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Anxiety Sensitivity and Distress Tolerance Typologies and Relations to Posttraumatic Stress Disorder: A Cluster Analytic Approach

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Abstract

A growing literature suggests a relationship between a high anxiety sensitivity (AS; the fear of anxiety and its related consequences)/low distress tolerance (DT; the capacity tolerate internal negative states) profile and posttraumatic stress disorder (PTSD) symptoms. However, specific profiles have not been identified or examined specifically in veteran samples. Thus, the aims of the present study were to establish empirically derived profiles created from response patterns on the Anxiety Sensitivity Index and Distress Tolerance Scale and to examine associations with PTSD symptom clusters among a sample of combat-exposed veterans ($N = 250$). A cluster analytic approach was utilized to identify AS/DT profiles, and a series of MANOVAs with post hoc analyses was conducted to examine the relationship between each AS/DT profile and each PTSD symptom cluster. Results indicated a three-cluster solution including a high AS/low DT “at risk” profile, a low AS/high DT “resilient” profile, and an average AS/DT “intermediate” profile. The at-risk profile was associated with significantly greater symptoms in each PTSD cluster (i.e., hyperarousal, avoidance, re-experiencing) when compared to the other two profiles. The at-risk profile was also associated with greater depressive symptoms and lower self-reported resilience. These findings extend the previous literature by identifying a high AS/low DT “at risk” profile and its associations with PTSD symptoms, underscoring the potential utility in targeting these affect-regulation constructs for clinical intervention.

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Keywords

Anxiety Sensitivity; distress tolerance; PTSD; cluster analysis

Introduction

Posttraumatic stress disorder (PTSD) is prevalent and associated with significant impairment in addition to high rates of psychiatric comorbidity (Kessler et al., 1995). Research efforts have increasingly focused on identifying transdiagnostic, cognitive-affective characteristics involved in the etiology and maintenance of PTSD and co-occurring conditions, with a particular emphasis on factors that are malleable to psychosocial intervention (e.g., Bullis, Fortune, Farchione, & Barlow, 2014; Vujanovic, Dutcher, & Berenz, 2016; Zvielli, Bernstein, & Berenz, 2012). Anxiety sensitivity (AS), the fear of anxiety and related consequences (Reiss, Peterson, Gursky, & McNally, 1986) and distress tolerance (DT), the capacity to tolerate negative internal states, (Simons & Gaher, 2005) in particular have emerged as promising targets.

Numerous studies have investigated AS and DT independently in relation to PTSD. AS is most often conceptualized as having three domains including cognitive, social, and physical, as measured by the self-report Anxiety Sensitivity Index (ASI-III; Taylor et al., 2007). Higher levels of AS are consistently associated with greater PTSD symptoms in both cross-sectional (Collimore, McCabe, Carleton, & Asmundson, 2008; Taylor, 1999, 2003) and longitudinal designs (Kilic, Kilic, & Yilmaz, 2008; Marshall, Miles, & Stewart, 2010; Norr, Albanese, Boffa, Short, & Schmidt, 2016). As a transdiagnostic risk factor, AS also has evidenced consistent associations with symptoms of depression, anxiety, and substance use disorders (Kushner, Thuras, Abrams, Brekke, & Stritar, 2001; Muris, Schmidt, Merckelbach, & Schouten, 2001; Stewart & Kushner, 2001). In an intervention study examining the role of AS in relation to PTSD and depressive symptoms, Mitchell and colleagues (2014) found that a reduction in AS cognitive concerns was significantly associated with reduction in PTSD and depression symptoms in both civilian and veteran samples, providing promising evidence of the clinical utility of AS reduction in intervention settings.

