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Factor Structure and Initial Validation of a Brief Measure of Perceived Emotional and Physical Distress Tolerance in Post-9/11 US Veterans

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Abstract

Distress tolerance (i.e., perceived or actual capacity to tolerate aversive internal states) has received considerable research attention as a transdiagnostic risk-factor underlying the development and maintenance of psychopathology. Lower levels of emotional distress tolerance have been linked to psychopathology (e.g. Posttraumatic Stress Disorder) within Military populations; however, the association of *physical* distress tolerance to psychopathology in this population has been under-researched. This research gap may be due in part to a paucity of comprehensive, temporally stable and *brief* measures of distress tolerance that have been validated within Military populations, which may hinder further examination and refinement of the construct. Addressing this problem, the current study evaluates the psychometric properties of a novel and brief measure of emotional and physical distress tolerance in a sample of United States

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post-9/11 Veterans. Participants were 307 Veterans ($M_{age} = 38.9$, 67.7% male) who completed the 10-item Distress Tolerance Inventory at baseline and annual follow-up. Exploratory structural equation modeling was used to examine the optimal latent factor structure and longitudinal invariance of the DTI measurement model, along with correlational analyses to examine the convergent properties of the DTI subscales. The DTI reflected a longitudinally invariant two-factor structure (emotional and physical distress tolerance), with excellent internal consistency and preliminary evidence of convergent validity. Thus, the DTI represents a brief, reliable and temporally stable measure of physical and emotional distress tolerance.

Keywords

distress tolerance; longitudinal metric invariance; exploratory structural equation modeling; Military Veterans

Research focused on identifying modifiable risk factors associated with multiple symptom clusters of psychopathology—known as transdiagnostic risk factors—has increased considerably (Eaton, Rodriguez-Seijas, Carragher, & Krueger, 2015). Distress tolerance, either perceived or actual capacity to tolerate aversive internal states is one such transdiagnostic risk factor that has received considerable attention as a possible explanatory mechanism underlying psychopathology (Leyro, Zvolensky & Bernstein, 2010). Actual or perceived inability (or lack of capacity) to tolerate aversive internal states is thought to intensify distress, motivating individuals' use of maladaptive coping behaviors (Zvolensky & Otto, 2007) and perpetuating symptoms of psychopathology.

Consistent with this supposition, low distress tolerance relates to avoidant or disengagement coping (Zvolensky, Leyro, Bernstein & Vujanovic, 2011), and overlaps with other transdiagnostic risk factors such as experiential avoidance (Shloss & Hagag, 2011), and anxiety sensitivity (Bernstein, Zvolensky, Vujanovic, & Moos, 2009). Moreover, low levels of distress tolerance have been linked to depression, generalized anxiety, and maladaptive coping behaviors such as substance use and self-harm (see Leyro et al., 2010). Conversely, high distress tolerance relates to more resilient personality prototypes (Elliot et al., 2016), lower levels of neuroticism (Marshall-Berenz, Vujanovic, Bonn-Miller, Bernstein, Zvolensky, 2010), and less perceived stress (Kiselica, Rojas, Bornovalova, Dube, 2015).

Within Military and veteran populations in particular, *emotional* distress tolerance has been shown to mediate the association between Posttraumatic Stress Disorder (PTSD) and substance use disorder (Holliday, Pederson & Levanthal, 2016; Banducci, Bujarski, Bonn-Miller, Patel, & Connolly, 2016). Furthermore, changes in emotional distress tolerance have been demonstrated to impact the severity of PTSD symptoms within military veterans over time (Banducci, Connolly, Vujanovic, Alvarez & Bonn-Miller, 2017).

