Posttraumatic Stress Disorder and Suicidal Ideation: The Moderating Effect of Cognitive Distortions

by

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Abstract

Although individuals with posttraumatic stress disorder (PTSD) are at an increased risk for suicidal ideation (SI; Tarrier & Gregg, 2004), it is unclear which factors could influence this relationship. It is hypothesized that negatively distorted posttraumatic cognitions such as self-blame and negative beliefs about the world or self might play a role, but this has not been investigated empirically. Accordingly, the present study examined a moderation model in which the effect of PTSD on SI is moderated by cognitive distortions. To identify the specific source of this hypothesized moderation effect, the moderation model was run separately for PTSD total severity and PTSD symptom clusters in combination with each of three types of cognitive distortions (i.e., self-blame and negative cognitions about the self and world). Trauma-exposed undergraduates ($N = 410$) completed measures of traumatic event exposure, PTSD, cognitive distortions, and SI. As expected, all PTSD variables significantly predicted SI. Further, negative cognitions about the world moderated the relationship between all six measured PTSD variables and SI. Analyses of simple slopes revealed strong and significant effects of all measures of PTSD on SI at high levels of negative cognitions about the world. These findings highlight the importance of assessing cognitive distortions in determining suicide risk with trauma survivors.

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Introduction

There is a well-established relationship between posttraumatic stress disorder (PTSD) and suicidal behavior (Nock et al., 2009; Panagioti, Gooding, & Tarrier, 2009, 2012), including suicidal ideation (SI; Tarrier & Gregg, 2004; Panagioti et al., 2012; Floen & Elklit, 2007; Davidson, Hughes, Blazer, & George, 1991). Studies comparing trauma-exposed individuals with and without PTSD have shown that those with PTSD show higher rates of SI (Krysinka & Lester, 2010; Panagioti et al., 2012), suicide attempts (Davidson et al., 1991; Kessler, Borges, & Walters, 1999), and death by suicide (Gradus et al., 2010). While these relationships have all been well corroborated, the strongest support appears to be for the relationship between PTSD and SI.

Specific empirical studies have substantiated the relationship between PTSD and SI. The relationship between PTSD and SI has been established in both military (Guerra, Calhoun, Mid-Atlantic Mental Illness Research, Education and Clinical Center Workgroup, 2011; Brunet & Monson, 2014; Hendin & Hass, 1991) and civilian samples (Floen & Elklit, 2007; Tarrier & Gregg, 2004; Wilcox, Storr, & Breslau, 2009). In addition to these studies with specific populations, large national and epidemiological studies have confirmed the positive and significant relationship between SI and PTSD (Ullman & Brecklin, 2002; Sareen, Houlahan, Cox, & Asmundson, 2005; Bernal et al., 2007). Meta-analytic studies (i.e., Krysinka & Lester, 2010; Panagioti et al., 2012) have determined that there is a positive relationship between PTSD and SI across multiple variables including age, gender, and trauma type. Moreover, this

relationship is sustained even after controlling for depressive symptomatology. While the relationship between PTSD and SI has been well-established and widely investigated, there is wide variability in the strength of the relationship between PTSD and SI across samples (see Krysinka & Lester, 2010 for a review), as such it is unclear what factors could influence the relationship between PTSD and SI.

It is possible that the relationship between PTSD and SI is influenced by cognitive distortions (i.e., the relationship between PTSD and SI changes in size, magnitude, or sign in the presence of cognitive distortions.) Cognitive distortions are defined as an individual's inaccurate interpretations of events, or errors in thinking (Tolin, 2016). Cognitive distortions have been implicated in many psychological disorders, including PTSD (e.g., Moser, Hajcak, Simons, & Foa, 2007). In the context of PTSD, cognitive distortions are more aptly described as posttraumatic cognitions. Posttraumatic cognitions have been studied widely in the context of PTSD, and as a result of their apparent importance, were incorporated into the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*) criteria for PTSD (APA, 2013). Foa and colleagues provided the most widely accepted conceptualization of posttraumatic cognitions through the development of the Posttraumatic Cognitions Inventory (PTCI; Foa, Ehlers, Clark, Tolin, & Orsillo, 1999). Grounded in posttraumatic psychopathology, the PTCI divides posttraumatic cognitions into three domains: negative cognitions about the self, negative cognitions about the world, and self-blame. Negative cognitions about the self include thoughts such as not being able to trust oneself, feeling as though one is weak, and feeling as though one is inadequate. Negative cognitions about the world include thoughts such as not being able to trust others, having to be alert of possible harm all the time, and feeling as though the world is a

dangerous place. Lastly, thoughts of self-blame include thinking that an event happened because of something that one did.

