Early life trauma, suicide ideation, and suicide attempts: The role of rumination and impulsivity

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Abstract

Suicide is the second leading cause of death for young adults in the United States. One of the many risk factors for suicide includes exposure to early life trauma. The present study examined whether rumination and impulsivity play a role in the relationship between early life trauma and increased risk for suicidal behavior (i.e., suicide ideation and suicide attempts) among 426 young adults. Early life trauma was associated with brooding, reflective rumination, and impulsivity in the form of negative urgency. Current or recent suicide ideators self-reported greater early life trauma, ruminative thinking, and impulsivity than non-ideators and non-attempters. Further, a multinomial logistic regression found that early life trauma, reflection, lack of premeditation, and lack of perseverance were associated with higher odds of reporting suicide ideation in the previous 6 months. We also found indirect relationships between early life trauma and suicide ideation through brooding or reflection and lack of perseverance in serial mediation analyses. These findings suggest that early life trauma may increase risk of suicide ideation to the degree that it leads to ruminative thinking and lack of follow-through with difficult tasks. How early life trauma might increase risk for ruminative thinking, impulsivity, and subsequent suicidal behavior is discussed.

Introduction

Suicide is the second leading cause of death among young adults in the United States (Centers for Disease Control, 2018). Previous research indicates an extensive association between early life trauma and increased risk for suicide ideation and attempts (Dube et al., 2001; Johnson et al., 2002; Afifi et al., 2008; Bruffaerts et al., 2010; Brodsky & Biggs, 2012). Findings from studies examining cognitive, behavioral, emotional, and neurobiological factors suggest that early life trauma impacts developing neurobiological systems that, in turn, negatively impact future psychological functioning, leading to maladaptive cognitive and behavioral patterns that increase the likelihood of suicidal behavior (Brodsky & Biggs, 2012; Mann & Currier, 2016). The present research focuses on

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two cognitive and behavioral vulnerabilities – rumination and impulsivity – that might play a role in such a pathway. Specifically, we examine whether the relationship between early life trauma, suicide ideation, and suicide attempt is explained by rumination and impulsivity among young adults.

Impulsivity-Related Traits: Associations with Suicide Ideation, Suicide Attempts, and Early Life Trauma

Prior research has linked personality traits that are distinct pathways to impulsive behavior (i.e., impulsivity-related traits) – in the form of negative urgency, lack of premeditation, and lack of perseverance – to the development of suicidal behavior, as well as to the onset and maintenance of various forms of psychopathology that might place individuals at risk for suicide ideation or attempts. Negative urgency, or the tendency to act rashly when under distress or when experiencing negative emotions, has been associated with suicidal behavior in clinical and non-clinical samples (Yen et al., 2009; Anestis et al., 2014; Valderrama et al., 2016; Valderrama & Miranda, 2017) and with onset of non-suicidal self-injury among college students (Riley, Combs, Jordan, & Smith, 2015). Moreover, high levels of negative urgency have been found in populations that are at risk for suicidal behavior – including individuals with a history of drug use, bipolar disorder, and those with a history of non-suicidal self-injury (Lynam et al., 2011; Bresin et al., 2013; Johnson et al., 2017). Lack of premeditation, or the tendency to not think carefully or plan before making a decision or taking action, has been found to prospectively predict suicide ideation and suicide attempts among community and college-student samples (Yen et al., 2009; Valderrama & Miranda 2017) and maintenance of non-suicidal self-injury among college students (Riley et al., 2015). In addition, lack of perseverance, or the tendency to not follow through with a task that is boring or difficult, was found to be associated with increased risk of suicidal behavior in a cross-sectional study of 1638 college students (Valderrama et al., 2016).

Emerging research has also indicated a relationship between impulsivity-related traits and early life trauma. One study found that young adults who experienced child abuse (physical and/or sexual abuse before the age of 17) had significantly higher levels of impulsivity, in the form of lack of premeditation and lack of perseverance, than young adults that had not experienced childhood abuse (Sujan et al., 2014). Further, experiencing multiple forms of abuse and neglect in childhood was found to be associated with negative urgency in a community sample of 335 young adults (Shin et al., 2018). Individuals who experienced early life emotional abuse were particularly likely to exhibit negative urgency in this sample. This finding is consistent with another study that found a significant and positive association between early life emotional abuse and negative urgency (Valderrama & Miranda, 2017). Taken together, these findings suggest that early life trauma may set the stage for impulsivity, which is a risk factor for suicidal behavior.

Rumination: Associations with Impulsivity, Suicide Ideation, Suicide Attempts, and Early Life Trauma

Rumination is defined as the tendency to repeatedly consider the causes and consequences of one's dysphoric mood and has been conceptualized as a cognitive process that may take one of two forms, brooding or reflection. Brooding refers to the tendency to passively and

repetitively dwell on a negative mood state, and reflection is a slightly more active attempt to understand the reasons for one's low mood (Treynor et al., 2003; Nolen-Hoeksema et al., 2008).

Brooding and reflection have both been associated with suicide ideation and attempts over time, with brooding more consistently so. A recent meta-analysis of cross-sectional and longitudinal studies found a significant relationship of moderate-to-large magnitude between brooding and suicide ideation, and a significant small-to-moderate relationship between reflection and ideation (Rogers & Joiner, 2017). Regarding suicide attempts, the same meta-analysis found a significant, moderate relationship between brooding and suicide attempts, but no relationship between reflection and suicide attempts (Rogers & Joiner, 2017). These findings suggest that brooding may facilitate the development of suicide ideation and behavior, whereas reflection is only linked to ideation.

How might brooding and reflection impart their negative effects on suicide ideation and behavior? One potential pathway is through impulsivity. Impulsive, or dysregulated, behaviors are defined as behaviors that provide short-term relief but lead to long-term negative consequences (Selby & Joiner, 2009). A sustained ruminative focus on one's problematic present state has been found to intensify negative emotions, which, in turn, exacerbate rumination (Selby, Kranzler, Panza, & Fehling, 2016). The Emotional Cascades model suggests that the ruminating individual then gets trapped in a vicious rumination-negative-affect cycle that ends when the individual engages in impulsive behavior as a way to break the cycle (Selby, Anestis, & Joiner, 2008). Thus, impulsive behavior may be a way to cope with the negative emotions evoked by rumination (Anestis, Soberay, Gutierrez, Hernandez & Joiner, 2014). Alternatively, it may be that the attentional resources consumed by rumination – and particularly brooding, given that it does not involve consideration of potential solutions – restrict one's ability to envision alternative means of problem solving, leading to suicidal thoughts and behavior being perceived as the only solution. Indeed, impulsivity-related traits have been linked with brooding, with those scoring higher on brooding than reflection also scoring higher on negative urgency, compared to those with low levels of brooding and reflection (Valderrama et al., 2016). Moreover, a lack of premeditation and perseverance were found to partially explain the cross-sectional relationship between brooding and risk for suicidal behavior (Valderrama et al., 2016).

