PTSD SYMPTOMS AND SUICIDALITY IN UNIVERSITY STUDENTS: THE ROLE
OF DISTRESS TOLERANCE

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A Senior Honors Thesis

Presented to

the Faculty of the Department of Psychology

University of Houston

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In Partial Fulfillment

of the Requirements for the Degree

Bachelor of Science

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By

Layla Kratovic

May, 2019

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PTSD SYMPTOMS AND SUICIDALITY IN UNIVERSITY STUDENTS: THE ROLE
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Abstract

Posttraumatic stress disorder (PTSD) is a strong predictor of suicide attempts and has been shown to independently predict suicidal ideation and suicide attempts. Distress tolerance (DT), which refers to the capacity to tolerate negative emotional and/or physical states, is a cognitive-affective factor with clinical relevance to PTSD and suicidality. No studies to date have examined the associations of PTSD symptoms, DT, and suicidal ideation or suicide risk among undergraduate students, a population at risk for suicidal ideation and behavior. It was hypothesized that greater PTSD symptom severity and lower perceived DT, respectively, would be associated with greater suicidal ideation and suicide risk (i.e., suicidality); and that PTSD symptom severity would exert an indirect effect on suicidality through perceived DT. Covariates included trauma load, negative affectivity, and gender. Participants were comprised of 819 trauma-exposed university students (78.0% female; Mage= 22.0) who consented to and completed self-report survey questionnaires. Results indicated that greater PTSD symptom severity and lower DT, respectively, were significantly associated with greater suicidal ideation and suicide risk. Further, PTSD symptom severity exerted an indirect effect on suicidal ideation and suicide risk through perceived DT. Effects were documented after controlling for theoretically relevant covariates. Clinical and research implications are discussed.

Keywords: Posttraumatic Stress, PTSD, Trauma, Suicide, Distress Tolerance, College Students

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Introduction

Suicide is a serious public health issue, especially among adolescents and young adults. Suicide is the second leading cause of death in the United States for individuals between the ages of 10 to 24, accounting for 17.6% of deaths in that age group (Heron, 2017). Furthermore, approximately 1,100 university students between 18- and 24-years of age commit suicide every year in the United States (Appelbaum, 2006). Suicidal ideation can be considered the first step on the path to suicidal behavior (Kachur, Potter, Powell, & Rosenberg, 1995), and a four-year prospective study conducted with first-year students at a college in the United States showed that an estimated 12% had experienced suicidal ideation at least once during their time at college (Wilcox et al., 2010). The National College Health Assessment revealed that 10.3% of male college students and 12.1% of female college students seriously considered suicide within the past year, and 1.9% of all college students attempted suicide within the past year (ACHA, 2017). Given these estimates, it is important to better understand clinically relevant psychological processes related to suicidal ideation and behavior in university students.

According to a cross-national analysis of the World Health Organization (WHO) World Mental Health Surveys, post-traumatic stress disorder (PTSD) is the strongest predictor of suicide attempts in developing countries and one of the three strongest predictors in developed countries (Nock, Hwang, Sampson, Kessler, & Angermeyer, 2009; Nock et al., 2015). The Canadian Community Health Survey Cycle demonstrated that PTSD is associated with suicidal behavior (i.e., attempts, ideation; Sareen et al., 2007), and research comparing

those with and without PTSD shows that PTSD is the only disorder that can independently predict suicidal ideation and suicide attempts (Bernal et al., 2007; Sareen, Cox, Goodwin, & Asmundson, 2005). Indeed, a recent meta-analysis of 50 articles revealed a positive association between PTSD and current suicidal ideation as well as prior attempted suicide (Krysinska & Lester, 2010). PTSD symptomatology is a major risk factor for suicidal thoughts and behaviors (Bentley et al. 2016; Jankovic et al. 2013; Krysinska & Lester 2010; Lopez-Castroman et al. 2015), as well, suggesting that subclinical PTSD symptoms also increase risk for suicidal ideation and behavior. PTSD has also been shown to be somewhat more common among suicide attempters, when compared to suicide ideators, suggesting that PTSD may be a facilitator for the transition from ideation to attempt (May & Klonsky, 2016; Nock et al., 2017). Since the association between PTSD and suicidal ideation and behavior is well-established, it is important to understand psychological factors that may be related to this association to inform suicide interventions.