Cognitive models of PTSD highlight the importance of cognitive distortions in the development of PTSD. Particularly, these models emphasize the central role of schemas, which are cognitive structures that organize information and experiences (e.g., McCann, Sakheim, & Abrahamson, 1988). The underlying theme of these theories is the notion that individuals develop and maintain schemas about themselves, others, and the world. Schemas are both positive and negative and continue to be shaped over time by individuals' experiences, the influence of themselves, and the influence of their culture. Schemas are challenged when individuals experience traumatic events. Following exposure to a traumatic event, individuals compare information about the trauma against existing schemas and then either incorporate this information into existing schemas (assimilation) or update and alter their schemas to reflect this new information (accommodation). However, if an individual is unable to assimilate or accommodate the new information, the result is psychological distress, and possibly PTSD (McCann et al., 1988; Brewin, Dalgleish, & Joseph, 1996).

Incongruent information (such as traumatic information) is constantly checked against existing schemas, which causes cognitive processing to continue until the discrepancy is resolved and the information is incorporated into existing schemas. In some cases, however, traumatic information is too discrepant with existing schemas and thus is unable to be incorporated into them, which can result in the development of maladaptive schemas about ourselves and the world. Within these schemas are cognitive distortions such as "I am bad," "I am worthless," and "the world is bad" (McCann et al., 1988).

Consistent with this view is Janoff-Bulman (1992)'s concept of shattered assumptions. According to Janoff-Bulman, people have three basic assumptions: the belief in personal invulnerability, the belief that the world is meaningful, and the perception that oneself is positive. The experience of traumatic events essentially "shatters" these assumptions, leading individuals to question their basic beliefs about the world and themselves. Trauma survivors experience a loss of meaning in their life and a loss of equilibrium and stability. These individuals no longer hold basic and true assumptions about the world, and have difficulty incorporating their experience of trauma into their previously held beliefs and schemas. As a result, these individuals may maintain these shattered assumptions about themselves, others, and the world, again giving rise to cognitive distortions (Janoff-Bulman, 1992).

In addition to theory, empirical research with trauma-exposed individuals has demonstrated the relationship between PTSD and cognitive distortions. Previous findings have demonstrated that there is a positive relationship between PTSD symptom severity and cognitive distortions (e.g., Cromer & Smyth, 2010; Kolts, Robinson, & Tracy, 2004; Daniels et al., 2011; Owens & Chard, 2011) Specifically, cognitive distortions about the self have been shown to be uniquely and positively associated with PTSD symptom severity (Daniels et al., 2011; Cromer & Smyth, 2010; Moser et al., 2007; Cox, Resnick, & Kilpatrick, 2014).

In addition to the relationship between PTSD and cognitive distortions, cognitive distortions, as measured by the PTCI (Foa et al., 1999) have been shown to be related with SI (e.g., McLean et al., 2017). Specifically, negative cognitions about the self were associated with greater SI (McLean et al., 2017). Moreover, more negative views of the world were associated with greater suicidal ideation and behavior (Brewin, Garnett, & Andrews, 2011). As such, this prior research points to a relationship between cognitive distortions and SI.

As evidenced by the previous review, there is support for a model that includes PTSD, cognitive distortions, and SI. Previous findings provide some information about each of the relationships, however, we do not know the exact nature of the relationships between these concepts. The most straightforward way to investigate these relationships would be to conduct a moderation analysis using one measure of PTSD, one measure of cognitive distortions, and SI. However, these relationships may be much more complex than this, because the constructs of interest (i.e., PTSD and cognitive distortions) are multifaceted. First, cognitive distortions can be broken down into three different domains: negative cognitions about the world, negative cognitions about the self, and self-blame. Given the multifaceted nature of cognitive distortions, and the substantive differences between these components, it is important to investigate all three and their influence on the relationship between PTSD and SI in order to parse out if a specific type of cognitive distortions influences the relationship between PTSD and SI. At this point, it is necessary to investigate at least three influences on the relationship between PTSD and SI. However, PTSD is also a complex construct with several underlying clusters.

In addition to measuring the underlying components of cognitive distortions, PTSD also contains underlying clusters that are important to parse out and measure. PTSD consists of 20 different symptoms that are divided into four different symptom clusters: reexperiencing symptoms (Cluster B), avoidance symptoms (Cluster C), negative alterations in cognitions and mood (Cluster D), and alterations in arousal symptoms (Cluster E). As such, it may be that the relationship between PTSD and SI is explained by the association between one of these clusters and SI rather than the entire syndrome. Evidence for parsing out PTSD into its clusters comes from extensive previous literature investigating the relationships between specific symptom clusters and SI. Further research into these models have shown that specific symptoms clusters

have different relationships with SI. Based on a review of the literature, the field has not yet come to a consensus about which PTSD cluster may be most strongly related to SI. All four (*DSM-5*) symptom clusters have been shown to predict SI: reexperiencing (Davis et al., 2014; Barr et al., 2016), avoidance (Lemaire et al., 2011), numbing (now called negative alterations in cognitions and mood in *DSM-5*; Guerra et al., 2011; Davis et al., 2014; Hellmuth et al., 2012; Levi-Belz, 2015; Pietrzak et al., 2015). However, while all these associations have been shown, it appears as though the preponderance of evidence for the strongest relationship between a PTSD symptom cluster and SI is for the numbing cluster (Guerra et al., 2011; Davis et al., 2014; Hellmuth et al., 2012; Levi-Belz, 2015; Pietrzak et al., 2015).