Although rumination has been repeatedly linked with increases in depressive symptoms (Nolen-Hoeksema, Morrow, & Frederickson, 1993) and suicide ideation (Miranda & Nolen-Hoeksema, 2007; Rogers & Joiner, 2017), little is known about its etiology. Research suggests that early life stress associated with early life trauma may be one factor involved in the development of a ruminative response style. Traumatic events in early developmental periods can interfere with normative cognitive growth in the developing brain. The prefrontal cortex (PFC), which is involved in cognitive processes that play a role in rumination (i.e., inhibitory control, attentional disengagement, cognitive flexibility), has a protracted period of development (Gogtay et al., 2010). As such, the PFC may be particularly susceptible to the effects of early life trauma: Research suggests that in the face of stressors, the HPA axis releases a cascade of hormones that can impair neural plasticity, impeding cognitive development, when found in high density in certain regions of

the brain (Pechtel & Pizzagalli, 2011). By interfering with the normative trajectory of the development of basic cognitive processes, early life trauma can lead to negative cognitive consequences, setting the stage for the development of rumination.

These negative consequences are apparent in studies comparing cognitive responses of youth exposed to early adversity with controls. For example, maltreated and neglected youth exhibit a tendency to identify and respond to facial expressions of a negative valence (Cicchetti & Curtis, 2005). Additionally, adolescents with early life stress have been found to exhibit impairments in inhibitory control, compared to peers without early adversity (Mueller et al., 2010). These findings suggest that allocating and maintaining increased attention to negative stimuli may serve an adaptive function in an early environment with increased potential for threat. Thus, early life stress may impact mental health through the development of rumination, a cognitive style that may serve as a coping strategy in the context of early adversity.

The Present Study

The present study sought to investigate the association between early life trauma, rumination, impulsivity, and suicidal thinking or behavior. Specifically, we examined differences in early life trauma, rumination, and trait impulsivity between individuals with or without a history of suicide ideation and/attempts. We also sought to identify which study measures would be statistically associated with suicide ideation and attempt history. Finally, we examined whether rumination and trait impulsivity would statistically mediate the relationship between early life trauma and suicide ideation.

Materials and Methods

Participants

Participants were 426 undergraduates (333 females; 78%), ages 18–43 ($M = 19.30$, $SD = 2.91$) recruited from an introductory psychology class at a public university in New York City. The racial/ethnic composition of the sample was 38% Asian ($n = 162$), 24% White ($n = 101$), 19% Hispanic/Latino/a ($n = 83$), 9% Black ($n = 40$), and 9% Other ($n = 40$). 92% self-reported as heterosexual ($n = 393$), 3% as bisexual ($n = 14$), 1% as gay or lesbian ($n = 6$), and 3% ($n = 14$) either preferred not to report their sexual orientation or classified it as "unknown."

Procedures

Participants completed in-person self-report assessments of early life trauma, impulsivity-related traits, rumination, suicide ideation, and suicide attempt history using Qualtrics survey software (Qualtrics LLC, Provo, Utah) on a desktop computer in a private cubicle. Participants received research credit for their introductory psychology course for their participation. Any participant that endorsed suicide ideation or a suicide attempt history received an email from the principal investigator (JV) that provided contact information for the college counseling center, as well as the lab telephone number that could be used to inquire about other resources. Procedures were approved by the Institutional Review Board of the City University of New York.

Measures

Early Life Trauma—The Early Trauma Inventory – Self Report Short Form Revised (ETISR-SF; Bremner et al., 2000) is a self-report questionnaire that assesses physical, emotional, sexual, and general trauma before the age of 18 ("Yes" or "No" response options). Sample items include: "Were you often ignored or made to feel that you didn't count?" and "Did you ever witness violence towards others, including family members?" The ETISR-SF has previously shown good internal consistency, reliability, and convergent validity (Bremner et al., 2000; Hyman et al., 2005). Items were summed to generate totals for each subscale and overall. Cronbach's alpha was .56, .72, .77, and .64 for general trauma, physical punishment, emotional abuse, and sexual abuse, respectively, in the current sample.

Rumination—Rumination was assessed using the brooding and reflection subscales of the Ruminative Responses Scale (RRS; Nolen-Hoeksema, Larson, & Grayson, 1999). Both subscales consist of 5 items each, and response options range from "almost never" (1) to almost always" (4), with a possible total range of 4–20 for each subscale. The brooding subscale assesses the tendency to focus passively on the reasons for a person's negative or dysphoric mood (Cronbach's alpha = .82 in the present sample). Items from each subscale were summed to generate total scores. The reflection subscale assesses the tendency to more actively try to understand the reasons for one's mood (Cronbach's alpha = .76 in the present sample).

Impulsivity-related traits—The UPPS Impulsive Behavior Scale (Whiteside & Lynam, 2001) is a 45-item self-report questionnaire that assesses four personality pathways to impulsive behavior: lack of premeditation (i.e., not thinking through the consequences of one's actions), negative urgency (i.e., the tendency to act rashly under conditions of negative affect), sensation seeking (i.e., the tendency to seek excitement), and lack of perseverance (i.e., not following through with a task that is boring or difficult). We used a shortened version of the form, developed by Glenn and Klonsky (2010), consisting of 16 items – four items from each impulsivity-related trait that had the highest item-total correlations in the initial study (Whiteside and Lynam, 2001). Items are rated on a four-point scale: (1) disagree strongly, (2) disagree some, (3) agree some, and (4) agree strongly. Total scores were computed for each subscale. Cronbach's alphas at baseline were 0.76, 0.74, 0.78, and 0.73 for lack of premeditation, negative urgency, sensation seeking, and lack of perseverance, respectively.

Suicide Ideation and Attempts—The Suicidal Behavior Screening (SBS) is a self-report survey used to screen for history of suicide attempts and recent/current suicidal ideation, with questions adapted from the Young Adult version of the Computerized Diagnostic Interview Schedule for Children (Shaffer et al., 2000). Suicide attempt history was determined by the "Yes" or "No" question, "Have you ever, in your whole life, tried to kill yourself or made a suicide attempt?" Suicide ideation was determined by the "Yes" or "No" question, "In the past 6 months, have you thought about killing yourself?" Thirty-six out of 426 participants (8%) reported a history of a previous suicide attempt. Fifty-nine

participants (14%) (11 previous suicide attempters) reported suicide ideation in the previous six months.

Participants were divided into four groups: participants with no history of suicide attempt or recent/current suicide ideation ('Controls', $n = 342$), individuals with history of a suicide attempt and no recent/current suicide ideation ('Attempt Only', $n = 25$), individuals with recent/current suicide ideation but no history of a suicide attempt ('Ideation Only', $n = 48$), and individuals with recent/current suicide ideation and a history of a suicide attempt ('Ideation and Attempt', $n = 11$).