DT can be measured via self-report (e.g., Distress Tolerance Scale [DTS]; Simons & Gaher, 2005), in which an individual's *perception* of their ability to withstand negative emotional states is assessed. Studies concerning the associations between DT and PTSD have found that lower levels of self-reported DT are associated with greater PTSD symptom severity in community samples (Marshall-Berenz, Vujanovic, Bonn-Miller, Bernstein, & Zvolensky, 2010; Vujanovic, Bonn-Miller, Potter, Marshall, & Zvolensky, 2011). Studies in veteran samples have replicated this pattern of findings, with DT being inversely associated with PTSD symptoms, particularly the hyperarousal and intrusions symptom clusters (Vinci, Mota, Berenz, & Connolly, 2016). Banducci and colleagues (2016) examined the relationships among DT, intolerance uncertainty (IU), and PTSD among veterans in relation to substance use disorders (SUD), finding an interaction between DT and IU such that veterans with low DT and high IU exhibited higher self-reported PTSD. This study also found that only low DT (and not IU) was associated with trauma-cue elicited SUD cravings

(Banducci et al., 2016). Associations have also been found between low DT and depressive symptoms, anxiety, suicidal ideation, and substance use disorders (Anestis, Bagge, Tull, & Joiner, 2011; Buckner, Keough, & Schmidt, 2007; Capron, Norr, Macatee, & Schmidt, 2013; Ellis, Vanderlind, & Beevers, 2013), thereby supporting the concept of DT as a transdiagnostic risk factor.

Although the majority of investigations to date have evaluated DT and AS separately, emerging evidence supports the utility of examining the intersection of these constructs with respect to psychopathology processes. At least two studies have found that behavioral DT moderated an association between AS and PTSD symptoms (Berenz, Vujanovic, Coffey, & Zvolensky, 2012; Farris, Vujanovic, Hogan, Schmidt, & Zvolensky, 2014), although other work has failed to detect such an association when perceived DT was examined as a moderator (Kraemer, Luberto, & McLeish, 2013). The need for integration of AS and DT in studies of PTSD is highlighted by past work documenting significant associations between AS and self-reported DT (Bernstein, Zvolensky, Vujanovic, & Moos, 2009; Mitchell, Riccardi, Keough, Timpano, & Schmidt, 2013; Wolitzky-Taylor et al., 2015). Bernstein and colleagues (2009) have further demonstrated using factor analysis methods that AS and self-reported measures of DT share a common higher-order factor, termed an “affect tolerance and sensitivity factor.” As such, further efforts to integrate studies of AS and DT are likely to result in greater explanatory power of PTSD and related outcomes.

Given that a profile of high AS/low DT may be associated with PTSD and other forms of psychopathology (e.g., depression), a profile characterized by lower levels of AS and greater ability to tolerate distress (low AS/high DT) may reflect resilience (e.g., the ability to adapt in the aftermath of stress; Bonanno, Galea, Bucciarelli, & Vlahov, 2006). Lifetime prevalence of PTSD is an estimated 8.3%, making resilience the more common trajectory (Kessler et al., 2005). Thus, research aimed at understanding the role of AS and DT in resilience is also warranted.

The current study sought to address to extend the AS/DT and PTSD literature. First, an AS and DT classification system has yet to be established in the context of PTSD and related psychopathology (e.g., depression). Theoretically, individuals high in AS and low in perceived DT (i.e., high AS/low DT) may be more vulnerable to psychiatric symptoms post-trauma, as heightened fear of sensations associated with anxiety and perceived inability to tolerate such fear could contribute to maladaptive emotion regulation strategies (e.g., experiential avoidance; Hayes, Wilson, Gifford, Follette, & Stosahl, 1996). Classifying a heterogeneous group of individuals into AS/DT subgroups could facilitate our ability to identify individuals at elevated cognitive-affective risk for PTSD for the purposes of targeted secondary prevention and intervention (Clatworthy, Buick, Hankins, Weinman, & Horne, 2005). Second, no studies to our knowledge have evaluated the interplay of AS and DT with respect to PTSD in veteran samples. This is a significant limitation, given the high prevalence of trauma exposure and rates of PTSD in veteran samples compared to the general population (23% among veterans returning from Iraq or Afghanistan; Hoge et al., 2004).