Given the lack of consensus in the field about which cluster is most strongly related to SI, all four clusters and their differential associations with SI were investigated. In addition, given the mounting evidence that the numbing cluster might be the cluster that is most strongly associated with SI, special attention was paid to this cluster by breaking it down into two parts: negative affect and anhedonia. Further justification for this breakdown comes from extensive confirmatory factor analysis (CFA) that supports models of PTSD with six factor anhedonia model of PTSD and a seven factor hybrid model of PTSD (e.g., Blevins, Weathers, Davis, Witte, & Domino, 2015).

The Present Study

The current study had three aims: first, to replicate and extend previous findings on the relationships between specific symptom clusters of PTSD and SI. In particular, the current study aimed to replicate this relationship and to add to the body of literature on which PTSD symptom cluster is driving the relationship between PTSD and SI. Second, since no previous study has investigated the influence of cognitive distortions on the relationship between PTSD and SI, the

current study examined the role of cognitive distortions as a moderator on the relationship between PTSD and SI. Third, the current study aimed to examine the moderating relationship of cognitive distortions at the subscale level. The specific hypotheses evaluated were:

Hypothesis 1: There will be a direct effect of PTSD on SI.

Hypothesis 2: Negative affect and anhedonia will produce the strongest effects on SI.

Hypothesis 3: The relationship between PTSD and SI will be moderated by one of the three cognitive distortions subscales, particularly at high levels of cognitive distortions.

Hypothesis 4: Negative cognitions about the self will be the strongest moderator on the relationship between PTSD and SI, particularly at high levels of negative cognitions about the self.

Method

Participants and Procedure

Trauma-exposed undergraduate students currently enrolled in an undergraduate psychology class at a southeastern university participated in this study. Participants were recruited using an online system and self-selected to participate. Participants were granted 1.0 points of research credit for completing the 60-minute survey. This protocol was reviewed and approved by the University's Institutional Review Board in February of 2017.

Participants included in the final sample all meet the criteria for a *DSM-5* Criterion A traumatic event (APA, 2013). Traumatic event exposure was determined by reviewing participants' descriptions of their traumatic experience and by evaluating their responses on the Life Events Checklist for *DSM-5* (LEC-5; Gray, Litz, Hsu, & Lombardo, 2004). Two graduate students independently reviewed and evaluated participants' descriptions of their events and coded their Criterion A status. In order to meet the criteria for a *DSM-5* Criterion A traumatic

event, a participant must have experienced actual or threatened death, serious injury, or sexual violence by directly experiencing the event, witnessing the event, learning about the event happen to a close friend or family member, or by repeated exposure to adverse details of the traumatic event through their occupation (APA, 2013). Individuals who did not meet these criteria were not coded as meeting Criterion A and were not used in the final sample (n = 446). After indicating participant's Criterion A status, both graduate student raters also indicated their confidence in their Criterion A decision. Only individuals that the graduate student raters were "highly confident" that they experienced a Criterion A event were included in the final sample (n = 414). Any discrepancies in Criterion A status were resolved through discussion among the two raters and, if necessary, with the help of a doctoral-level psychologist, who is an expert in trauma assessment and PTSD. Lastly, individuals who did not complete any of the study measures were excluded from the final sample (n = 410). A description of the types of traumatic events reported by the participants can be found in Table 1.

The final sample consisted of 410 participants who ranged in age from 17 to 34 (M = 19.5, SD = 1.67). The majority of the sample self-identified as female (80.2%) and Caucasian (90.0%). Racially, the rest of the sample was made up of Black (5.9%), Asian (1.5%), Native Hawaiian or Pacific Islander (0.2%) and other (2.0%) individuals. In addition, 4.1% of the sample self-identified as Hispanic or Latino.

Measures

Demographics. A custom demographics questionnaire was created to gather information about participants. Included in this questionnaire were questions about age, race, ethnicity, student status, marital status, and work status.