Distress tolerance is a psychological factor with relevance to both suicidality (i.e., ideation and behavior) and PTSD symptoms. Distress tolerance refers to the self-reported or behaviorally-demonstrated capacity to tolerate negative or aversive emotional and/or physical states (Simon & Gaher, 2005; Leyro, Zvolensky, & Bernstein, 2010). According to studies conducted with both clinical and nonclinical, trauma-exposed samples, distress tolerance has a significant negative association with PTSD symptom severity (for a review, see Vujanovic & Zegel, in press; e.g., Banducci, Connolly, Vujanovic, Alvarez, & Bonn-Miller, 2017; Vujanovic, Bonn-Miller, Potter, Marshall, & Zvolensky, 2011b; Marshall-Berenz, Vujanovic, Bonn-Miller, Bernstein, & Zvolensky, 2010). Research also suggests that individuals who have low distress tolerance may perceive PTSD symptoms as threatening,

engage in avoidance, and experience arousal more intensely (Vujanovic et al., 2011a, 2011b; Vujanovic & Zegel, in press). Furthermore, recent studies conducted with undergraduate students show that low perceived distress tolerance is associated with lower levels of acquired capability for suicide, but higher levels of suicidal desire (Anestis et al., 2011a, 2011b; Anestis & Joiner, 2012; Bender, Anestis, Gordon, & Joiner, 2012). Overall, these findings suggest that even though low perceived distress tolerance may be associated with greater suicidal desire and PTSD symptoms, higher levels of behaviorally-indexed distress tolerance may be related to suicidal behavior.

Indeed, the literature suggests different associations between self-reported distress tolerance versus behaviorally-indexed distress tolerance with regard to the relationship between PTSD symptomatology and suicidal behavior (Anestis et al., 2011a, 2011b, 2012; Bender et al., 2012; Bartlett et al., 2018; Stanley, Hom, Spencer-Thomas, & Joiner, 2017; Vujanovic, Bakhshaie, Martin, Reddy, & Anestis, 2017). Higher levels of behaviorally-indexed distress tolerance significantly moderate -- or exacerbate -- the relationship between PTSD symptom severity and number of past suicide attempts, such that heightened behavioral distress tolerance intensifies the association between PTSD and suicide attempts in inpatients with substance use disorder (Anestis, Tull, Bagge, & Gratz, 2012). Conversely, lower levels of self-reported (perceived) distress tolerance exacerbate associations between PTSD symptom severity and suicide risk -- defined by suicidal ideation and behavior -- in firefighters (Bartlett et al., 2018). Furthermore, among acute-care psychiatric inpatients, PTSD symptom severity indirectly affects suicidality (i.e., ideation, intent, or behavior) as basis for hospitalization and suicidal desire severity via lower perceived distress tolerance (Vujanovic et al., 2017). Although the literature on relations between PTSD, distress

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tolerance, and suicidal ideation or behavior is emerging, no studies to date have assessed these associations among undergraduate students, a population at risk for suicidal ideation and behavior.

Taken together, distress tolerance appears to be an important construct with clinical relevance to the PTSD-suicidality association. This study proposed to extend the examination of these associations to undergraduate students. First, it was hypothesized that greater PTSD symptom severity would be related to greater suicidal ideation and suicide risk (i.e., suicidality). Second, it was hypothesized that lower self-reported distress tolerance would be related to greater suicidal ideation and suicide risk. Finally, it was hypothesized that PTSD symptom severity would exert an indirect effect on suicidal ideation and suicide risk through self-reported, perceived distress tolerance among undergraduate students. More specifically, PTSD symptom severity was hypothesized to be associated with lower distress tolerance, which would be associated with greater suicidal ideation and global suicide risk, creating an indirect association between PTSD symptom severity and suicidality. Effects were expected above and beyond the effects of relevant covariates, including trauma load, negative affectivity, and gender. Covariates were selected based on their robust associations with suicidal ideation and suicide risk in past studies examining PTSD-suicidality relations (e.g., Anestis, Pennings, Lavender, Tull, & Gratz, 2013; Anestis & Joiner, 2012; Bartlett et al., 2018; Langhinrichsen-Rohling, Arata, Bowes, O'Brien, & Morgan, 2004; Vujanovic et al., 2017).