By contrast, the relation of perceived *physical* distress tolerance to psychopathology and other relevant outcomes within Military populations remains significantly under-studied. Physical distress tolerance—and pain tolerance in particular— may have unique clinical relevance within Military and Veteran populations, over and above emotional distress tolerance. An important tenant of military culture reflects the capability to demonstrate

toughness and perseverance in the face of physical hardship without complaint. Likewise, high pain tolerance and emotional suppression are strongly valued (Cernich, Belanger, Pramuka & Brim, 2015). Even so, pain is a prevalent concern among returning United States Veterans, with up to 60% of returning Veterans endorsing pain-related disability (Butchart, Kerr, Heisler, Piette, & Krein, 2009). In fact, chronic pain acceptance (a construct related to physical distress tolerance in this context), predicts current and future disability levels in Veterans, even accounting for PTSD, depression, alcohol use disorder, and mild traumatic brain injury (Cook et al., 2015). Thus, endorsement of limited physical distress tolerance may have unique clinical implications within Military and Veteran populations over and above that of emotional distress tolerance. Despite the potentially important clinical implications of the construct within this group, a brief, multidimensional measure of physical and emotional distress tolerance has yet to be psychometrically evaluated within a Military Veteran sample.

Measuring Physical and Emotional Distress Tolerance.

One considerable limitation to research examining distress tolerance reflects the paucity of comprehensive, yet parsimonious measures. Distress refers to physically or emotionally aversive experiential states (Zvolensky et al., 2011), and promising theoretical models conceptualize distress tolerance similarly as individuals' capability (or *perceived* capability, in the case of self-reported tolerance) to endure physically and emotionally aversive experiences (Bebane, Flowe, & Maltby, 2015; Mitchell, Riccardi, Keough, Timpano & Schmidt, 2013). Nevertheless, the majority of empirical works tend to operationalize self-reported distress tolerance entirely within the affective domains of distress (Zvolensky et al., 2010; but see Telch, Jacquin, Smits, & Powers, 2003 for an example of a behavioral operationalization of physical distress tolerance). Indeed, self-report measures exclusively targeting tolerance of negative emotional states, such as the Distress Tolerance Scale (DTS; Simons & Gaher, 2005), are commonly employed as a proxy for distress tolerance limiting inferences regarding how emotional and physical distress tolerance relate to different behaviors, characteristics, and symptoms. As previously discussed, the need for comprehensive measures of physical and emotional distress tolerance may be critical for research in Military Veteran populations. Potential differential effects of physical and emotional distress tolerance may have important implications for understanding population-specific vulnerabilities to factors such as suicide risk (Brenner, Gutierrez, Cornette, Betthausen, Bahraini, & Staves, 2008; Denckla, Bailey, Jackson & Chen, 2015) and PTSD (Farris, Vujanovic, Hogan, Schmidt, and Zvolensky, 2014).

Acknowledging this limitation, researchers have called for more integrative measurement models capturing both physical and emotional dimensions of distress tolerance (Zvolensky et al., 2010). Studies have attempted to address this gap by synthesizing existing measures to compose hierarchical latent measurement models—with implications for more parsimonious measurement (Bardeen, Fergus, & Orcutt, 2013; McHugh & Otto, 2012). Using a series of factor analyses, Bebane and colleagues (2015) derived a 20-item multidimensional measure of distress tolerance using items pulled from five existing measures of emotional distress and physical discomfort intolerance. While the comprehensiveness of the Bebane et al. (2015) multidimensional measure is promising, evidence for convergent and discriminant validity,

as well as temporal stability, has yet to be established. Furthermore, each of the five subscales comprising the Bebane et al. measure is composed of items pulled from established domain-specific assessments that are measured with varying scale lengths and response categories (e.g. 1 [*strongly agree*] to 7 [*strongly disagree*], vs. 0 [*absent*] to 4 [*very strong*]). Simply revising the items to be measured along the same uniform scale may introduce measurement error for items that were not originally formulated for such a scaling format. On the other hand, failing to standardize item scales makes scoring and interpretation of overall subscale scores ambiguous at best, limiting the practical utility of the measure. Thus, a *brief* parsimonious multi-dimensional inventory composed of items originally and explicitly developed to capture physical and emotional domains of distress would advance measurement and construct validation of a multifaceted distress tolerance construct.

Distress Tolerance Inventory.