PTSD Checklist for DSM-5 (PCL-5). PTSD symptoms were measured using the PCL-5, the most widely used self-report measure for PTSD (Blevins et al., 2015). The PCL-5 is a 20-item self-report questionnaire used to measure symptoms of PTSD that correspond to the *DSM- 5* diagnostic criteria for PTSD (APA, 2013). Participants were asked to identify their worst traumatic experience and complete the measure in reference to this event. Participants indicated on a 5-point Likert scale, ranging from zero (0 = *not at all*) to four (4 = *extremely*), how bothered they were by each of the *DSM-5* symptoms (i.e., reexperiencing, avoidance, negative alterations in cognitions and mood, and hyperarousal) of PTSD in the past month (APA, 2013). The PCL-5 has shown high internal consistency, strong test-retest reliability, and strong discriminant and convergent validity for evaluating PTSD symptoms (Blevins et al., 2015). Cronbach's alpha for the current sample was .95.

Life Events Checklist for DSM-5 (LEC-5). Traumatic event exposure and trauma type were determined using the LEC-5 (Gray et al., 2004). The LEC-5 is a self-report measure that asks participants about their experiences of 17 different traumatic events, including: natural disaster, fire, transportation accident, a serious accident at work, home, or during a recreational activity, exposure to a toxic substance, physical assault, assault with a weapon, sexual assault, combat, captivity, life-threatening illness or injury, severe human suffering, sudden violent or accidental death, and serious injury, harm, or death you caused to someone. Participants indicated the nature of their exposure to the event by checking if the event happened to them directly, they witnessed it, they learned about it, it was part of their job, they are unsure if they experienced the event, or if the event does not apply to them. The LEC-5 also includes several follow-up questions about the traumatic experiences to aid in determining Criterion A status. The LEC-5 has shown good stability over time and good convergent validity (Gray et al., 2004).

Posttraumatic Cognitions Inventory (PTCI). Cognitive distortions were measured using the PTCI (Foa et al., 1999). The PTCI is a 36-item self-report measure that asks participants about their thoughts and beliefs related to a traumatic event. Participants rate the degree to which they agree or disagree with each statement using a 7-point Likert scale ranging from one (1 = *totally disagree*) to seven (7 = *totally agree*). The items are split into three subscales: negative cognitions about the self (NCAS), negative cognitions about the world (NCAW), and self-blame (SB). The PTCI has been shown to be psychometrically sound, with strong internal consistency, good test-retest reliability, and good convergent validity for measuring cognitive distortions (Foa et al., 1999). Cronbach's alpha for the full scale was .96. Cronbach's alpha for the subscales ranged from .81 to .96.

Depressive Symptoms Inventory-Suicidality Subscale (DSI-SS). SI was measured using the DSI-SS (Joiner, Pfaff, & Acres, 2002). The DSI-SS is a short self-report measure (four items) that assesses suicidal ideation and impulses over the past two weeks. Participants are presented with four groups of statements (A-D), each of which include four statements of varying degrees of suicidal thoughts or behaviors. Participants are asked to choose the statement that best describes their thoughts and behavior during the past two weeks. The DSI-SS shows good internal consistency and good convergent validity (Joiner et al., 2002). Cronbach's alpha for the current sample was .93.

Data Analytic Plan

All analyses were conducted using Mplus Version 8 (Muthén & Muthén, 1998-2017). Given that not all items were normally distributed, a robust maximum likelihood (MLR) estimator was used (Curran, West, & Finch, 1996). A small proportion of the data were missing; covariance coverage for the proportion of pairwise present data ranged from .74 to 1.00. Data

were missing because participants chose not to answer items, or accidentally skipped items. Full Information Maximum Likelihood Estimator (FIML) was applied to handle missing data (Enders, 2010). Based on the guidelines detailed by Kline (2016) outliers were defined as three standard deviations above or below the mean and were fenced to these values. To ease in the interpretation of the subsequent analyses, data were standardized. Descriptive statistics for all study variables can be found in Table 2. All bivariate correlations were positive and can be found in Table 3.

A series of simple linear regression were conducted to estimate the direct effects of the PTSD variables on SI. Next, a series of moderation models, based on PROCESS Model 1, were tested (Hayes, 2018). This analysis involves testing the direct effects of PTSD and cognitive distortions on SI, and the interaction between PTSD and cognitive distortions on SI. This analysis produces path coefficients for each direct and interactive effects. Most importantly is the value of the interaction coefficient. If this coefficient is significant, the interaction between PTSD and cognitive distortions is significant, and cognitive distortions therefore moderates the relationship between PTSD and SI (i.e., the relationship between PTSD and SI is altered in the presence of cognitive distortions).