Method

Participants

This study was a sub-analysis of a parent study (PI: Vujanovic). Participants for this study included a sub-sample of 819 undergraduate students at the University of Houston (UH), who participated in the parent study and who met inclusionary criteria for this sub-analysis. Eligible participants for this investigation were English-speaking undergraduates currently enrolled at UH who were between 18 and 64 years of age and reported a history of one or more traumatic life events according to the *DSM-5* PTSD Criterion A definition (American Psychiatric Association [APA], 2013). Finally, those eligible for the current analysis must have responded correctly to all survey validation questions. Please see Table 1 for a summary of participant characteristics.

Measures

Demographics Questionnaire. The demographics questionnaire is a brief self-report measure that screens for the respondents' gender, age, race, ethnicity, and marital status. It also assesses the respondents' current academic year, course load, grade point average (GPA), college major, and employment status. Gender was used as a covariate in the current analyses.

Life Events Checklist for DSM-5 (LEC-5; Weathers et al., 2013). The LEC-5 is a self-report measure that screens for potentially traumatic events experienced at any point throughout the lifespan. Respondents are presented with a list of potentially traumatic events (e.g., assault, combat, transportation accident) along with an "other" item that assesses for potentially traumatic events not listed. The LEC-5 has demonstrated adequate psychometric properties, including test-retest reliability and convergent validity (Weathers et al., 2013). In

this study, the LEC-5 was used to screen for trauma exposure, an inclusion criterion for the study, and the LEC-5 total score was used to determine trauma load (i.e., total number of traumatic event types endorsed), a covariate.

PTSD Checklist- Civilian Version- 5 (PCL-5; Blevins, Weathers, Davis, Witte, & Domino, 2015). The PCL-5 is a well-established, 20-item self-report measure of PTSD symptom severity. Each of the items reflects a symptom of PTSD according to the DSM-5. The respondents use a 5-point scale (0 = not at all to 4 = extremely) to express how often they have been bothered by a PTSD symptom in the past month. The PCL-5 demonstrates good psychometric properties, including good internal consistency, test-retest reliability, convergent and discriminant validity (Blevins et al. 2015; Bovin et al., 2015). Internal consistency of the total PTSD symptom severity (PCL-5 total score) in the current sample was excellent (α=0.95). In the current study, the PCL-5 total score was used to derive the respondent's level of PTSD symptom severity, a predictor variable.

Distress Tolerance Scale (DTS; Simons & Gaher, 2005). The DTS is a 15-item self-report measure that measures the extent to which respondents can experience and withstand distressing emotional states (Simons & Gaher, 2005), rated on a 5-point scale (1 = strongly agree to 5 = strongly disagree). The DTS demonstrates good psychometric properties, including good internal consistency, test–retest reliability, convergent validity, and discriminant validity with established measures of mood (Simons and Gaher, 2005). In the current sample, internal consistency for the total DTS score was excellent (α=0.90). As consistent with past work among populations exposed to potentially traumatic events (Hashoul-Andary et al., 2016; Marshall-Berenz et al., 2010; Vujanovic et al., 2017), the DTS

total score was used to measure the respondent's total level of perceived distress tolerance, the mediator variable.