The Distress Tolerance Inventory (DTI; Telch, 1998) represents a previously unpublished inventory designed to measure individuals' perceived capacity to tolerate aversive physical and emotional internal states. Though unpublished dissertations (e.g., Cogle, 2008; Kruse; 2008; Pai, 2011) and published studies (Elliot et al., 2016) have utilized the measure, there are no peer reviewed psychometric evaluations of the DTI. Nonetheless, prior works have used an unpublished psychometric analysis (Telch & Cogle, n.d.) to provide justification for a two-factor structure of the DTI. Unfortunately, details regarding the referenced analysis are not available. Given the potential utility of the DTI as a brief, multidimensional assessment of emotional and physical distress tolerance, systematic psychometric evaluation of this measure is warranted.

Current Study

The current study evaluated the factor structure, scale reliability, and convergent validity of the DTI using a sample of United States post-9/11 Veterans ($N = 307$). Random sample selection in SPSS was used to select approximately 50% of the total cases for the purposes of splitting the sample into two subsamples for exploratory and validation purposes, respectively. Within the first subsample (heretofore referred to as 'Sample A', $n = 144$), we examined the latent factor structure of the DTI using exploratory structural equation modeling ("ESEM") and examined the internal consistency of the derived factors. ESEM (Asparouhov, Muthén, & Muthén, 2009) is a multivariate technique combining aspects of confirmatory and exploratory factor analysis to empirically derive a factor structure from a set of items. ESEM improves upon exploratory factor analysis by enabling incremental parameter constraints within nested model comparisons for the purposes of invariance testing (Marsh, Morin, Parker, & Kaur, 2014). Moreover, while confirmatory factor analysis constrains cross-loadings across non-target factors to be zero, ESEM addresses cross-loadings through targeted rotation. As the psychometric properties of the DTI have yet to be established, a confirmatory measurement model specifying indicators to be zero *a-priori* would be inappropriate for exploratory psychometric analyses (Marsh et al., 2014).

With the second subsample (heretofore referred to as ‘Sample B’, $n = 163$), we established the temporal stability of the DTI measured at baseline and one year later using longitudinal invariance testing with ESEM. Additionally, we estimated zero-order correlations between the DTI subscales and theoretically related variables (experiential avoidance, coping), relevant personality characteristics (neuroticism, resilience), and mental health correlates (depression, anxiety, stress, and posttraumatic stress symptoms) to examine the preliminary convergent properties for the physical and emotional subscale, respectively.

Hypothesis.

We expected the DTI to demonstrate a longitudinally invariant two-factor latent structure reflecting physical and emotional distress tolerance. We expected both DTI scales to correlate positively with active coping and resiliency, and negatively with avoidance coping, experiential avoidance, neuroticism, anxiety, stress, depression and posttraumatic stress symptoms.

Methods

Participants and Procedures

This secondary data analysis included 307 post-9/11 Veterans who participated in a longitudinal study examining post-deployment functioning. Veterans were recruited using randomly stratified mailings (oversampling for woman Veterans and those with non-excluded mental health diagnoses, particularly PTSD and depression), flyers, and in-service presentations to healthcare staff. Veterans were eligible if they completed the baseline assessment, were willing to complete follow-up assessments, and were not planning to move in the next four months. Veterans were excluded if they had a diagnosis of bipolar or a psychotic disorder, were in active suicidal / homicidal crisis, or were not stabilized on psychiatric medications or in psychotherapy (i.e. they recently started or stopped psychiatric medication or psychotherapy). With respect to the latter requirement, stabilization was defined as 3 months on a Selective Serotonin Reuptake Inhibitor or Monoamine Oxidase Inhibitor, > 1 month on an anxiolytic or beta-blocker; or > 1 month post-medication discontinuation at the time of baseline assessment. Likewise, psychotherapy stabilization was defined as 3 months stabilization on psychotherapy or > 1 month post-psychotherapy discontinuation at the time of baseline assessment. This requirement was to ensure that symptoms assessed at baseline were due to underlying psychiatric conditions and not due to the effects of starting or stopping medications and/or psychotherapy.