After simple moderation analyses revealed significant interactions, these interactions were "probed." Using the guidelines described by Hayes (2018), the "pick a point" approach was implemented to probe the interactions at three values (i.e., 16^{th}, 50^{th}, and 84^{th} percentiles, as recommended by Hayes, 2018). Also referred to as an analysis of simple slopes, this analysis involves selecting particular values of a moderator (in this case, particular values of cognitive distortions) and testing the conditional effect of the independent variable on the dependent

variable at these values. These values reveal the strength of the association of PTSD and SI at particular values of the moderator.

Results

Simple linear regressions revealed significant direct effects for all measures of PTSD on SI. Specifically, there was a direct effect of PTSD total symptom severity on SI ($\beta = .42$, $p < .001$), reexperiencing symptoms on SI ($\beta = .32$, $p < .001$), avoidance symptoms on SI ($\beta = .25$, $p < .001$), negative affect on SI ($\beta = .43$, $p < .001$), anhedonia on SI ($\beta = .43$, $p < .001$), and arousal symptoms on SI ($\beta = .36$, $p < .001$). As expected, negative affect and anhedonia showed the strongest effects on SI. Results of the direct effects are presented in Table 4.

Moderation analyses were conducted to investigate the moderating effect of several measures of cognitive distortions (NCAW, NCAS, and SB) on the relationship between several PTSD variables (PCL total, reexperiencing symptoms, avoidance symptoms, negative affect, anhedonia, and arousal symptoms). Results of the moderation analyses are presented in Table 5 and analyses of simple slopes are presented in Table 6.

First, self-blame was evaluated as a moderator on the relationship between PTSD and SI. There were no significant interactions involving self-blame. Results of these interactions are displayed in Table 5.

When NCAS was evaluated as a moderator on the relationship between PTSD and SI, there was one significant interaction. Specifically, there was a significant interaction between negative affect and NCAS on SI ($\beta = .24$, $SE = 0.08$, $p < .01$). Analysis of simple slopes indicated that there was a marginally significant effect for those with low levels of NCAS, but not for those with moderate or high levels of NCAS. Among those with low levels of NCAS, negative affect was slightly negatively associated with SI ($\beta = -.13$, $t = -2.46$, $p < .05$).

When NCAW was evaluated as a moderator, there were significant interactions between all six PTSD variables and NCAW on SI. First, there was a significant interaction between PTSD total symptom severity and NCAW on SI ($\beta = .23$, $SE = 0.07$, $p < .01$). Analysis of simple slopes indicated significant effects at both moderate levels of NCAW and high levels of NCAW, but not at low levels of NCAW. Specifically, for those with moderate and high levels of NCAW there was a strong and positive relationship between PTSD total symptom severity and SI ($\beta = .18$, $t = 4.07$, $p < .001$; $\beta = .43$, $t = 4.13$, $p < .001$). Of note, at higher levels of NCAW, PTSD total symptom severity and SI were more strongly associated than at moderate levels of NCAW ($\beta = .43$ vs. $\beta = .18$). Second, there was a significant interaction between reexperiencing symptoms and NCAW on SI ($\beta = .20$, $SE = 0.07$, $p < .01$). Analysis of simple slopes indicated significant effects at both moderate levels of NCAW and high levels of NCAW, but not at low levels of NCAW. These results indicated that for those with moderate and high levels of NCAW there was a strong and positive relationship between reexperiencing symptoms and SI ($\beta = .13$, $t = 2.77$, $p < .01$; $\beta = .37$, $t = 3.90$, $p < .001$). Of note, reexperiencing symptoms and SI were more strongly associated at high levels of NCAW than at moderate levels ($\beta = .37$ vs. $\beta = .13$). Third, there was a significant interaction between avoidance symptoms and NCAW on SI ($\beta = .17$, $SE = 0.06$, $p < .01$). Analysis of simple slopes revealed a significant effect at high, but not low or moderate, levels of NCAW. Specifically, at high levels of NCAW, there was a significant and positive relationship between avoidance symptoms and SI ($\beta = .26$, $t = 2.80$, $p < .01$).

Fourth, there was a significant interaction between negative affect and NCAW on SI ($\beta = .24$, $SE = 0.07$, $p < .001$). Analysis of simple slopes revealed a positive and significant relationship between negative affect and SI for both individuals with moderate ($\beta = .19$, $t = 3.93$, $p < .001$) and high levels of NCAW ($\beta = .45$, $t = 4.29$, $p < .001$), but not for individuals with low

levels of NCAW. Of note, negative affect and SI were more strongly associated at high levels of NCAW than at moderate levels of NCAW (β = .45 vs. β = .19). Fifth, there was a significant interaction between anhedonia and NCAW on SI (β = .21, SE = 0.08, p < .01). Analysis of simple slopes revealed a significant and positive relationship between symptoms of anhedonia and SI at both moderate (β = .19, t = 3.93, p < .001) and high levels of NCAW (β = .38, t = 3.40, p < .01), but not at low levels of NCAW. Of note, anhedonia and SI were more strongly associated at higher levels of NCAW than at moderate levels of NCAW (β = .38 vs. β = .19)