The purpose of the present study was to extend prior research by conducting a cluster analysis of AS and DT in a sample of combat veterans. Cluster analysis is a well-established method for obtaining empirically derived subtypes (Everitt, Landau, Leese, & Stahl, 2011) (Aldenderfer & Blashfield, 1984). Cluster analysis is statistically beneficial in that it allows for the grouping of homogenous items together while separating items that are different from one another in a way that enables further analyses to be conducted with these identified groups (Mooi & Sarstedt, 2001). The use of this method is meaningful in that it provides the opportunity to establish and compare empirically-derived profiles and identify patterns and structures that allow for ease of further analysis. The primary aim of the study was to identify empirically-defined typologies of AS and DT and to identify associations between AS/DT typologies and PTSD symptom clusters. It was hypothesized that higher levels of AS, coupled with lower DT, would be associated with greater PTSD symptom severity. The second aim was to examine the validate the cluster solution identified in aim 1 by examining AS/DT profiles by examining associations between typology and depression symptoms and self-reported resilience. It was hypothesized that a high AS/low DT typology would be associated with the greatest levels of depressive symptoms and lowest levels of resilience, while a low AS/high DT typology would be associated with the lowest levels of depression and highest levels of resilience.

Methods

Participants

The sample included 287 Operation Enduring Freedom/Operation Iraqi Freedom/Operation New Dawn (OEF/OIF/OND) veterans ($M_{\text{age}} = 30.16$, $SD = 4.49$; 10.1% women) who participated in an ongoing study (enrollment began in 2012) (R01 AA020179; PI Amstadter) designed to examine the effects of combat trauma and stress reactivity on drinking behaviors in veterans. Participants were recruited through the community, as well as the university and Veterans Affairs hospitals, by advertising (e.g., flyers, Internet, mailings, and phone calls), and through collaborations with other researchers.

Eligible participants were between 21–40 years old, able to provide informed consent, and regular drinkers (drank alcohol at least 4 days in the month prior to the study screener) who did not report a history of alcohol withdrawal or actively cutting back on drinking. Other exclusion criteria included: women who were pregnant or nursing, or who suspected they might be pregnant; history of a moderate or severe traumatic brain injury (TBI); the presence of a blood-clotting disorder; and presence of a medical condition or medication affecting hypothalamic-pituitary-adrenal axis functioning (e.g., antidepressants).

Measures

Demographic information regarding gender (i.e., male, female), race (i.e., white, black, other), marital status (i.e., never married, separated/divorced, currently married or cohabitating, widowed), age, military branch, and number of deployments were obtained from all participants.

Anxiety Sensitivity Index (ASI; Reiss et al., 1986).—The ASI is a 16-item self-report measure of anxiety sensitivity that encompasses three domains: fear of cognitive symptoms of anxiety (e.g., “When I am nervous, I worry that I might be mentally ill”), fear of socially observable symptoms of anxiety (e.g., “It is important for me to not appear nervous”), and fear of physical symptoms of anxiety (e.g., “It scares me when I feel “shaky” (trembling”). Individuals are asked to respond to each question on a 5-point Likert scale (0 = “Very little” to 4 = “Very much”). A continuous score for each subscale was created and used as an index of anxiety sensitivity within each domain (i.e., cognitive dyscontrol [Cronbach’s alpha = .71], social concerns [Cronbach’s alpha = .74], physical concerns [Cronbach’s alpha = .83]) for the present analyses.

Distress Tolerance Scale (DTS; Simons & Gaher, 2005).—The DTS is a 15-item self-report measure, in which respondents indicate on a 5-point Likert-type scale (1 = “strongly agree” to 5 = “strongly disagree”) the extent to which they believe they can experience and withstand distressing emotional states. The DTS possesses four subscales including tolerance (e.g., “I can’t handle feeling distressed or upset”), absorption (e.g., “When I feel distressed or upset I must do something about it immediately”), appraisal (e.g., “My feelings of distress or upset are not acceptable”), and regulation (e.g., “When I feel distressed or upset I must do something about it immediately”) in addition to a total score. A continuous score for each subscale was created and used as an index of distress tolerance within each domain (i.e., tolerance [Cronbach’s alpha = .70], absorption [Cronbach’s alpha = .79], appraisal [Cronbach’s alpha = .80], regulation [Cronbach’s alpha = .75]) for the present analyses.