Data Analysis

Pearson correlations were computed to examine relationships between early life trauma, rumination, and impulsivity. A one-way ANOVA was conducted to examine differences in early life trauma, rumination, and impulsivity by history of suicide ideation and/or attempts (no ideation/attempt, ideation only, attempt only, ideation and attempt). Two participants had missing data on one question on the RRS's reflection subscale, and one participant had missing data on the ETI sexual abuse subscale items. Those missing values were counted as 0 in computing total scores. A multinomial logistic regression analysis was conducted order to examine whether early life trauma, rumination, and impulsivity would statistically predict history of suicide ideation or past history of a suicide attempt (with 'controls' as the reference group). Serial mediation analyses were then conducted to assess whether there were indirect effects of early life trauma on suicide ideation via brooding and impulsivity. Serial mediation analyses were conducted via PROCESS for SPSS, using model 6 (Hayes, 2013), and conditional indirect effects were tested using bias-corrected 95% confidence intervals, calculated using a bootstrapping procedure (with $n = 5000$ resamples). Conditional indirect effects were considered statistically significant when their confidence intervals did not include zero.

Results

There were no age, gender, or racial/ethnic differences in impulsivity, with the exception that men had higher sensation seeking scores ($M = 2.86$, $SD = 0.68$) than women ($M = 2.58$, $SD = 0.76$), $t(424) = 3.27$, $p < .01$, and participants who identified as sexual minorities (i.e., lesbian, gay, bisexual, or those who preferred not to disclose their sexual orientation) also had higher sensation seeking scores ($M = 11.91$, $SD = 2.99$) than did heterosexual participants ($M = 10.46$, $SD = 2.98$), $t(424) = 2.69$, $p < .01$. There was no gender difference in brooding or reflection, nor a difference by sexual orientation. However, there was a significant negative correlation between age and brooding, $r = -.10$, $p < .05$, and there was a significant racial/ethnic difference in brooding, $F(4,421) = 3.17$, $p < .05$, with Asian participants having higher ($M = 11.86$, $SD = 3.54$) scores than White participants ($M = 10.47$, $SD = 3.55$), $t(421) = 3.08$, $p < .05$ (Bonferroni-corrected). Men had higher scores on total early life trauma ($M = 7.60$, $SD = 3.83$), compared to women ($M = 6.66$, $SD = 4.26$), $t(161.43) = 2.04$, $p < .05$, as did sexual minority participants ($M = 8.48$, $SD = 4.46$), versus heterosexual individuals ($M = 6.73$, $SD = 4.14$), $t(424) = 2.32$, $p < .05$. There were no age, gender, or racial/ethnic differences in suicide ideation/attempt group. However, sexual

minority participants were more likely to report a history of both recent suicide ideation and a lifetime suicide attempt (18%), $Z = 5.9$, $p < .01$, and less likely to report no history of ideation/attempt (58%), Z = −3.4, $p < .01$, while participants who identified as heterosexual were more likely to report no history of ideation/attempt (82%), $Z = 3.4$, $p < .01$, and less likely to report a history of both ideation and attempt (1%), Z = −5.9, $p < .01$, than expected by chance; $\chi2 = 37.53$, $p < .01$.

Relationship between early life trauma, rumination, and impulsivity-related traits

Correlations between early life trauma and rumination and impulsivity-related traits are shown in Table 1. Total early life trauma, as indicated by the total ETISR-SF score, was significantly and positively associated with brooding, $r = .29$, $p < .01$, and reflection, $r = .23$, $p < .01$. More specifically, early life trauma in the form of general trauma, physical punishment, and emotional abuse was significantly associated with brooding and reflection. Early life sexual abuse was not significantly associated with brooding or reflection.

Each type of early life trauma was significantly and positively associated with negative urgency. Exposure to physical punishment was also significantly correlated with sensation seeking.

Brooding was significantly and positively associated with negative urgency, $r = .38$, $p < .01$, and lack of perseverance, $r = .14$, $p < .01$. Reflection was significantly and positively associated with negative urgency, $r = .16$, $p < .01$, and lack of perseverance, $r = .11$, $p < .05$. There was a trend towards a positive association between reflection and sensation seeking, $r = .09$, $p = .05$.

Examining group differences in early life trauma, rumination, and impulsivity

A one-way ANOVA revealed significant differences across groups for all early life trauma (ETISR-SF) subscales (see Table 2). Post-hoc Bonferroni-corrected comparisons revealed that the control group had significantly lower total early life trauma scores than each of the other three groups. Further, the Ideation and Attempt group had significantly higher total early life trauma scores than the Ideation Only group, but not significantly higher than the Attempt Only group. There were no significant differences between the Ideation and Attempt group and the Attempt-Only group on any of the dimensions of the ETISR-SF. However, the Ideation and Attempt group had significantly higher sexual abuse scores than the Ideation-Only group, and the Attempt-Only group had higher sexual abuse scores than the control group.

There were also significant differences across groups for brooding and reflection and for three of the four impulsivity subscales (lack of premeditation, negative urgency, and lack of perseverance). Post-hoc Bonferroni-corrected comparisons revealed that individuals in the Ideation-Only group had significantly higher brooding, reflection, lack of premeditation, negative urgency, and lack of perseverance than individuals in the control group. In addition, the Ideation and Attempt group had higher brooding and reflection scores than did the control group (see Table 2 for details).

Examining predictors of suicide ideation and attempts based on early life trauma, rumination, and impulsivity

A multinomial logistic regression analysis was conducted to examine whether early life trauma, rumination, and impulsivity would statistically predict recent/current suicide ideation or history of a suicide attempt, with no current/recent ideation or history of attempt as the reference group, adjusting for sexual orientation (given that Chi Square analyses suggested an association between sexual orientation and suicide ideation/attempt group). Each unit increase in early life trauma was significantly associated with higher odds of being in the Ideation-Only group (O.R. = 1.12, CI = 1.03–1.21), in the Attempt-Only group (O.R. = 1.20, CI = 1.09–1.33), and in the Ideation and Attempt group (O.R. = 1.36, CI = 1.14–1.62). Reflection, lack of premeditation, and lack of perseverance were significantly associated with higher odds of being in the Ideation-Only group, but negative urgency was not associated with being in the Ideation-Only group. Rumination and impulsivity were not associated with higher odds of being in the Attempt-Only group nor in the Ideation and Attempt group. Being a sexual minority was associated with higher odds of being in the Ideation and Attempt group but not of being in the Ideation-Only nor in the Attempt-Only groups (see Table 3).