Sixth, there was a significant interaction between arousal symptoms and NCAW on SI (β = .24, SE = 0.07, p < .01). Analysis of simple slopes revealed that at high levels of NCAW there was a significant and positive relationship between arousal symptoms and SI, such that for those with high levels of NCAW, arousal symptoms were significantly and positively associated with SI (β = .35, t = 3.34, p = .001). While there was no relationship between arousal symptoms and SI at moderate levels of NCAW, there was a slight negative relationship between arousal symptoms and SI at low levels of NCAW (β = -.18, t = -2.59, p < .05).

Discussion

The current study aimed to replicate and extend previous findings on the relationship between PTSD and SI, both at the overall symptom severity level and at the cluster level. Moreover, the current study also aimed to examine various measures of cognitive distortions as moderators of the relationship between PTSD and SI. These findings replicate previous findings that have shown that there is a relationship between PTSD and SI, and that cognitive distortions may influence this relationship. These findings also extend previous research by investigating specific symptom clusters of PTSD and specific cognitive distortions.

First, the present study replicated previous findings that there is a positive and significant relationship between PTSD and SI. Consistent with previous findings, the subsets of Cluster D (i.e., negative affect and anhedonia) emerged as having the strongest direct effects on SI. While there is no consensus in the field on which PTSD cluster is most strongly associated with PTSD, previous findings have found strong evidence for the numbing cluster to be most strongly related to SI (Guerra et al., 2011; Davis et al., 2014; Hellmuth et al., 2012; Levi-Belz, 2015; Pietrzak et al., 2015), which is similar to negative alterations in cognitions and mood in *DSM-5*.

While cognitive distortions did emerge as a moderator on the relationship between PTSD and SI, NCAS did not emerge as the strongest moderator of this relationship. However, NCAS moderated one relationship with SI: with negative affect. Further analysis of these relationship revealed only marginally significant effects at low levels of NCAS. Given that this effect was only marginally significant, it should be interpreted with caution. Based on these results, it appears that NCAS is not an important influence on the relationship between PTSD and SI.

While NCAS did not appear to be an important influence on the relationship between PTSD and SI, the current study demonstrated the importance of the influence of NCAW on this relationship. NCAW moderated the relationships between all six measures of PTSD and SI. NCAW influenced the relationship between PTSD and SI, regardless of the measure of PTSD that was used. This is the first time to our knowledge that such a relationship has been demonstrated. The current study provides support for a relationship between PTSD, NCAW, and SI, specifically suggesting that NCAW moderate the relationship between PTSD and SI.

Probing of the significant interactions revealed even more insight into the relationship between PTSD, SI, and the influence of NCAW. In particular, the relationship between PTSD and SI differed across levels of NCAW, and differed depending on the measure of PTSD used.

Of particular note, among the significant results, PTSD and SI were more strongly associated at higher levels of NCAW. Overall, these results highlight the differential relationship between PTSD and SI based on levels of cognitive distortions. In particular, it is important to note that it appears the relationship between measures of PTSD and SI is strongest at high levels of NCAW.

Unexpectedly, NCAW emerged as the most important and strongest moderator of the relationship between different measures of PTSD and SI. This finding was unexpected, based on the bivariate correlations that show that NCAS was most strongly associated with SI. One possible explanation for this is the different shapes of the distributions of the measures of cognitive distortions. Specifically, NCAW was more normally distributed, whereas NCAS was more positively skewed. As such, it is possible that there was a ceiling effect for NCAS, but not for NCAW. Another possible explanation for the stronger effect of NCAW than NCAS could be the relationship between traumatic event type and these measures. Given that the most common type of traumatic event experienced in this sample was a transportation accident, it is possible that NCAW are more common than NCAS in this sample. However, research on cognitive distortions and their association with traumatic event type is sparse and most focuses on the relationship between interpersonal trauma and cognitive distortions (e.g., Torres et al., 2013). Future research should investigate particular types of traumatic events and their relationships with cognitive distortions.

One alternative explanation for the moderating relationship of cognitive distortions on PTSD and SI is the overlap between PTSD symptoms and cognitive distortions, particularly negative affect. Given the addition of items evaluating negative feelings about oneself, other people, or the world to the *DSM-5* criteria for PTSD (APA, 2013), one could posit that these relationships are simply a factor of this overlap. However, the present study refutes this claim.

While the overlap between these symptoms may account for the relationship between Cluster D symptoms and negative affect symptoms with SI, the use of other measures of PTSD and the significant interactions between these PTSD variables and cognitive distortions support that the relationship occurs not merely because of the overlap in these symptoms, but because these variables are actually related.