Beck Depression Inventory II (BDI-II; Beck, Steer, & Brown, 1996).—The BDI-II is a 21-item self-REPORT measure of depressive symptoms experienced in the past two weeks (e.g. sadness, guilty feelings, self-criticalness). Each item presents three statements reflecting mild, moderate, and severe symptoms and participants are asked to endorse the statement that most reflects how they have been feeling the prior two weeks. The BDI-II discriminates between depressed and non-depressed individuals, possesses high internal consistency and convergent validity (Beck et al., 1996) and is the most commonly used measure of depressive symptoms. The BDI-II demonstrated high internal consistency within the present sample (.88).

Connor-Davidson Resilience Scale (CRSIC; Cambell-Sills & Stein, 2007).—The revised version of the CD-RISC was used. Respondents are instructed to respond to each item on a five-point Likert scale ranging from 0 (not true at all) to 4 (true nearly all the time) assessing their self-perceived resilience (e.g. “I can deal with whatever comes my way”). The CD-RISC demonstrated high internal consistency within the present sample (.88).

Life Events Checklist (LEC; Blake et al., 1995).—The LEC assesses trauma exposure history, including a list of 17 potentially traumatic events (e.g., sexual assault, physical assault). Participants indicate whether they have experienced each event, have witnessed the event happening to someone else, or have learned about the event happening to someone close to them. Participants endorsing exposure to combat (experienced the event) on the

LEC were included in the present analyses. A total score was also calculated summing the number of events that participants endorsed as either experiencing or witnessing. This sum score was examined as a potential covariate.

***Clinician Administered PTSD Scale for DSM-IV (CAPS; Blake et al., 1990).*—**

The CAPS is a diagnostic interview for current (past month) and lifetime PTSD. The CAPS demonstrated high internal consistency overall (.89) and on each of the three past-month PTSD symptom clusters in the present study (hyperarousal, avoidance, re-experiencing; range .62 to .80), and has been shown to correlate strongly (i.e., above .61) with other measures of PTSD (Hovens et al., 1994; Hyer, Summers, Boyd, Litaker, & Boudewyns, 1996). A continuous score for each subscale was created and used as an index of past month symptom severity for the present analyses.

Procedure

Potential participants underwent screening via telephone or REDCap. REDCap is a secure web-based application designed exclusively to support data capture for research studies (Harris et al., 2009). Individuals meeting preliminary criteria came in for an office visit. The office visit included the provision of informed consent, a clinical interview, and a battery of self-report measures to assess combat exposure, traumatic event exposure history, PTSD symptoms, and emotion regulation characteristics. The Virginia Commonwealth University and Richmond McGuire VA Institutional Review Boards approved all study procedures.

Data Analytic Plan

Prior to conducting the analyses, data were checked for normality and outliers. Given that skewness and kurtosis values for each variable were within acceptable range, no variables were transformed. Descriptive statistics and bivariate correlations were computed for the ASI subscales (i.e., cognitive, social, physical), DT subscales (i.e., tolerance, absorption, appraisal, regulation), and DSM-IV PTSD symptom clusters (i.e., hyperarousal, avoidance, re-experiencing). Next, values on the ASI and DTS subscales were converted to *z*-scores and analyzed using a *k*-means cluster analysis to identify AS/DT typologies. A series of ANOVAs and Chi-Square analyses was conducted to determine potential cluster differences based on demographic variables including gender, marital status, age, race, number of lifetime traumatic experiences, military branch (dichotomized as Army [most endorsed branch] vs. other for analyses), or number of deployments. Given that significant differences were not identified across clusters based on the aforementioned variables, a MANOVA was conducted to examine the relationship between each AS/DT profile and each PTSD symptom cluster severity with no covariates. Follow-up univariate one-way analyses of variance (ANOVAs) and additional post hoc tests were then conducted to examine differential PTSD cluster symptom severity based on cluster membership. These analyses were additionally repeated with other trauma relevant outcomes including depression and resilience (i.e., BDI-II and CD-RISC scores) set as the criterion variables. All analyses were performed in SPSS Version 21.