Examining rumination, lack of perseverance, and lack of premeditation as statistical mediators of the relationship between early life trauma and suicide ideation

Finally, given the higher levels of brooding, reflection, lack of perseverance, and lack of premeditation in the Ideation-Only group, we examined whether lack of perseverance or lack of premeditation, in the presence of brooding or reflection, would statistically mediate the relationship between early life trauma and suicide ideation. Serial mediation analyses were conducted to assess whether early life trauma (predictor) predicted brooding or reflection (mediator 1), lack of premeditation or lack of perseverance (mediator 2), and suicide ideation (outcome variable). We did not examine an indirect effect through negative urgency, because it did not contribute significantly to the multinomial model. Analyses adjusted for sexual orientation.

The indirect effect of early life trauma on suicide ideation, passing through brooding and lack of perseverance, was significant [indirect effect = .004; 95% CI = .001 – .009] (see Figure 1). Further, the indirect effect of early life trauma on suicide ideation, passing through reflection and lack of perseverance, was also significant [indirect effect = .003; 95% CI = .0001 – .007] (see Figure 2). The indirect effects through lack of premeditation as a mediator were not statistically significant.

Discussion

The present study examined the relationships among early life trauma, subtypes of rumination and impulsivity, and suicide ideation and attempts. We found that early life trauma was associated with brooding, reflective rumination, and impulsivity, in the form of negative urgency. In addition, individuals with recent/current suicide ideation – with or without a history of a suicide attempt – self-reported greater early life trauma, ruminative thinking, and impulsivity than individuals without any ideation or a history of attempt. Early

life trauma, reflection, lack of premeditation, and lack of perseverance were associated with higher odds of reporting suicide ideation. Finally, we found an indirect relationship between early life trauma and suicide ideation through brooding or reflection via lack of perseverance in serial mediation analyses.

All forms of early life trauma assessed in the present study were significantly and positively associated with negative urgency. Our study replicated previous findings demonstrating negative urgency to be particularly high among suicide ideators with or without a suicide attempt history, while also having a stronger relationship with rumination than other impulsivity subtypes (Anestis & Joiner, 2011; Lynam et al., 2011; Valderrama et al., 2016; Valderrama & Miranda, 2017). However, importantly, negative urgency was not a significant statistical predictor of suicidal thinking or history of suicidal behavior in our sample after adjusting for other variables. Taken together, these findings suggest that there may be other factors that interact with early life trauma, rumination, and negative urgency to increase risk for suicide ideation or attempts. For instance, vulnerable genotypes might interact with early life trauma to increase vulnerability to rumination and impulsive behavior that occurs during moments of emotional distress, as suggested by the aforementioned analyses of follow-up data from a subsample of this study (Valderrama & Miranda, 2017). Other indicators of emotion dysregulation (e.g., reactive aggression, negatively biased information processing, difficulty in emotion recognition) may also result in such impulsivity and may stem from a number of factors, including early life trauma (Shields & Cicchetti, 1998; Pollak & Tolley-Schell, 2003; Tull et al., 2007). Future research should further assess cognitive and trait vulnerabilities that might play a role in the relationship between early life trauma, rumination, negative urgency, and suicidal behavior.

Lack of perseverance and lack of premeditation predicted the presence of suicidal ideation in our sample. Early life trauma was not associated with either of these impulsivity-related traits; however, we did find an indirect effect of early life trauma on suicidal ideation through both brooding and reflective rumination via lack of perseverance. We have previously reported an indirect effect of brooding, not reflection, on suicide risk through lack of perseverance (Valderrama et al., 2016). Those results were consistent with previous research indicating brooding to be more maladaptive than reflection (Treynor et al., 2003; Miranda and Nolen-Hoeksema, 2007). However, the extent to which reflection is adaptive or maladaptive may depend on a number of factors, including poor coping strategies, history of suicide attempts, co-occurring high levels of brooding, and high levels of impulsivity (Marroquín et al., 2010; Surrence et al., 2009; Valderrama et al., 2016; Junkins & Haeffel, 2017). Our present results indicate that greater early life trauma is associated with greater brooding and reflection. Accordingly, the negative consequences of experiencing early life trauma might dampen the adaptive cognitive processes associated with reflection.

One theory of rumination suggests that rumination may direct attention to the discrepancy between one's current and one's ideal state (Martin & Tesser, 1996). Perceiving the discrepancy as large following a stressful life event, one may ruminate in a maladaptive effort to resolve the discrepancy. Additionally, chronic and uncontrollable stressors may be particularly likely to maintain rumination, because there is no immediate or predictable way to reduce the discrepancy (Watkins, 2008). Given that traumatic events in childhood may

be perceived as especially threatening and uncontrollable, early life stress may be especially likely to increase risk for the development of rumination.

While lack of perseverance did not mediate the relationship between early life trauma and ideation, by itself (i.e., it did so in serial analyses that included brooding or reflection), it is important to note that it was a stronger predictor of suicide ideation in our sample than were early life trauma or rumination. Lack of perseverance has been conceptualized as a psychological process that might reflect cognitive difficulties with sustaining attention (difficulty with remaining focused on tasks that are difficult or boring) and may reflect a low sense of responsibility (Whiteside & Lynam, 2001). Given that rumination interferes with attention (Morrison & O'Connor, 2008), rumination resulting from trauma may thus lead to lack of follow-through with difficult tasks. Such characteristics might contribute to the maintenance of behaviors that increase the likelihood of suicidal thoughts and behavior, such as substance use problems and non-suicidal self-injury (Dick et al., 2010; Glenn & Klonsky, 2010; Riley et al., 2015). Future research should explore different factors that might explain why specific types of early life trauma might relate to different pathways to impulsive behavior, such as lack of perseverance.

Some study limitations should be noted. First, the present sample was non-clinical, had a small number of previous attempters relative to non-attempters, and was primarily female, and thus, our results may not generalize to clinical settings or to males. However, importantly, the non-clinical nature of our sample still yielded a robust relationship between early life trauma and suicidal thoughts and behavior while also establishing early life trauma as a correlate of ruminative thinking and negative urgency. A second limitation was that our examination of early life trauma was restricted to adverse events occurring anytime before the age of 18. Thus, we could not differentiate how trauma experienced at specific ages might differentially impact cognitive and behavioral development. Future research should examine how age of trauma influences future ruminative thinking, pathways to impulsive behavior, and suicidal behavior. We also relied on retrospective self-report to determine early life trauma history, which may result in under- or overreporting of early life trauma. Further, since we did not measure affect in this study, we cannot provide additional evidence that rumination and negative emotions may increase the likelihood of impulsive behaviors as proposed by the Emotional Cascades Model. Finally, our data are cross-sectional, thus limiting inferences about causality.