A total of 345 Veterans were enrolled, of whom 36 did not meet eligibility criteria. Of the remaining 309 Veterans, two were excluded because they did not complete the DTI, bringing the final sample to 307. On average, participants were 38.9 years old ($SD = 9.8$), and mostly male (67.7%), with at least some college education (89.7%). With respect to ethnicity, 19.9% were Hispanic, while the racial distribution was 57.3% White, 33.1% Black/African American, and 9.6% other. At the time of baseline assessment, 101 Veterans were stable on medication, and 104 reported being stable in psychotherapy (note, these numbers are not mutually exclusive). The majority had served in the Army (85.7%) with an average of 15 years of military service ($SD = 9.5$). All but three Veterans in the sample reported at least

one OEF/OIF deployment ($M_{\text{deployments}} = 1.5$, $SD = 0.77$), spending an average of 12.6 months deployed ($SD = 21$).

Approximately 57% of Veterans met lifetime diagnostic criteria for PTSD based on the Clinician-Administered PTSD scale for DSM-IV. Furthermore, 93.5% of Veterans reported exposure to at least one event meeting DSM-IV A1 criteria (event involving actual or threatened death or serious injury). After splitting the sample, Sample A included $N = 144$ and Sample B included $N = 163$. The Central Texas Veterans Health Care System Institutional Review Board approved all procedures, including a data-safety monitoring plan safe-guarding Veteran confidentiality and safety. Following informed consent, Veterans completed a series of self-report measures at baseline and one year later.

Measures

Distress Tolerance Inventory.—The DTI (Telch, 1998) is a previously unpublished, multidimensional measure of distress tolerance. Both 10-item (Cougles, 2008; Pai 2011) and 16-item versions (Kruse, 2008) have been used in prior studies. However, only the 10-item version appears to have undergone exploratory factor analyses and initial scale validation—though details regarding these analyses are not currently available within the public domain (Telch & Cougle, n.d.). Thus, we limited our secondary psychometric evaluation to the original 10-item scale for the sake of parsimony. These 10 items (5 in each subscale, See Table 1) were developed to tap into both physical (“I can handle quite a bit of physical pain or physical discomfort”) and emotional (“I am able to handle feelings of emotional pain as well as most people”) distress dimensions. Items were measured on a six-point Likert-type scale, with larger scores indicating greater distress tolerance. The 10-item version was reported in two unpublished dissertations (Cougles, 2008; Pai, 2011) as having a two-factor structure (referencing the unpublished psychometric analyses), with good internal consistency and test-retest reliability for the total scale and each subscale. However, details regarding the original derivation of the two-factor solution for the items were not reported.

Active and Avoidant Coping.—The Brief COPE (B-COPE; Carver, 1997) is a measure of coping behaviors. The measure consists of 28 items rated on a four-point Likert-type scale, ranging from 0 (“I haven’t been doing this at all”) to 3 (“I’ve been doing this a lot”). Based on procedures described in Martindale et al. (2016), we created two second-order subscale scores by averaging the 14 first-order components of the B-COPE to represent action-oriented and avoidance coping. Higher scores represent a greater tendency to engage in action-oriented or avoidance coping, with Cronbach’s alpha equal to .82 and .71, and McDonald’s omega equal to .82 and .80, respectively.

Experiential Avoidance.—The 7-item version of the Acceptance and Action Questionnaire (AAQ-II, Bond et al., 2011) measured experiential avoidance. The AAQ-II is measured on a Likert-type scale from 1 (“never true”) to 7 (“always true”). Cronbach’s alpha is equal to .93, and McDonald’s omega is equal to .92.

Neuroticism.—Neuroticism was measured using the neuroticism subscale of the NEO Five-Factor Inventory (NEO-FFI), a shortened version of the NEO PI-R (Costa & McCrae,

1989). The subscale consisted of 12 items measured on a 5-point Likert scale, with higher scores indicating greater levels of neuroticism. Cronbach's alpha is equal to .88, and McDonald's omega is equal to .90.

Resiliency.—Resilience was measured using Smith and colleagues' (2008) Brief Resilience Scale. The BRS consists of 6 items measuring perceived ability to 'bounce back' after stressful experiences, measured on a 5-point Likert scale. Cronbach's alpha is equal to .89, and McDonald's omega is equal to .88.