Beck Suicide Scale for DSM-5 (BSS-5; Beck & Steer, 1991). The BSS-5 is a self-report screening measure that assesses the severity of respondents' suicidal ideation or their desire to die (Lam, Michalaak, & Swinson, 2004). The respondent determines which statement most accurately describes their past-week suicidal ideation (e.g., "I have no desire to kill myself") for each item. The BSS-5 demonstrates excellent psychometric properties, including internal consistency, test-retest reliability, and construct and convergent validity (Batterham et al., 2015; Chioqueta & Styles, 2006; Pinninti, Steer, Rissmiller, Nelson, & Beck, 2002). Internal consistency of the first five items in the BSS-5 in the current sample was good ($\alpha=0.82$). In the current study, the first five items in the BSS-5 were used to derive the respondent's self-reported suicidal ideation severity, which was an outcome variable.

Suicide Behavior Questionnaire - Revised (SBQ-R; Osman et al., 2001). The SBQ-R is a 4-item self-report measure of suicide risk. Each of the items in the measure assesses a different aspect of suicidality, including lifetime suicide ideation and/or attempts, frequency of suicide ideation over the last year, threat of suicide attempt, and likelihood of future suicidal behavior. The SBQ-R has demonstrated good psychometric properties in adult inpatient populations, including sensitivity (93%), specificity (95%), positive predictive value (0.87), and discrimination (0.89; Osman et al. 2001;Batterham et al., 2015). Internal consistency of the total suicide risk (SBQ-R total score) in the current sample was good ($\alpha=0.80$). In this study, all four items were used to estimate global suicide risk, which served as an outcome variable.

The Positive & Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). The PANAS is a 20-item self-report measure that examines the extent to which respondents generally feel different emotions, rated on a 5-point scale (1 = very slightly or not at all to 5 = extremely). This study employed the negative affect subscale (PANAS-NA) to assess participants' negative affect during the previous month. The PANAS-NA contains 10 items that describe negative affective states (e.g., "distressed," "nervous"). The PANAS has demonstrated good psychometric properties, including internal consistency, construct validity, convergent validity, and discriminant validity (Crawford & Henry, 2004; Serafini, Malin-Mayor, Nich, Hunkele, & Carroll, 2016; Vera-Villarroel et al., 2017). In the current sample, internal consistency for the PANAS-NA total score was good (α=0.88). The PANAS-NA total score was used in this study to determine the propensity to experience negative affect symptoms, which served as a covariate.

Procedure

Undergraduate students were recruited through the UH SONA system, which provided a direct link to an online survey. Those willing to participate provided informed consent through the UH SONA system and were made aware that they could cease participation at any point without penalty. The online survey contained a series of self-report measures that the students were instructed to complete, and it was estimated to take 1.5-2 hours to complete. Student participation was voluntary, and those who completed the online survey received course credit in the form of two SONA credits for their participation. The study was approved by the UH institutional review board.

Data Analytic Strategy

First, descriptive statistics and bivariate correlations were calculated for all study variables. Second, data were examined for missingness and normality. Third, mediation analyses were conducted using PROCESS Macro for IBM SPSS Statistics 24.0 (Hayes & Preacher, 2014), a computational tool that conducts observed-variable mediation process analysis. Regression coefficients for each hypothesized path were evaluated. PTSD symptom severity (PCL-5 total score) was the predictor variable and perceived distress tolerance (DTS total score) served as the mediator variable in all models. Separate analyses were conducted for both suicidality outcomes: (1) suicidal ideation (BSS-5 total score) and (2) global suicide risk (SBQ-R total score). Covariates included a) number of traumatic event types experienced (LEC-5 total score), b) negative affectivity (PANAS-NA total score), and c) gender. Ten thousand bootstrap re-samplings were conducted to detect the indirect effects of the predictor variable (PCL-5 total score) on the outcome variables via perceived distress tolerance (DTS total score). Path a signified the direct effect of PTSD symptom severity (PCL-5 total score) on perceived distress tolerance (DTS total score). Path b signified the direct effect of perceived distress tolerance (DTS total score) on both suicidality outcomes. Path c and path c' indicated the total (direct + indirect effect) and direct effects, respectively, of PTSD symptom severity (PCL-5 total score) on both suicidality outcomes. Finally, path a*b signified the indirect effect of PTSD symptom severity (PCL-5 total score) on both suicidality outcomes via perceived distress tolerance (DTS total score). Thus, the indirect effect was calculated as the product of the path "a" and path "b" beta coefficients. A bootstrap confidence interval without zero indicates a significant indirect effect (Preacher & Hayes, 2008).