Implications

These results highlight the necessity of carefully assessing cognitive distortions in individuals with symptoms of PTSD, particularly NCAW. As such, the results of the current study have important implications for clinical intervention and practice. Now that cognitive distortions have been incorporated into the *DSM-5* criteria for PTSD (APA, 2013), it is routine to evaluate for the presence of some cognitive distortions (i.e., item 9 on PCL-5; Blevins et al., 2015). However, it appears that a more thorough evaluation of negative cognitions, particularly about the world, is important. As such, clinicians should regularly and thoroughly assess for negative cognitions about the world in individuals with PTSD. Administering more extensive measures of cognitive distortions, such as the PTCI (Foa et al., 1999), could assist clinicians in assessing for cognitive distortions. Clinicians should also be aware that while individuals with PTSD symptoms are at an increased risk for developing SI, clinicians should also be aware that this relationship is further strengthened when the individual also presents with NCAW. These cognitions should be carefully assessed and addressed to prevent the development of SI. The assessment of cognitive distortions could be further developed by the creation of a clinician-administered interview of cognitive distortions.

Apart from the important implications for the thorough assessment of individuals with PTSD, the current study's results also have important implications for intervention. The results

of the current study highlight the importance of addressing cognitive distortions in individuals with PTSD to hinder the development of SI. Interventions such as Cognitive Processing Therapy (CPT; Resick, Monson, & Chard, 2017) are highly useful in the treatment of PTSD (e.g., Owens, Pike, & Chard, 2001). CPT aids clients in processing a traumatic event(s) by altering their cognitions about the traumatic event and its effects until they are assimilated into the client's existing schemas about the world, self, and others. By addressing these cognitive distortions, it is possible that interventions such as CPT could prevent the development of SI.

Limitations

The current study has important implications and contributions to the field, however, it is not without limitations. First, given the cross-sectional nature of the data and the types of analyses used (i.e., moderation), relationships can be established between the study variables, but causation cannot and should not be inferred. As such, future research should employ longitudinal designs such that causation and temporal relationships can be established between these variables. In addition, with the use of longitudinal data, more sophisticated modeling techniques (i.e., structural equation modeling) can be used to evaluate the relationships between PTSD, cognitive distortions, and SI.

Second, the population of the current study lacked heterogeneity. Specifically, participants were undergraduate students who were mostly Caucasian and female. While it is conceivable that these participants displayed lower levels of pathology compared to the general population, Bernat, Ronfeldt, Calhoun, and Arias (1998) demonstrated that undergraduate students experience traumatic events at similar levels as the general population. In addition, the generalizability and validity of the current findings are increased significantly through the use of

DSM-5 Criterion A to classify traumatic event exposure. Given that Criterion A was used to code traumatic event exposure, our sample is more similar to a community or clinical sample.

Lastly, the use of self-report measures introduces the possibility of some method error. While the current study used psychometrically sound, reliable, and valid measures, self-report measures require individuals to recall past events and feelings, which introduces the possibility of error due to methodology. Future studies should use clinician-administered interviews such as The Clinician-Administered PTSD Scale for DSM-5 (CAPS-5; Weathers et al., 2013) to decrease the possibility of method error.

Future Directions

As mentioned previously, future research should employ longitudinal designs so that causational relationships may be inferred between these variables. Moreover, the use of longitudinal designs will allow for more sophisticated statistical techniques, which will further detail the nature of the relationships between PTSD, cognitive distortions, and SI. In addition, given the possibility of method bias introduced by the use of self-report measures, future research should use clinician-administered interviews. Given that there is not a clinician-administered interview for cognitive distortions, such an interview should be developed and created.

In conclusion, the present study demonstrated a relationship between several measures of PTSD and SI. Moreover, the results of this study detail the moderating relationship of cognitive distortions, particularly NCAW, on this relationship. Future and continued research in this area will allow for more concrete insight into understanding and predicting of SI in vulnerable populations, with important implications for clinical practice.

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Appendix

Table 1

Frequency of Traumatic Event Types

Event Type	Total % (*n*)
Transportation accident	33.2 (136)
Sexual assault	14.6 (60)
Natural disaster	11.7 (48)
Suicide	9.5 (39)
Serious accident at work, home, or during recreational activity	6.6 (27)
Physical assault	6.6 (27)
Fire or explosion	4.6 (19)
Assault with a weapon	3.9 (16)
Sudden, unexpected death of someone close to you	2.7 (11)
Exposure to toxic substance	2.0 (8)
Other unwanted or uncomfortable sexual experience	1.5 (6)
Other non-interpersonal trauma	1.4 (6)
Sudden violent death	0.7 (3)
Combat or exposure to a war-zone	0.5 (1)
Captivity	0.2 (1)
Life-threatening illness or injury	0.2 (1)

Note. n = number of participants.