Depression, Anxiety and Stress.—The 21-item Depression, Anxiety and Stress Scales (DASS-21; Lovibond & Lovibond, 1995) measured self-reported symptoms of depression, anxiety and stress experienced in the week prior to measurement. Cronbach's alphas in the present study for each subscale of the DASS were .93, .89, and .92 and McDonald's omegas were .91, .90, and .91, for depression, anxiety, and stress, respectively.

Posttraumatic Stress Symptoms.—Posttraumatic stress symptoms were measured using the military version of the 17-item PTSD symptoms Checklist for the DSM-IV (PCL-M; Weather, Litz, Huska, & Keane, 1994), a self-report measure of posttraumatic stress symptom severity in the month prior to assessment. Participants were asked how often they were bothered by each symptom in the past month (e.g. "repeated, disturbing memories, thoughts or images of a stressful military experience"), with each item measured on a 1 (not at all) to 5 (extremely) Likert scale. Cronbach's alpha is equal to .97, and McDonald's omega is equal to .88.

Results

All ESEM models (cross-sectional and longitudinal) were tested using Mplus version 7.11 (Muthen & Muthen, 1998) with robust maximum likelihood estimation and an oblique Geomin rotation. Items were specified to be continuous in each model described below, with is acceptable given the six-point rating scale of the DTI (Rhemtulla, Brosseau-Liard, & Savalei, 2012).

Sample A: Cross-sectional ESEM for exploration and data-reduction.

The optimal factor structure of the DTI was explored using cross-sectional ESEM, specifying a 2-factor solution with an oblique Geomin rotation. The initial 2-factor solution represented a poor fit to the data, $r\chi^2(26, N = 144) = 64.4, p < .001, CFI = .912, TLI = .847, RMSEA = .101 (.070, .133)$. Examination of factor loadings suggested dropping the item, "I am a real wimp when it comes to physical pain", as this item failed to load above .32 on either factor (Tabachnick & Fidell, 2001). Removing this item resulted in slightly improved model fit, $r\chi^2(19, N = 144) = 45.9, p < .001, CFI = .932, TLI = .872, RMSEA = .099 (.063, .136)$. However, the item, "I'll take fairly extreme measures to stop physical pain", did not load highly or significantly onto either factor. Once again, removing this item yielded improvement in fit, $r\chi^2(13, N = 144) = 25.4, p = .02, CFI = .967, TLI = .928, RMSEA = .081 (.031, .128)$.

Inspection of modification indices, however, suggested correlating the uniqueness terms for the two items, “I usually face emotionally upsetting situations head on” and “I usually follow through with tasks that are emotionally upsetting” ($M.I. = 14.636$). Notably, the wording is very similar for both items, suggesting some redundancy with respect to meaning. Though exploratory SEM enables correlation of uniqueness terms (unlike traditional EFA), for the sake of parsimony, we opted instead to drop the lower loading of the two items: “I usually follow through with tasks that are emotionally upsetting”, which resulted in an excellent fitting model, $\chi^2(8, N = 144) = 9.08, p = .34, CFI = .997, RMSEA = .031 (.000, .105)$. Factor loadings for the 7 items in the final two factor solution are provided in Table 2. Lastly, the estimated correlation between the physical and emotional distress tolerance factors was low and non-significant, $r = .103, p = .34$, providing initial support for the discriminant properties of the two sub-scales.

Internal consistency reliability.

Cronbach’s alphas for the DTI scales were adequate, equaling .84 and .76 for physical and emotional distress tolerance, respectively. However, use of Cronbach’s alpha to determine the internal consistency of a multidimensional measure has fallen out of favor due to its strict and difficult to assess assumption of essential tau-equivalence, which requires that each item measures the same latent variable on the same scale, with potentially differing amounts of precision (Dunn, Baguley, & Brunsden, 2014). When the assumption of essential tau equivalence is violated, Cronbach’s alpha is a biased estimator of internal consistency. Thus, McDonald’s omega, which does not assume tau-equivalence, is the preferred coefficient of internal consistency among a growing number of psychometricians (Dunn et al., 2014). Omega coefficients for the physical and emotional distress tolerance subscales were .88, and .79, respectively. Explained common variance for a general factor structure was low ($E.C.V = .15$), which supports the multidimensional structure of the DTI and suggests aggregate scores should only be derived at the subscale level.