Results

Descriptive Statistics

A summary of participant characteristics is presented in Table 1. Regarding normality, the LEC-5 total score, PCL-5 total score, SBQ-R total score, and BSS-5 total score distributions were all positively skewed within the sample. The PANAS negative affect score and DTS total score distributions were normally distributed within the sample. To account for the positive skew, log transformations were conducted on the LEC-5 total score, PCL-5 total score, SBQ-R total score, and BSS-5 total score[1]. No missingness in the data was detected. Examination of collinearity diagnostics revealed no evidence of excess collinearity among predictors (variance inflation index [VIF] < 1.53). VIF values greater than 10.0, indicating problematic collinearity (Mason & Perreault, 1991), were not observed.

The sample consisted of 639 women (78.0%), 177 men (21.6%), and 3 transgender individuals (0.4%) from an undergraduate population at UH. The mean age was 22.0 years ($SD = 5.2$). The racial composition of the sample was 52.5% White ($n = 430$), 24.9% Asian ($n = 204$), 11.4% 'Other' ($n = 93$), 8.9% African American ($n = 73$), 1.8% American Indian/Alaskan Native ($n = 15$), and 0.5% Native Hawaiian/Pacific Islander ($n = 4$). Further, 32.4% ($n = 265$) identified as Hispanic or Latino. The average number of traumatic event types experienced by this sample was 4.75 ($SD = 2.68$), with natural disaster (83.8%), transportation accident (76.3%), and life-threatening illness or injury (42.6%) as the most commonly endorsed event types. The mean PCL-5 score for the sample was 15.9 (SD = 16.2), indicating average low levels of PTSD symptomatology. Approximately 16.5% ($n = 135$) of the sample met criteria for PTSD per the recommended PCL-5 diagnostic cutoff of 33 (Bovin

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[1] The patterns of results remained consistent with and without log transformations.

et al., 2015). Approximately 30.5% (n = 250) of participants met criteria for current global

suicide risk per the recommended SBQ-R cutoff of 7 (Osman et al; 2001).

Bivariate Correlations

Bivariate correlations for study variables are presented in Table 2. PTSD symptom

severity was significantly positively associated with global suicide risk (r = .39, p < .01) and

suicidal ideation severity (r = .36, p < .01). Distress tolerance was significantly negatively

associated with PTSD symptom severity (r = -.40, p < .01), global suicide risk (r = -.33, p

< .01), and suicidal ideation severity (r = -.32, p < .01). With regard to covariates, trauma

load was significantly positively associated with PTSD symptom severity (r = .33, p < .01),

global suicide risk (r = .17, p < .01), and suicidal ideation severity (r = .07, p < .05). Trauma

load was not significantly related to distress tolerance. Negative affect was significantly,

positively associated with PTSD symptom severity (r = .48, p < .01), global suicide risk (r

= .35, p < .01), and suicidal ideation severity (r = .37, p < .01); negative affect was negatively

associated with distress tolerance (r = -.50, p < .01). Finally, endorsing male (versus female)

gender was significantly related to increased trauma load (r = -.12, p < .01) and greater

perceived distress tolerance (r = -.10, p < .01).

