the stress-related symptoms. Previous research has demonstrated a dose-response relation between stressful life events and suicide attempts in that greater number of stressful events was associated with greater number of suicide attempts (Wang et al. 2012). The nature of stress has also been shown to differentially impact risk for suicidal behavior, as Grover et al. (2009) found that problem solving abilities moderated the relation between stressful life events, but not chronic stress, and suicide attempts. Thus, future research should examine whether the relationship between stress-related symptoms and suicidal behavior varies by the severity, frequency, and nature of stressful life events.

Another limitation of the study is the cross-sectional design, as the temporality of the effects was not assessed. It is possible that depression, rumination, or suicidal ideation may yield stress-related symptoms, rather than the inverse relation examined in the present study. Despite these concerns, Kraemer et al. (2001) propose that cross-sectional designs are useful in elucidating developmental psychiatric processes with certain parameters in place, such as

clarity of terminology, reliability of measures, type of process examined, and selection of time scale. The present study was a preliminary investigation of a potential mediation effect of rumination and depressive symptoms in the relation between stress-related symptoms and suicidal ideation, an effect that may be moderated by gender. Future research with a prospective design is warranted to better understand the temporal nature of the relation among the variables examined (Kraemer et al. 2001).

In a similar vein, while the SBQ-R is a widely used, reliable, and valid measure of risk for suicidal behavior, it is retrospective, as it inquires about suicidal ideation in the past year. Thus, future research should employ a prospective design with more sensitive assessments of suicidal ideation and attempts to better examine the direction of the relationships and to better account for suicidal thoughts and behaviors prior to the development of posttraumatic stress. Moreover, individuals with cognitive vulnerabilities like rumination may be at increased risk for stress-related symptoms, depression, and suicidal ideation, irrespective of their relationship with one another. Additionally, since the sample is selected from a college student population, and it is predominantly female, the findings may not generalize to a broader young adult population beyond college students. It should be noted, however, that Blanco et al. (2008) found minimal difference in the mental health of college students compared to their non-college-attending peers.

Despite these limitations, there are various strengths to this study that are noteworthy, including that the present findings broaden our understanding of the relation between stress-related reactions and risk for suicidal behavior by examining the role of rumination, depressive symptoms, and the moderating effect of gender. Additionally, the large sample size, as well as its racial and ethnic diversity, suggests that the findings may generalize to various racial and ethnic groups. Since the sample is recruited from a non-clinical setting, there is greater variability in the representation of posttraumatic stress symptoms and suicidal ideation, which allows for a better gauge of the relation between these two factors beyond a clinical population, where more severe endorsements are represented.

Conclusion

While the extant literature demonstrates a link between stressful life events and suicidal behavior, the mechanisms through which stress-related symptoms may increase risk for suicidal behavior are not well understood. The present study offers preliminary findings for the potential mediating roles of rumination, as an avoidant cognitive response style, and depressive symptoms, among males and females. Depressive symptoms appear to explain the relationship between stress-related symptoms and suicidal ideation among both men and women. However, rumination, particularly brooding, appears to be an important explanatory variable among women, relative to men. This information may inform prevention and intervention services targeted at reducing risk for suicidal ideation and behavior among individuals with a history of stressful experiences. Specifically, the reduction of ruminative thinking to more adaptive cognitive response styles may protect against the maintenance of stress-related symptoms and reduce vulnerability to depressive symptoms, which may, in turn, reduce risk for suicidal ideation and behavior, particularly among young adult females.

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Fig. 1. Direct and indirect effect of brooding and depressive symptoms in the relation between stress-related symptoms and suicidal ideation, adjusting for age, among females. *Note* $*p < .05$; b = unstandardized coefficient

Fig. 2. Direct and indirect effect of brooding and depressive symptoms in the relation between stress-related symptoms and suicidal ideation, adjusting for age, among males. *Note* $^*p < .05$; b = unstandardized coefficient

Table 1

Means and standard deviations on study variables, by gender

M/SD	Total (N = 1375)	Female 72 % (N = 991)	Male 28 % (N = 384)	<i>t</i>/χ^2
Age	19.88 (2.23)	19.84 (2.18)	19.99 (2.35)	0.81
Stress-related symptoms	27.47 (21.25)	28.55 (21.15)	24.78 (21.47)	3.04 *
Brooding	10.66 (3.84)	10.84 (3.84)	10.20 (3.84)	3.04 *
Reflection	10.31 (3.46)	10.40 (3.46)	10.07 (3.47)	1.62
Depressive symptoms	10.40 (8.55)	11.27 (8.88)	8.73 (7.75)	5.26 *
Suicidal ideation	278 (20 %)	218 (22 %)	61 (16 %)	6.39 *

*
 $p < .05$

Hierarchical linear regression model with stress-related symptoms, brooding, and depressive symptoms predicting suicidal ideation, adjusting for age

Table 2

	Model 1			Model 2			Model 3			Model 4		
	b	SE	Adj. R ²	b	SE	Adj. R ²	b	SE	Adj. R ²	b	SE	Adj. R ²
Age	−0.02 *	0.009	0.06	−0.02 *	0.009	0.09	−0.02 *	0.008	0.18	−0.02 *	0.008	0.18
Gender	0.04	0.05		0.03	0.04		−0.03	0.04		−0.12	0.12	
SRS	0.008 *	0.001		0.005 *	0.001		0.001	0.001		0.003	0.001	
Brooding				0.04 *	0.006		0.02 *	0.006		0.01	0.01	
Depression							0.03 *	0.003		0.03 *	0.006	
SRS × gender										−0.003	0.002	
Brooding × gender										0.008	0.01	
Depression × gender										0.01	0.006	

SRS stress-related symptoms, *b* unstandardized regression coefficient

* *p* < .05

Hierarchical linear regression model with stress-related symptoms, reflection, and depressive symptoms predicting suicidal ideation, adjusting for age

Table 3

	Model 1			Model 2			Model 3			Model 4		
	b	SE	Adj. R ²	b	SE	Adj. R ²	b	SE	Adj. R ²	b	SE	Adj. R ²
Age	−0.02 *	0.009	0.06	−0.02 *	0.009	0.06	−0.02 *	0.008	0.18	−0.02 *	0.008	0.18
Gender	0.05	0.05		0.05	0.05		−0.02	0.04		0.05	0.13	
SRS	0.008 *	0.001		0.007 *	0.001		0.001	0.001		0.002	0.021	
Reflection				0.02 *	0.006		0.008	0.006		0.02	0.01	
Depression							0.04 *	0.003		0.03 *	0.005	
SRS × gender										−0.002	0.002	
Reflection × gender										−0.01	0.01	
Depression × gender										0.01	0.006	

SRS stress-related symptoms, b unstandardized regression coefficient

* $p < .05$