Results

Two hundred and fifty OIF/OEF/OND veterans aged 21–40 ($M_{age}=30.05$, $SD=4.45$; 89.8% male; 67.2% White, 20.2% Black, 25% Other; 54.4% Army, 18.5% Marines, 9.1% Navy, 3.1% Air Force; 11% Other) completed all items on the DTS subscales (i.e., tolerance, absorption, appraisal, regulation) and ASI subscales (i.e., cognitive, social, physical) and were included in the present analyses. Table 1 displays the means and bivariate correlations between DTS subscales, ASI subscales, and PTSD symptom clusters. The highest correlations were present among subscales within the same scale and significant modest associations were present among ASI subscales, DTS subscales, and PTSD symptom clusters with the exception of the correlation between ASI Physical Concerns and re-experiencing PTSD symptoms ($r(242) = .11$, $p > .05$).

Cluster Analysis

The DTS and ASI subscale values were converted to z -scores and analyzed using a k -means cluster analysis which identifies homogeneous groups within heterogeneous data. A disadvantage of cluster analyses pertains to the lack of fit indices provided for each potential solution. Given this concern, multiple cluster solutions were examined in order to identify the most interpretable profile solution. Moreover, in an effort to validate our findings in light of the lack of fit indices, we additionally examined the identified cluster solution within frequently comorbid internalizing symptoms (i.e., depressive symptoms). We additionally attempted to validate our findings by investigating the derived cluster solution with regard to resilience which we hypothesized would demonstrate an inverse pattern relative to PTSD and depressive symptoms.

Cluster solutions consisting of two, three, and four clusters were examined. The two-cluster solution appeared to cluster dissimilar profiles into a single low AS/high DT subtype while the three-cluster solution separated an average AS/DT subtype from the low AS/high DT group. Use of a four-cluster solution resulted in smaller cell sizes, separating similar profiles and thus creating difficulty in profile interpretation. Following examination of these multiple cluster solutions, a 3-cluster solution was selected as it was the most parsimonious solution given that it appeared to create the most interpretable results (i.e., clustering typologies were clearly defined) while providing greater depth of knowledge regarding potential clustering of AS and DT.

Cluster analysis is an iterative process and convergence for the 3-cluster solution was reached in 5 iterations. The final cluster centers and the number of participants in each cluster are shown in Table 2. Participants in Cluster 1 ($n=22$) were low in DT and high in AS. Given the pattern of findings and relationship between the low DT/high AS phenotype and psychopathology within the literature, this cluster was identified as “at-risk”. Cluster 2 participants ($n=119$) were moderately above average on DT and moderately below average on AS. This pattern of results was considered the “resilient” cluster to reflect the literature suggesting that this pattern may be associated with less psychiatric symptoms when compared to the low DT/high AS at-risk cluster. Participants in Cluster 3 ($n=109$) were moderately below average on DT, and were slightly above average on AS. This pattern was interpreted as the “intermediate” cluster. Univariate ANOVAs indicated that the clustered

groups differed significantly on all seven classifying variables (ASI subscales [cognitive, social, physical], DT subscales [tolerance, absorption, appraisal, regulation], all $ps < .001$).

Cluster Associations with PTSD

The ANOVAs and χ^2 tests examining potential cluster differences based on demographics found no significant differences based on gender ($\chi^2 (2, 250) = 1.65, p = .44$), marital status ($\chi^2 (6, 250) = 6.31, p = .39$), age ($F(1, 247) = .12, p = .89$), ethnicity ($\chi^2 (2, 238) = 1.48, p = .48$), number of lifetime traumatic experiences ($F(2, 246) = 1.91, p = .15$), military branch (dichotomized as Army vs. other; $\chi^2 (2, 250) = .55, p = .76$), or number of deployments ($F(2, 247) = 1.96, p = .14$). Given that no significant differences were identified between the clusters regarding demographic factors and traumatic life experiences, a MANOVA was conducted with no covariates. The empirically derived AS/DT profiles were included as the independent variables and the PTSD symptom clusters served as the dependent variables. Box's M test which tests the multivariate distribution of the data was significant; thus Pillai's Trace was the multivariate statistic employed when evaluating the MANOVA. The MANOVA revealed a statistically significant effect for cluster membership, Pillai's Trace = .18, $F(6, 446) = 6.69, p < .001, \eta^2 = .09$. Follow-up univariate ANOVAs demonstrated significant differences between each typology and PTSD symptom clusters (re-experiencing ($F(2, 228) = 14.58, p < .001, \eta^2 = .12$); avoidance ($F(2, 228) = 19.54, p < .001, \eta^2 = .15$); hyperarousal ($F(2, 228) = 16.23, p < .001, \eta^2 = .12$). Post-hoc multiple comparison analyses using Bonferroni correction (adjusted p value of .017) demonstrated that the "at-risk" cluster mean re-experiencing and avoidance scores were significantly greater than both "resilient" and "intermediate" clusters (Table 3). Although cluster 2 was significantly different from both clusters 1 and 3, mean hyper-arousal and avoidance scores in clusters 1 and 3 were not significantly different from one another.