Mediation Analyses

Please see Table 3 for a summary of mediation analyses. Controlling for covariates,

distress tolerance (DTS; mediator) was negatively associated with (1) global suicide risk

(SBQ-R) and (2) suicidal ideation severity (BSS-5; path b in Table 3). In terms of the

association between PTSD severity (PCL-5) and global suicide risk, the total effect (path c)

and direct effects (path c′) were statistically significant. The indirect effect (path a*b) was

significant, indicating a significant association of PTSD severity with global suicide risk

through distress tolerance. Second, with regard to the association between PTSD severity and suicidal ideation severity, the total effect (path c) and the direct effect (path c′) were statistically significant. The indirect effect of PTSD severity on suicidal ideation severity (path a*b) was significant, indicating a significant association of PTSD severity with suicidal ideation severity through distress tolerance.

Discussion

Suicidal ideation and behavior are a serious mental health concern among university students (ACHA, 2017; Appelbaum, 2008). The current study examined, among undergraduate students, the direct effects of PTSD symptom severity and distress tolerance in relation to suicidality, defined as suicidal ideation and global suicide risk; and tested the mediating role of distress tolerance in the association between PTSD symptom severity and suicidality. The hypotheses were largely supported. All effects were documented after controlling for theoretically relevant covariates, including trauma load, negative affectivity, and gender.

Consistent with the hypotheses, PTSD symptom severity was significantly associated with suicidality in university undergraduates, above and beyond the effects of covariates. PTSD symptom severity demonstrated a positive association with both suicidality outcomes (i.e., suicidal ideation, global suicide risk), indicating that more severe PTSD symptoms are associated with heightened suicidal ideation and suicide risk. These findings are consistent with extant literature, which has demonstrated that PTSD symptom severity is associated with suicidal ideation (e.g., Krysinksa & Lester, 2010; Marshall et al., 2001) and behavior (e.g., Panagioti, Gooding, & Tarrier, 2012; Rojas et al., 2017); Sareen et al., 2007). Given high trauma exposure rates (Frazier et al., 2009; Kirk & Dollar, 2008) and heightened

suicidal behavior prevalence (ACHA, 2017; Appelbaum, 2006; Wilcox et al., 2010) among university students, it is important to continue to build upon our understanding of the PTSD-suicidality association in this population.

Second, results demonstrated a significant, negative association between distress tolerance and suicidality, after controlling for covariates. As hypothesized, distress tolerance is negatively associated with both suicidal ideation severity and suicide risk. In other words, a lower ability to withstand distress is associated with heightened suicidal ideation and suicide risk. These particular findings further strengthen theoretical and empirical data which suggest that perceived distress tolerance is associated with suicidal ideation (Anestis et al., 2011a; Anestis & Joiner, 2012; Vujanovic et al., 2017) and suicide risk (Anestis et al., 2011b; Bender et al., 2012). Indeed, low perceived distress tolerance has been associated with heightened suicidal desire or suicidal ideation in undergraduate, community, psychiatric inpatient and outpatient, and firefighter populations (e.g., Anestis et al., 2011a, b; Bartlett et al., 2018; Capron, Norr, Macatee & Schmidt, 2013). Given the high rates of suicidal ideation and behavior among undergraduate students (Appelbaum, 2006; Heron, 2017), future work is needed to explore the relationship between distress tolerance and suicidality in this vulnerable population in order to inform specialized suicide prevention programs.

Finally, as hypothesized, an indirect effect was established between PTSD and suicidality (i.e., suicidal ideation and suicide risk) through distress tolerance. Please see Figure 1 for a depiction of the theoretical model. This indicates that, among university students, lower levels of distress tolerance may account for the association between heightened PTSD symptom severity and suicidal ideation as well as suicide risk. These findings replicate and extend past work that documented these associations among

psychiatric inpatients (Vujanovic et al., 2018). Notably, research has also supported a moderating role of distress tolerance in the association between PTSD and suicide risk among firefighters (Bartlett et al., 2018), psychiatric inpatients (Vujanovic et al., 2017), and adults in residential substance use treatment (Anestis et al., 2012). However, the current study is the first to assess the relationship between PTSD symptom severity and suicidality (i.e., suicidal ideation and suicide risk) via distress tolerance in university students, therefore contributing to the growing literature on this association. Future work might continue to explore these associations among university students using various methodologies, including interview-based measures and longitudinal designs.