Future Directions

Several additional future directions are worth highlighting. A strength of our study is that several predictors of suicide risk were examined in sequence in an attempt to understand the development of suicidal ideation and behavior from early vulnerability factors. Our results are consistent with previous research linking early life trauma and suicidal thinking and behavior. This relationship was partially explained by the presence of rumination (i.e., brooding, reflection) and a lack of perseverance. How early life trauma influences the development of maladaptive cognitions and behavior may depend on a number of factors, including genetic and neurobiological systems. Brodsky & Biggs (2012) have proposed that the interaction of early life trauma and biological factors (e.g., epigenetic

changes) might affect neurobiological substrates of emotion dysregulation (e.g., the HPA axis) and impulsivity (e.g., serotonergic system) that might confer risk for suicidal thinking or behavior. Future research should examine how trauma type, frequency of trauma, and severity of trauma might impact neurobiological systems that relate to cognitive and behavioral vulnerabilities associated with suicidal behavior.

Given the correlational nature of our study, an important future direction is to replicate these findings longitudinally to assess causal relationships. Related, what we examined in this study were the trait versions of rumination and impulsivity. A brief longitudinal design using experience sampling methods might be informative about the temporal relationship of increases in rumination to fluctuations in state impulsivity and suicide ideation. Such a study would help clarify how impulsivity impacts suicide ideation. For example, impulsivity may be a state-dependent variable that fluctuates, along with suicide ideation, in moments of distress. Alternatively, it may be that what rumination largely impacts is the trait version of impulsivity, which may increase suicidal ideation through other mechanisms, such as exposure to provocative events. This is in line with ideas proposed by the Interpersonal Theory of Suicide, which suggests that impulsive individuals have more exposure to painful and provocative events, which, in turn, facilitates suicidal intent (Anestis, Soberay, Gutierrez, Hernandez, & Joiner, 2014; Joiner, 2005).

Additionally, it will be important to assess which features of suicide ideation may be influenced by the trauma-rumination-impulsivity link identified in our study. Suicide ideation in this study was assessed by one item indicating the presence or absence of ideation; future studies should examine more precise features of ideation, such as frequency or severity. There are two reasons to do so. First, a pressing need in the field of suicide research is to better understand the progression from suicide ideation to suicide attempts, given converging evidence that known suicide risk factors do not distinguish between ideators and attempters (Klonsky, May, & Saffer, 2016). An unintended consequence of this emphasis on distinguishing between ideation and attempts, however, has been an under-focus on suicide ideation and its features, which may themselves be predictive of suicide attempts. Indeed, some research suggests that certain aspects of ideation, such as frequency, are predictive of short-term risk for a suicide attempt (Miranda, Ortin, Scott, & Shaffer, 2014). Second, there is good reason to expect that rumination and impulsivity may increase frequency or severity of ideation. Rumination can be conceptualized as an effort to engage with life's problems, given that people who ruminate partly do so because they think it imparts insight (Lyubomirsky & Nolen-Hoeksema, 1993). However, it is a *failed, painful* effort to do so, as it rarely leads to solutions and instead intensifies psychological pain (Moberly & Watkins, 2008). When efforts to engage with life are repeatedly paired with pain, one becomes conditioned to want to avoid engaging with life (Klonsky & May, 2015a). Thus, rumination may over time give one a sense that one is always working to resolve problems to no avail and that such efforts only increase pain, shaping the instinct to want to avoid engaging with difficult circumstances (aka lack of perseverance). Lack of perseverance may then translate into faster and more frequent momentary escapes from problem solving and into suicide ideation, increasing hopelessness by creating a perception that problems are unsolvable. Research suggests that it is this combination of pain and hopelessness – rather than one or the other – that significantly increases suicide ideation

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(Klonsky & May, 2015b). In line with these ideas, recent findings suggest that impulsivity mediates the link between problem solving and suicide ideation severity (Gonzalez & Neander, 2018).

Conclusion

In conclusion, findings from the present study provide further evidence of the deleterious effects of early life trauma. From a public health and community perspective, greater awareness of the negative impact early life trauma can have on young individuals may be valuable in efforts to decrease or limit preventable stressors. From a clinical perspective, our results suggest that early life trauma history should be considered when treating individuals with a history of suicidal thinking and behavior, particularly if they suffer from excessive ruminative thinking and have difficulty with sustaining attention or following through on difficult tasks.

Acknowledgments

References

Afifi TO, Enns MW, Cox BJ, Asmundson GJG, Stein MB, & Sareen J. (2008). Population attributable fractions of psychiatric disorders and suicide ideation and attempts associated with adverse childhood experiences. American Journal of Public Health, 98, 946–952. [PubMed: 18381992]

Anestis MD, & Joiner TE (2011). Examining the role of emotion in suicidality: Negative urgency as an amplifier of the relationship between components of the interpersonal–psychological theory of suicidal behavior and lifetime number of suicide attempts. Journal of Affective Disorders, 129, 261–269 [PubMed: 20825997]

Anestis MD, Soberay KA, Gutierrez PM, Hernandez TD, & Joiner TE (2014). Reconsidering the link between impulsivity and suicidal behavior. Personality and Social Psychology Review, 18, 366–386. [PubMed: 24969696]

Anestis MD, Tull MT, Lavender JM, & Gratz KL (2014). The mediating role of nonsuicidal self-injury in the relationship between impulsivity and suicidal behavior among inpatients receiving treatment for substance use disorders. Psychiatry Research, 218, 166–173. [PubMed: 24768248]

Bremner JD, Vermetten E, Mazure CM. (2000) Development and preliminary Psychometric properties of an instrument for the measurement of childhood trauma: The Early Trauma Inventory. Depression and Anxiety, 12, 1–12. [PubMed: 10999240]

Bresin K, Carter DL, & Gordon K. (2013). The relationship between trait impulsivity, negative affective states, and urge for nonsuicidal self-injury: A daily diary study. Psychiatry Research, 205, 227–231. [PubMed: 23062776]

Brodsky B, & Biggs E. (2012). Adverse childhood experiences and suicidal behavior. Suicidologi, 17, 16–21.

Bruffaert R, Demyttenaere K, Borges G, Haro JM, Chiu WT, Hwang I, … Nock MK (2010). Childhood adversities as risk factors for onset and persistence of suicidal behaviour. British Journal of Psychiatry, 197, 20–27.

Cicchetti D, & Curtis J. (2005). An event-related potential study of the processing of affective facial expressions in young children who experienced maltreatment during the first year of life. Development and Psychopathology, 17, 641–677. [PubMed: 16262986]

Dick DM, Smith G, Olausson P, Mitchell SH, Leeman RF, O'Malley SS, & Sher K. (2010). Review: understanding the construct of impulsivity and its relationship to alcohol use disorders. Addiction Biology, 15, 217–226. [PubMed: 20148781]

Dube SR, Anda RF, Felitti VJ, Chapman DP, Williamson DF, & Giles WH (2001). Childhood abuse, household dysfunction, and the risk of attempted suicide throughout the life span: findings from the Adverse Childhood Experiences Study. Journal of the American Medical Association, 286, 3089–3096. [PubMed: 11754674]

Glenn CR, & Klonsky ED (2010). A multimethod analysis of impulsivity in non-suicidal self-injury. Personality Disorders: Theory, Research, and Treatment, 1, 67–75.