Cluster Associations with Depression and Resilience

The same series of analyses were utilized to examine the relationship between the clusters and depression symptoms, as well as self-reported resilience. The univariate ANOVA examining the relationship between AS/DT clusters and BDI symptoms demonstrated a statistically significant effect for cluster membership, $F(2,247) = 47.91, p < .001, \eta^2 = .28$. Follow-up Bonferroni corrected comparisons (adjusted p value of .017) demonstrated significant differences in BDI symptoms based on AS/DT profile in a similar pattern as those identified when examine each PTSD cluster as the outcome (Table 3). An inverse pattern of findings was revealed when examining cluster membership in relation to self-reported resilience whereby cluster 2 was significantly greater than both clusters 1 and 3. The univariate ANOVA examining the relationship between AS/DT clusters and CD-RISC score demonstrated a statistically significant effect for cluster membership, $F(2,246) = 16.87, p < .001, \eta^2 = .12$. Follow-up Bonferroni corrected comparisons (adjusted p value of .017) demonstrated significant differences between each cluster and CD-RISC scores (Table 3). Table 4 displays the means and standard errors for each criterion variable (PTSD symptoms clusters, BDI, CD-RISC) by AS/DT profile.

Discussion

The present study aims were two-fold. First, we identified empirically derived subtypes of AS and DT in a sample of combat exposed veterans on measures of AS and DT and whether these particular typologies were differentially associated with PTSD symptom clusters of re-experiencing, hyperarousal, and avoidance. Three clusters were identified and the final three-cluster solution included high AS/low DT, low AS/high DT, and average AS/DT subtypes. When examining these typologies in conjunction with PTSD symptoms, the subtype characterized as high AS/low DT exhibited the highest levels of PTSD symptoms within each PTSD symptom cluster (i.e., “at-risk” group). This “at-risk” group is consistent with the extant literature suggesting that high AS and low DT are independently associated with PTSD (Collimore et al., 2008; Kilic et al., 2008; Marshall et al., 2010; Norr et al., 2016; Taylor, 1999, 2003). Conversely, the profile characterized by low AS/high DT constituted a “resilient” group (i.e., lower levels of PTSD symptoms), while the average AS/DT subtype exhibited moderate levels of symptoms (i.e., “intermediate” group) in that symptoms within each PTSD cluster fell between those identified in the “at-risk” and “resilient” groups. To our knowledge, the present study is the first to examine specific AS/DT typologies and their respective relations to PTSD symptoms among combat exposed veterans.

Second, to further validate our cluster results, we tested associations between AS/DT typology and both depression and self-reported resilience. The high AS/low DT profile (i.e. “at-risk” profile) exhibited the highest levels of depressive symptoms (via BDI-II scores), the low AS/high DT profile (i.e. “resilient” profile) exhibited the lowest depressive symptoms and the “intermediate” group exhibited average BDI-II symptoms. Further evidence of the validity of this solution is demonstrated by the inverse pattern demonstrated for the criterion variable of self-reported resilience (via CD-RISC scores). The high AS/low DT profile exhibited the lowest CD-RISC scores, the low AS/high DT profile exhibited highest scores, and an intermediate group exhibited moderate CD-RISC scores. Although the cluster analytic approach does not provide fit indices, the pattern of findings with regard to depression and resilience aid in validating the initial profiles identified with respect to PTSD. These findings further support the growing literature suggesting that individuals possessing high levels of AS and low levels of DT may be at increased risk of experiencing PTSD symptoms (Berenz et al., 2012; Farris et al., 2014), as well as related psychiatric conditions such as depressive symptoms, anxiety, suicidal ideation, and substance use disorders (Anestis et al., 2011; Buckner et al., 2007; Capron et al., 2013; Ellis et al., 2013).