Although not the primary aims of the study, there were additional findings worthy of mention. First, PTSD symptom severity and distress tolerance were significantly, negatively associated at the bivariate level ($r = -.40$), demonstrating an association similar in magnitude to that found in trauma-exposed community samples ($r = -.42$, Marshall-Berenz et al., 2010; $r = -.38$, Vujanovic et al., 2011b), but somewhat stronger than the association found in firefighter ($r = -.29$, Bartlett et al., 2018) and military veteran ($r = -.30$, Banducci et al., 2017) populations. Generally, present findings are consistent with past research, which indicates a negative correlation between PTSD and distress tolerance in civilian (Fetzner, Peluso, & Asmundson, 2014; Marshall-Berenz et al., 2010; Vujanovic et al., 2011b, Vujanovic et al., 2013), firefighter (Bartlett et al., 2018), psychiatric inpatient (Vujanovic et al., 2017), substance-using (Vujanovic, Rathnayaka, Amador, & Schmitz, 2015), and veteran populations (Banducci, Bujarski, Bonn-Miller, Patel, Connolly, 2016; Banducci et al., 2017). Second, trauma load (i.e., number of reported trauma exposure types) was significantly positively associated with both global suicide risk ($r = .17$) and suicidal ideation severity ($r =$

.10). These findings are also consistent with past work, demonstrating that the experience of trauma is an independent and significant correlate of suicide risk (e.g., Bartlett et al., 2018; Vujanovic et al., 2017). Third, gender was significantly negatively correlated with both trauma load (r = -.12) and distress tolerance (r = -.10), indicating that students who identified as male were more likely to report a higher number of traumatic event types and greater self-reported distress tolerance as compared to those students who identified as female. These findings are consistent with extant literature, indicating that males report increased exposure to trauma (Danielson et al., 2017; Marshall-Berenz et al., 2010). Past work also indicates that males report greater perceived distress tolerance, as based upon college student (Kraemer et al., 2017; Chowdhury et al., 2018), community (Marshall-Berenz, Vujanovic, Bonn-Miller, Bernstein, & Zvolensky, 2010; Vujanovic et al., 2018), psychiatric inpatient (Vujanovic et al., 2016; Vujanovic et al., 2017), and substance use samples (Vujanovic et al., 2016). Overall, additional research examining these constructs in university samples is needed to better understand these phenomena and to inform prevention and intervention work among university students.

The results of the current study should be interpreted in light of several limitations. First, while a strength of the sample was its diversity with regard to race/ethnicity, socio-economic status, sexual orientation, and academic year, the majority of the sample identified as female (78.0%). This is in contrast to the overall student body at UH, which has approximately even gender distribution (University of Houston Institutional Research, 2018). Second, the study utilized a cross-sectional design. Thus, no inferences regarding causality may be inferred. Future work may address this limitation through the use of longitudinal and experimental designs in order to better understand the relations among PTSD, distress

tolerance, and suicidality among university students. Third, while the self-report methodology facilitated the screening of a large sample of university students, effects of method variance and reporting bias cannot be ruled out. Future research may benefit from employing interview-based measures of PTSD and multimodal measures (i.e., self-report and behavioral indices) of distress tolerance to better distill relations between PTSD and perceived or behaviorally-indexed distress tolerance associations with suicidality in this population. Finally, the measures of suicide incorporated within the current study contained only limited queries of past attempts and/or non-suicidal self-injury. Increased research is needed to better understand associations of PTSD and distress tolerance (both psychological and behavioral) with and past and present suicidal ideation, behavior, and non-suicidal self-injury among university students.

Overall, the current study also had many notable strengths. First, the current study evaluated a large sample of university students. Furthermore, this study was the first investigation to empirically document the mediating role of distress tolerance in the association between PTSD symptom severity and suicidality among university students. Future research should build upon these preliminary findings by investigating these associations using behavioral measures of distress tolerance and more detailed measures of suicidal and self-injury behaviors. Research examining factors that impact the association between PTSD and suicidality among diverse university students may inform interventions to reduce the burden of suicidality within the higher education.