Gogtay N, Giedd JN, Lusk L, Hayashi KM, Greenstein D, Vaituzis AC, ... & Rapoport JL (2004). Dynamic mapping of human cortical development during childhood through early adulthood. Proceedings of the National Academy of Sciences, 101(21), 8174–8179.

Gonzalez VM, & Neander LL (2018). Impulsivity as a mediator in the relationship between problem solving and suicidal ideation. Journal of Clinical Psychology, 74(9), 1626–1640. [PubMed: 29543334]

Hayes AF (2013). An introduction to mediation, moderation, and conditional process analysis: A regression-based approach. New York, NY: Guilford Press.

Hyman S, Garcia M, Kemp K, Mazure CM, & Sinha R. (2005). A gender specific psychometric analysis of the Early Trauma Inventory-Short Form in cocaine dependent adults. Addictive Behaviors, 30, 847–852. [PubMed: 15833587]

Johnson JG, Cohen P, Gould MS, Kasen S, Brown J, & Brook JS (2002). Childhoodadversities, interpersonal difficulties, and risk for suicide attempts during lateadolescence and early adulthood. Archives of General Psychiatry, 59, 741–749. [PubMed: 12150651]

Johnson SL, Carver CS, & Tharp JA (2017). Suicidality in bipolar disorder: The role of emotion-triggered impulsivity. Suicide and Life-Threatening Behavior, 47, 177–192. [PubMed: 27406282]

Joiner TE (2005). Why people die by suicide. Cambridge, MA: Harvard University Press.

Junkins MB, & Haeffel GJ (2017). Rumination: Reflection can amplify the depressogenic effects of brooding. International Journal of Cognitive Therapy, 10, 34–46.

Lynam DR, Miller JD, Miller DJ, Bornovalova MA, & Lejuez CW (2011). Testing the relations between impulsivity-related traits, suicidality, and non-suicidal self-injury: A test of the incremental validity of the UPPS model. Personality Disorders, 2, 151–160. [PubMed: 21833346]

Klonsky ED, & May AM (2015a). Impulsivity and suicide risk: review and clinical implications. Psychiatric Times, 32(8), 13–21.

Klonsky ED, & May AM (2015b). The three-step theory (3ST): A new theory of suicide rooted in the "ideation-to-action" framework. International Journal of Cognitive Therapy, 8(2), 114–129.

Klonsky ED, May AM, & Saffer BY (2016). Suicide, suicide attempts, and suicidal ideation. Annual review of clinical psychology, 12, 307–330.ChicagoLyubomirsky S, & Nolen-Hoeksema S. (1993). Self-perpetuating properties of dysphoric rumination. Journal of Personality and Social Psychology, 65(2), 339. [PubMed: 8366423]

Mann JJ, & Currier D. (2016). Suicide and attempted suicide. In Fatemi S & Clayton P (Eds.), The Medical Basis of Psychiatry (pp. 687–706). New York: Springer.

Marroquín BM, Fontes M, Scilletta A, Miranda R. (2010). Ruminative subtypes and coping responses: Active and passive pathways to depressive symptoms. Cognition and Emotion, 24, 1446–1455.

Martin LL, & Tesser A. (1996). Some ruminative thoughts. In Wyer RS (Ed.),Ruminative Thoughts (pp.1–47). Hillsdale, NJ: L. Erlbaum Associates.

Miranda R, & Nolen-Hoeksema S. (2007). Brooding and reflection: Rumination predicts suicidal ideation at 1-year follow-up in a community sample. Behaviour Research and Therapy, 45, 3088–3095. [PubMed: 17825248]

Miranda R, Ortin A, Scott M, & Shaffer D. (2014). Characteristics of suicidal ideation that predict the transition to future suicide attempts in adolescents. Journal of Child Psychology and Psychiatry, 55(11), 1288–1296. [PubMed: 24827817]

Moberly NJ, & Watkins ER (2008). Ruminative self-focus and negative affect: an experience sampling study. Journal of Abnormal Psychology, 117(2), 314. [PubMed: 18489207]

Morrison R, & O'Connor RC (2008). The role of rumination, attentional biases and stress in psychological distress. British Journal of Psychology, 99(2), 191–209. [PubMed: 17559717]

Mueller SC, Maheu FS, Dozier M, Peloso E, Mandell D, Leibenluft E, Pine DS, & Ernst M. (2010). Early-life stress is associate with impairment in cognitive control in adolescence: An fMRI study. Neuropsychologia, 48, 3037–3044. [PubMed: 20561537]

Nolen-Hoeksema S, Larson J, & Grayson C. (1999). Explaining the gender difference in depressive symptoms. Journal of Personality and Social Psychology, 77, 1061–1072. [PubMed: 10573880]

Nolen-Hoeksema S, Morrow J, & Frederickson BL (1993). Response styles and the duration of episodes of depressed mood. Journal of Abnormal Psychology, 102, 20–28. [PubMed: 8436695]

Nolen-Hoeksema S, Wisco BE, Lyubomirsky S. (2008). Rethinking rumination. Perspectives on Psychological Science, 3, 400–424. [PubMed: 26158958]

Pechtel P, & Pizzagalli DA (2011). Effects of early life stress on cognitive and affective function: an integrated review of human literature. Psychopharmacology, 214, 55–70. [PubMed: 20865251]

Pollak SD, & Tolley-Schell SA (2003). Selective attention to facial emotion in physically abused children. Journal of Abnormal Psychology, 112, 323–338. [PubMed: 12943012]

Riley EN, Combs JL, Jordan CE, & Smith GT (2015). Negative urgency and lack of perseverance: Identification of differential pathways of onset and maintenance risk in the longitudinal prediction of non-suicidal self-injury. Behavior Therapy, 46, 439–448. [PubMed: 26163709]

Rogers ML, & Joiner TE (2017). Rumination, suicidal ideation, and suicide attempts: A meta-analytic review. Review of General Psychology, 21, 132–142.