Less is known about the “resilient” subtype, and further empirical study is needed to understand what factors promote healthy cognitive-affective development. Future studies evaluating predictors of resilience would be useful in developing an understanding of recovery post-trauma, as well as potential in-roads for intervention. For example, interventions centered on AS and DT could reduce vulnerability to symptom development in trauma-exposed individuals (Lotan, Tanay, & Bernstein, 2013).

Despite previous research suggesting differential associations with PTSD based on symptom cluster being assessed, with findings suggesting that DT may be more relevant to hyperarousal and intrusion symptoms, the present study did not identify this pattern (Vinci,

Mota, Berenz, & Connolly, 2016). Examining PTSD symptom clusters independently may not be necessary; however, additional research is warranted in order to determine whether this pattern holds in other samples.

Evaluations of the impact of combined AS and DT intervention programs on transdiagnostic psychiatric risk in trauma-exposed samples may be warranted. A previous research trial examining the impact of DT skills training, the Skills for Improving Distress Intolerance program, has been successfully implemented among substance users as a brief and viable method of improving DT (Bornovalova, Gratz, Daughters, Hunt, & Lejuez, 2012). Moreover, brief interventions aimed at decreasing AS, such as the Anxiety Sensitivity Amelioration Training program, have demonstrated promise in terms of decreasing AS and stress reactivity (Schmidt et al., 2007). The impact of AS reduction interventions on DT, and vice versa, should be evaluated, and the utility of a combined AS/DT intervention should be evaluated.

These findings are not without limitations. First, the present study is cross-sectional and direction of causation cannot be inferred. Longitudinal studies of AS/DT typologies in relation to PTSD development and maintenance are needed. Given that the developmental nature of AS/DT remains unknown, examination of these constructs across time will improve the literature as a whole. Although AS and DT are frequently assumed to be trait-like and thus existing prior to psychopathology, the development of certain patterns of AS/DT could co-develop with psychiatric symptoms following trauma. Given the uncertainty within this domain, additional empirical attention particularly as it pertains to longitudinal trajectories is warranted. Second, the current study relied on self-report measures of AS and DT. DT in particular is considered multidimensional in nature, encapsulating perceived and actual (i.e., behaviorally observed) tolerance of both physical and emotional distress. Human laboratory studies of these constructs would provide further insight into the proposed typologies. Third, the sample size is modest and the present study was conducted only among combat exposed veterans (predominately male) thus limiting generalizability. Fourth, although specific clusters and their relative risk profiles were examined, the present analyses did not identify specific cut-off scores. This marks an important next step for future research and would likely prove beneficial in regards to screening of potentially vulnerable individuals in clinical settings. Finally, although the present study aimed to examine PTSD as a continuous variable, the clinical relevance of examining PTSD in this manner should be investigated. The present study is beneficial in its examination of the continuum of symptoms which may tap into subclinical PTSD populations.

The present study represents an important next step in understanding the relationships among AS, DT, and PTSD. The identified typologies and respective relations to PTSD symptom clusters, depression symptoms, and self-reported resilience highlight the potential transdiagnostic utility of examining these underlying cognitive-affective factors (AS/DT) in relation to psychiatric symptoms.

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Public Significance Statement

The present study identified three empirically derived anxiety sensitivity and distress tolerance profiles among a sample of 250 combat veterans. The high anxiety sensitivity/low distress tolerance profile was associated with greater symptoms of posttraumatic stress disorder and depression.