Table 2

Descriptive Statistics for PCL-5, DSI-SS, and PTCI Subscales

	N	M	SD
PCL-5	398	14.70	16.15
Re-experiencing	408	3.76	4.54
Avoidance	408	2.20	2.50
Negative Affect	406	3.37	3.84
Anhedonia	405	1.59	2.69
Arousal	402	3.64	4.75
PTCI Subscales			
NCAW	357	21.77	11.09
NCAS	347	37.36	21.38
SB	359	9.49	5.79
DSI-SS	326	0.51	1.30

Note. PCL-5 = PTSD Checklist for DSM-5; PTCI = Posttraumatic Cognitions Inventory; NCAW = Negative Cognitions About the World; NCAS = Negative Cognitions About the Self; SB = Self-Blame; DSI-SS = Depressive Symptoms Inventory-Suicidality Subscale; N = sample size; M = sample mean; SD = sample standard deviation.

Table 3

Bivariate Correlations Among PTSD, Cognitive Distortions, and Suicidal Ideation

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. PCL-5	1									
2. Re-experiencing	.90***	1								
3. Avoidance	.83***	.76***	1							
4. Negative Affect	.89***	.72***	.68***	1						
5. Anhedonia	.84***	.66***	.57***	.72***	1					
6. Arousal	.90***	.69***	.66***	.74***	.74***					
7. NCAW	.52***	.39***	.41***	.48***	.45***	.83***	1			
8. NCAS	.64***	.44***	.45***	.61***	.64***	.96***	.67***	1		
9. SB	.52***	.37***	.44***	.54***	.44***	.77***	.51***	.67***	1	
10. DSI-SS	.41***	.31***	.25***	.42***	.42***	.56***	.38***	.62***	.31***	1

Note. PCL-5 = PTSD Checklist for DSM-5; NCAW = Negative Cognitions About the World; NCAS = Negative Cognitions About the Self; SB = Self-Blame; DSI-SS = Depressive Symptoms Inventory-Suicidality Subscale; *** $p < .001$.

Table 4

Regression Coefficients for Direct Effects on Suicidal Ideation

Model	β
PTSD Total	0.42***
Re-experiencing	0.32***
Avoidance	0.25***
Negative Affect	0.43***
Anhedonia	0.43***
Arousal	0.36***

Note. *** $p < .001$; β = standardized beta values; PTSD Total = total score on PTSD Checklist for DSM-5 (PCL-5).

Table 5

The Interaction Between Measures of PTSD and Cognitive Distortions on SI

	NCAW		NCAS		SB	
Predictor	β	SE_β	β	SE_β	β	SE_β
PTSD	0.23**	0.07	0.18	0.09	0.10	0.08
Reexperiencing	0.20**	0.07	0.14	0.08	0.07	0.08
Avoidance	0.17**	0.06	0.05	0.08	0.05	0.08
Negative Affect	0.24***	0.07	0.24**	0.08	0.09	0.09
Anhedonia	0.21**	0.08	0.18	0.09	0.16	0.09
Arousal	0.24**	0.07	0.16	0.09	0.07	0.09

Note. NCAW = Negative Cognitions About the World; NCAS = Negative Cognitions About the Self; SB = Self-Blame; β = standardized beta values; SE_β = standard error of the standardized beta values; SI = suicidal ideation; PTSD = total score on PTSD Checklist for DSM-5 (PCL-5); *** $p < .001$; ** $p < .01$; * $p < .05$.

Table 6

Simple Slope Analyses for the Conditional Effects of Measures of PTSD on SI

		Low		Moderate		High	
Predictor	Moderator	β	t-value	β	t-value	β	t-value
Negative Affect	NCAS	-0.13*	-2.46	-0.08	-1.90	0.15	1.32
PTSD	NCAW	-0.08	-1.00	0.18***	4.07	0.43***	4.13
Reexperiencing		-0.10	-1.33	0.13**	2.80	0.37***	3.90
Avoidance		-0.15	-2.02	0.05	1.11	0.26**	2.80
Negative Affect		-0.08	-1.10	0.19***	3.93	0.45***	4.29
Anhedonia		-0.02	-0.27	0.19***	3.97	0.39**	3.40
Arousal		-0.18*	-2.59	0.09	1.79	0.35**	3.34

Note. *** $p < .001$; ** $p < .01$; * $p < .05$; NCAW = Negative Cognitions About the World; NCAS = Negative Cognitions About the Self; β = standardized beta values; PTSD = total score on PTSD Checklist for DSM-5 (PCL-5); Low = 16th percentile; Moderate = 50th percentile; High = 84th percentile.