Selby EA, Anestis MD, Joiner TE (2008). Understanding the relationship betweenemotional and behavioral dysregulation: Emotional cascades. Behaviour Research and Therapy, 46, 593–611. [PubMed: 18353278]

Selby EA, Kranzler A, Panza E, & Fehling KB (2016). Bidirectional-compounding effects of rumination and negative emotion in predicting impulsive behavior: Implications for emotional cascades. Journal of Personality, 84, 139–153. [PubMed: 25388298]

Selby EA & Joiner TE (2009). Cascades of emotion: The emergency of Borderline Personality Disorder from emotional and behavioral dysregulation. Review of General Psychology, 13, 219–229. [PubMed: 20161656]

Shaffer D, Fisher P, Lucas CP, Dulcan MK, & Schwab-Stone ME (2000). NIMH Diagnostic Interview Schedule for Children IV (NIMH DISC-IV): Description, differences from previous diagnoses, and reliability of some common diagnoses. Journal of the American Academy of Child and Adolescent Psychiatry, 39, 28–38. [PubMed: 10638065]

Shields A, & Cicchetti D. (1998). Reactive aggression among maltreated children: The contributions of attention and emotion dysregulation. Journal of Clinical Child Psychology, 27, 381–395. [PubMed: 9866075]

Shin SH, McDonald SE, & Conley D. (2018). Profiles of adverse childhood experiences and impulsivity. Child Abuse and Neglect, 85, 118–126. [PubMed: 30172413]

Sujan AC, Humphreys KL, Ray LA, & Lee SS (2014). Differential association of child abuse with self-reported versus laboratory-based impulsivity and risk-taking in young adulthood. Child Maltreatment, 19, 145–155. [PubMed: 25034226]

Surrence K, Miranda R, Marroquín BM, & Chan S. (2009). Brooding and reflectiverumination among suicide attempters: Cognitive vulnerability to suicidal ideation.Behaviour Research and Therapy, 47, 803–808. [PubMed: 19577225]

Treynor W, Gonzalez R, & Nolen-Hoeksema S. (2003). Rumination Reconsidered: A Psychometric Analysis. Cognitive Therapy and Research, 27, 247–259.

Tull MT, Barrett HM, McMillan ES, & Roemer L. (2007). A preliminary investigation of the relationship between emotion regulation difficulties and posttraumatic stress symptoms. Behavior Therapy, 38, 303–313. [PubMed: 17697854]

Valderrama J, & Miranda R. (2017). Early life stress predicts negative urgency through brooding, depending on 5-HTTLPR genotype: A pilot study with 6-month follow-up examining suicide ideation. Psychiatry Research, 258, 481–487. [PubMed: 28890225]

Valderrama J, Miranda R, & Jeglic E. (2016). Ruminative subtypes and impulsivity in risk for suicidal behavior. Psychiatry Research, 236, 15–21. [PubMed: 26791398]

Watkins ER (2008). Constructive and unconstructive repetitive thought. Psychological Bulletin, 134, 163–206. [PubMed: 18298268]

Whiteside SP, & Lynam DR (2001). The five factor model and impulsivity: Using a structural model of personality to understand impulsivity. Personality and Individual Differences, 30, 669–689.

Yen S, Shea MT, Sanislow CA, Skodol AE, Grilo CM, Edelen MO, … Gunderson JG (2009). Personality traits as prospective predictors of suicide attempts. Acta Psychiatrica Scandinavica, 120, 222–229. [PubMed: 19298413]

[Indirect Effect: 0.004 (.002)*]
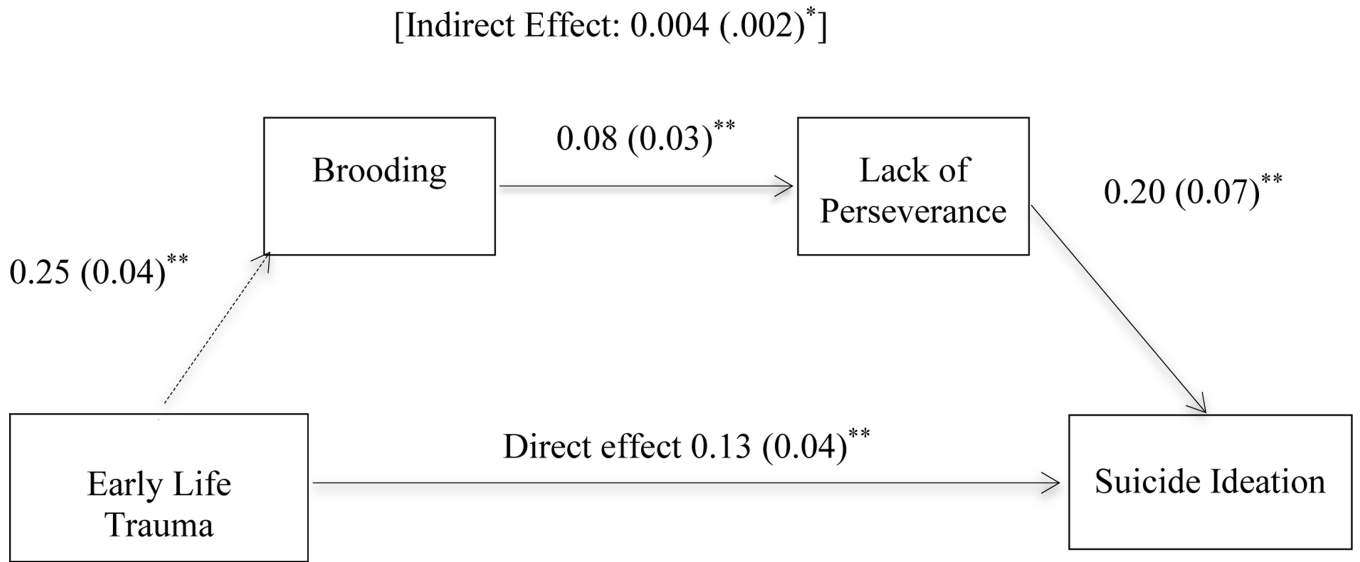
Figure 1.
Early life trauma is significantly associated with brooding and suicide ideation. The indirect effect of early life trauma on suicide ideation, passing through brooding and lack of perseverance, was significant. Analysis adjusts for sexual minority status. Values shown are in log odds metric, with standard errors in parentheses. A dotted line reflects a non-significant relationship. $*p < 0.05$; $**p < 0.01$. $N = 426$.

[Indirect Effect: 0.003 (.002)*]