Table 1:

Distress Tolerance Scale, Anxiety Sensitivity Index, and Clinician Administered Posttraumatic Stress Disorder Scale Means and Correlations

	M (SD)	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. DTS Tolerance	3.76 (.91)	-									
2. DTS Appraisal	3.44 (.83)	.61***	-								
3. DTS Absorption	3.74 (.81)	.70***	.60***	-							
4. DTS Regulation	3.16 (.98)	.34***	.51***	.37***	-						
5. ASI Physical Concerns	6.64 (5.48)	-.35***	-.43***	-.38***	-.30***	-					
6. ASI Mental Incapacitation Concerns	2.34 (2.66)	-.41***	-.50***	-.47***	-.36***	.54***	-				
7. ASI Social Concerns	6.84 (2.04)	-.24***	-.24***	-.22***	-.16*	.36***	.36***	-			
8. CAPS Re-experiencing	5.49 (6.65)	-.28***	-.33***	-.35***	-.22**	.11	.24***	.17*	-		
9. CAPS Avoidance	8.35 (9.95)	-.28***	-.36***	-.35***	-.21**	.16*	.35***	.19**	.73***	-	
10. CAPS Hyperarousal	11.82 (8.18)	-.30***	-.32***	-.28***	-.15*	.14*	.26***	.24***	.62***	.67***	-

Note:

* < .05

** < .01

*** < .001.

Table 2:

Final Cluster Centers (z scores) of Empirically Derived AS/DT Profiles

Classifying Variables	Cluster 1 “At-risk” (<i>n</i> = 22)	Cluster 3 “Intermediate” (<i>n</i> = 109)	Cluster 2 “Resilient” (<i>n</i> = 119)
DTS Tolerance	−1.58	−.29	.55
DTS Appraisal	−1.70	−.45	.73
DTS Absorption	−1.49	−.36	.61
DTS Regulation	−.84	−.44	.56
ASI Physical Concerns	1.54	.24	−.60
ASI Mental Incapacitation Concerns	1.87	.21	−.59
ASI Social Concerns	.91	.27	−.40

Note: Convergence for the 3-cluster solution was reached in 5 iterations.

Table 3.

Bonferroni Comparison for AS/DT Cluster by CAPS, BDI-II, and CD-RISC Score Difference by Symptom Cluster

Comparisons	Mean Score Difference	Std. Error	95% CI	
			Lower Bound	Upper Bound
Re-experiencing				
Cluster 1 vs. Cluster 2	6.77***	1.45	3.91	9.62
Cluster 1 vs. Cluster 3	3.41*	1.46	.53	6.30
Cluster 2 vs. Cluster 3	-3.36**	.86	-5.05	-1.66
Avoidance				
Cluster 1 vs. Cluster 2	10.93***	2.11	5.84	16.02
Cluster 1 vs. Cluster 3	4.91	2.14	-.24	10.07
Cluster 2 vs. Cluster 3	-6.02***	1.26	-9.04	-2.99
Hyperarousal				
Cluster 1 vs. Cluster 2	7.47***	1.81	3.10	11.83
Cluster 1 vs. Cluster 3	2.30	1.83	-2.10	6.71
Cluster 2 vs. Cluster 3	-5.16***	1.05	-7.70	-2.63
BDI-II				
Cluster 1 vs. Cluster 2	11.21***	1.35	7.96	14.47
Cluster 1 vs. Cluster 3	5.62***	1.36	2.34	8.90
Cluster 2 vs. Cluster 3	-5.59***	.77	-7.45	-3.74
CD-RISC				
Cluster 1 vs. Cluster 2	-6.06***	1.18	-8.91	-3.21
Cluster 1 vs. Cluster 3	-3.34*	1.19	-6.21	-.47
Cluster 2 vs. Cluster 3	2.72***	.68	1.09	4.36

Note:

*
< .05

**
< .01

< .001.

Table 4:

PTSD Symptom Cluster, BDI-II, and CD-RISC Means and Standard Errors by Symptom Cluster

Variables	Cluster 1 “At-risk” <i>M (SE)</i>	Cluster 3 “Intermediate” <i>M (SE)</i>	Cluster 2 “Resilient” <i>M (SE)</i>
Re-experiencing	10.23 (1.69)	6.82 (.69)	3.46 (.49)
Avoidance	15.50 (2.45)	10.59 (1.07)	4.57 (.65)
Hyperarousal	16.48 (2.07)	14.17 (.80)	9.01 (.66)
BDI-II	15.59 (1.57)	9.97 (.64)	4.38 (.41)
CDRISC	27.82 (1.41)	33.88 (.36)	31.16 (.56)