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Table 1

Participant Characteristics (n = 819)

Variable	Mean (SD) / n (%)
Gender[1]	
Male	177 (21.6%)
Female	639 (78.0%)
Transgender	3 (0.4%)
Age[1]	22.0 (5.2)
Race[1]	
White	430 (52.5%)
Asian	204 (24.9%)
Other'	93 (11.4%)
Black/African American	73 (8.9%)
American Indian/Alaskan Native	15 (1.8%)
Native Hawaiian/Pacific Islander	4 (0.5%)
Ethnicity[1]	
Hispanic/Latino	265 (32.4%)
Not Hispanic/Latino	554 (67.6%)
Sexual orientation[1]	
Heterosexual	491 (82.9%)
Bisexual	44 (7.4%)
Gay or Lesbian	20 (3.4%)
Asexual	19 (3.2%)
Pansexual	9 (1.5%)
Other'	6 (1.0%)
Queer	3 (0.5%)
Marital status[1]	
Single/never married	742 (90.6%)
Married	64 (7.8%)
Divorced	10 (1.2%)
Separated	2 (0.2%)
Widowed	1 (0.1%)
Academic year[1]	
Freshman (0-29 semester hours)	127 (15.5%)
Sophomore (30-59 semester hours)	194 (23.7%)
Junior (60-89 semester hours)	280 (34.2%)
Senior (90 or more semester hours)	205 (25.0%)
Post-Baccalaureate (graduated with degree but currently enrolled in classes)	13 (1.6%)
Grade point average (GPA) [1]	3.3 (2.1)
Annual household income[1]	

$0 - $15,000	78 (13.2%)
$15,001 - $25,000	54 (9.1%)
$25,001 - $ 35,000	54 (9.1%)
$35,001 - $50,000	85 (14.4%)
$50,001 - $75,000	95 (16.0%)
$75,001 - $100,000	84 (14.2%)
$100,001 - $200,000	91 (15.4%)
More than $200,000	51 (8.6%)
LEC Total[2]	4.7 (2.7)
Trauma exposure (happened to me, witnessed it, and/or part of my job) [2]	
Natural disaster	686 (83.8%)
Fire or explosion	250 (30.5%)
Transportation accident	625 (76.3%)
Serious accident	258 (31.5%)
Exposure to toxic substance	81 (9.9%)
Physical assault	341 (41.6%)
Assault with a weapon	101 (12.3%)
Sexual assault	113 (13.8%)
Other unwanted or uncomfortable sexual experience	247 (30.2%)
Combat or exposure to a war-zone	31 (3.8%)
Captivity	16 (2.0%)
Life-threatening illness or injury	349 (42.6%)
Severe human suffering	116 (14.2%)
Sudden violence death	95 (11.6%)
Sudden accidental death	122 (14.9%)
Serious injury, harm, or death you caused to someone else	52 (6.3%)
Any other stressful event or experience	209 (25.5%)
PCL Total[3]	15.9 (16.2)
Current PTSD (PCL-5 >= 33) [3]	135 (16.5%)
SBQ-R Total[4]	5.6 (3.0)
Current global suicide risk (SBQ-R >= 7) [4]	250 (30.5%)
Past year suicidal ideation (SBQ-R item 2) [4]	
Never	513 (62.6%)
Rarely (1 time)	129 (15.8%)
Sometimes (2 times)	90 (11.0%)
Often (3-4 times)	43 (5.3%)
Very Often (5 or more times)	44 (5.4%)
BSS-5 (screener) [5]	0.7 (1.5)

Note. [1]Demographics Questionnaire; [2]LEC-5: Life Events Checklist for DSM-5; [3]PCL-5: PTSD Checklist for DSM-5; [4]SBQ-R: Suicide Behavior Questionnaire – Revised; [5]BSS-5: Beck Suicide Scale for DSM-5.