Figure 2.
Early life trauma is significantly associated with reflection and suicide ideation. There was an indirect effect of early life stress on risk for suicide ideation when reflection preceded lack of perseverance. Analysis adjusts for sexual minority status. Values shown are in log odds metric, with standard errors in parentheses. A dotted line reflects a non-significant relationship. *$p < 0.05$; ** $p < 0.01$. $N = 426$.
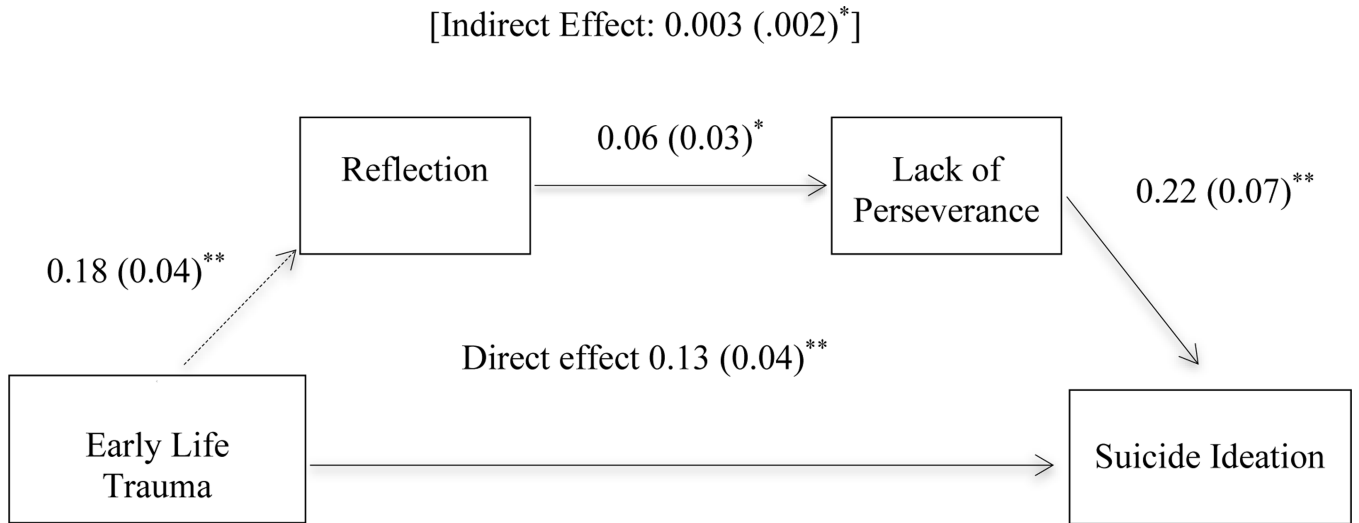
Table 1.

Means, Standard Deviations, and Correlations among Self-report Measures

	M	SD	1	2	3	4	5	6	7	8	9	10	11
1. General Trauma	2.17	1.81	…										
2. Physical Punishment	2.40	1.63	.28**	…									
3. Emotional Abuse	1.78	1.70	.36**	.35**	…								
4. Sexual Abuse	0.53	0.98	.30**	.10*	.18**	…							
5. ETI Total	6.87	4.19	.76**	.67**	.74**	.48**	…						
6. Brooding	11.37	3.62	.14**	.22**	.35**	.02	.29**	…					
7. Reflection	9.58	3.37	.18**	.13**	.20**	.08	.23**	.49**	…				
8. Lack of Premeditation	7.11	2.01	−.04	.01	.01	.07	.01	.05	−.10*	…			
9. Negative Urgency	10.61	2.77	.11*	.22**	.25**	.10*	.25**	.38**	.16**	.28**	…		
10. Sensation Seeking	10.57	3.00	.04	.11*	−.03	.07	.07	−.02	.09	.09	.14**	…	
11. Lack of Perseverance	7.06	2.07	−.06	.04	.08	.09	.04	.14**	.11*	.36**	.08	.02	…

*
$p < 0.05$;

**
$p < 0.01$

Table 2.

Means and Standard Deviations of Self-Report Measures by Group

Group	Controls[a] ($n = 342$)	Ideation Only[b] ($n = 48$)	Attempt Only[c] ($n = 25$)	Attempt + Ideation[d] ($n = 11$)	F, p	n^2
Brooding **	10.99 (3.53)[b,d]	13.02 (3.62)[a]	11.68 (3.60)[d]	15.18 (2.68)[a,c]	9.20, $p < .01$	0.06
Reflection **	9.23 (3.37)[b,d]	11.21 (3.08)[a]	9.76 (2.45)[d]	13.00 (2.57)[a,c]	9.26, $p < .01$	0.06
Lack of Premeditation **	6.95 (2.00)[b]	7.93 (2.06)[a]	7.56 (1.80)	7.56 (1.80)	4.09, $p < .01$	0.03
Negative Urgency **	10.36 (2.73)[b]	11.65 (2.92)[a]	11.64 (2.51)	11.64 (2.34)	4.97, $p < .01$	0.03
Sensation Seeking	10.48 (2.98)	11.15 (3.23)	10.92 (2.63)	9.91 (3.36)	0.97, $p = .41$	0.01
Lack of Perseverance **	6.92 (2.01)[b]	8.17 (2.31)[a,c]	6.80 (2.06)[b]	7.18 (1.60)	5.40, $p = .01$	0.04
General Trauma **	1.99 (1.72)[c]	2.63 (1.96)	3.16 (2.06)[a]	3.36 (1.96)	6.45, $p < .01$	0.04
Physical Punishment*	2.27 (1.62)	2.83 (1.51)	2.76 (1.78)	3.45 (1.51)	3.82, $p = .01$	0.03
Emotional Abuse **	1.57 (1.60)[b,c,d]	2.46 (1.68)[a]	2.48 (2.10)[a]	3.73 (1.42)[a]	11.32, $p < .01$	0.07
Sexual Abuse **	0.40 (0.78)[c,d]	0.73 (1.11)[d]	1.20 (1.58)[a]	1.91 (2.12)[a,b]	14.92, $p < .01$	0.1
ETISR-SF Total **	6.24 (3.83)[b,c,d]	8.65 (4.03)[a,d]	9.60 (4.96)[a]	12.45 (5.35)[a,b]	17.32, $p < .01$	0.11

**
$p < .01$.

Superscripts denote group differences, based on Bonferroni-corrected post hoc tests.

Table 3.

Multinomial Logistic Regression Predicting Suicide Ideation/Attempt Group

	O.R.	p	95% CI
Ideation Only			
Sexual Minority	1.99	.21	0.69–5.79
Early Life Trauma**	1.12	< .01	1.03–1.21
Brooding	1.05	.45	0.94–1.16
Reflection**	1.16	< .01	1.04–1.29
Lack of Premeditation*	1.23	< .05	1.03–1.48
Negative Urgency	1.05	.49	0.91–1.20
Sensation Seeking	1.03	.65	0.91–1.15
Lack of Perseverance*	1.20	< .05	1.02–1.41
Attempt Only			
Sexual Minority	1.30	.75	0.26–6.56
Early Life Trauma**	1.20	< .01	1.09–1.33
Brooding	0.97	.68	0.84–1.12
Reflection	1.02	.79	0.88–1.18
Lack of Premeditation	1.19	.14	0.94–1.49
Negative Urgency	1.13	.19	0.94–1.36
Sensation Seeking	0.99	.88	0.86–1.14
Lack of Perseverance	0.91	.39	0.73–1.13
Ideation + Attempt			
Sexual Minority**	36.85	< .01	5.60–242.58
Early Life Trauma**	1.36	< .01	1.14–1.62
Brooding	1.22	.17	0.92–1.61
Reflection	1.36	< .05	1.04–1.78
Lack of Premeditation	1.30	.28	0.81–2.07
Negative Urgency	1.02	.93	0.74–1.40
Sensation Seeking	0.81	.12	0.62–1.43
Lack of Perseverance	0.93	.75	0.61–1.43

*
$p < .05$;

**
$p < .01$