Sample B: ESEM Test of Temporal Invariance.

Using Sample B, we established longitudinal invariance for the factor solution derived in Sample A. First, we estimated two separate ESEM models for data collected at baseline and annual follow-up to ensure adequate fit for each time point. The seven item, two-factor solution represented an adequate fit to data collected at the first-time point, $\chi^2(8) = 14.23, p = .08; CFI = .970, RMSEA = .069 (.000, .123), SRMR = .029$, and excellent fit at annual follow-up, $\chi^2(8) = 7.43, p = .49; CFI = 1.000, RMSEA = .000 (.000, .095), SRMR = .022$.

Next, we imposed longitudinal invariance constraints from baseline to annual follow-up based on Marsh and Colleagues’ taxonomy of invariance tests for evaluating measurement invariance across multiple occasions (see Marsh, Muthen, Asparouhov, Luedtke, Robitzsch, Morin & Trautwein, 2009; Marsh, Ludtke, Muthen, Asparouhov, Morin, Trautwein, & Nagengast, 2010 and Marsh et al., 2014). While longitudinal invariance testing is typically employed within a CFA framework, the same procedures apply when testing invariance within an ESEM framework (Marsh et al., 2010). That is, we specified incrementally constrained models to examine the temporal invariance of the DTI, examining five stages of

temporal measurement and factorial invariance: configural, metric (or weak invariance), scalar (or strong invariance), residual (or strict invariance), and covariance invariance.

Constraining factor loadings, item intercepts, and item residual terms to be equal from baseline to annual follow-up did not result in a significant decrement in model fit, fulfilling requirements for strict measurement invariance. As such, any differences in mean scores across time could be attributed to changes in the underlying latent distress tolerance factors rather than artifacts of measurement. Moreover, the time-specific factor covariance between emotional and physical distress tolerance were invariant from baseline to annual follow-up (Table 3), suggesting the relationship between emotional and physical distress tolerance remains stable over time. These results provide support for the test-retest reliability of the measure, with the standardized covariance of each latent subscale at baseline with annual follow-up equal to .756 and .500, for emotional and physical distress tolerance, respectively.

Convergent properties.

Emotional distress tolerance correlated positively with psychological flexibility and resilience, and negatively with avoidant coping, neuroticism, depression, anxiety, stress, and posttraumatic stress symptoms (Table 4). Likewise, physical distress tolerance correlated positively with resilience and negatively with neuroticism. Neither physical nor emotional distress tolerance correlated with action-oriented coping. Physical distress tolerance was unrelated to symptoms of depression, anxiety, stress, posttraumatic stress symptoms or avoidant coping.

Discussion

The present study evaluated the psychometric properties of the DTI within a longitudinal sample of post-9/11 Veterans. The DTI demonstrated a stable two-factor structure measuring emotional and psychological distress tolerance, with subscales demonstrating good internal consistency, as well as evidence of convergent and discriminant validity.

Notably, the correlation between latent physical and emotional distress tolerance was low and non-significant. This finding is consistent with other studies noting a small and/or non-significant correlation between physical discomfort intolerance and measures of emotional distress tolerance (e.g. Cougle et al., 2013; Mitchell et al., 2013), suggesting emotional and physical distress tolerance may be two orthogonal lower-order factors subsumed within a higher-order distress tolerance construct (Zvolensky, Vujanovic, Bernstein, & Leyro, 2010). Given this apparent orthogonality, future works should consider how emotional and physical distress tolerance *interact* to predict theoretically relevant target outcomes within military populations.

Longitudinal invariance and convergent validity were examined in Sample B. According to the results of the longitudinal ESEM invariance test, the DTI demonstrated strict measurement and construct-level longitudinal invariance (Teresi, 2006). That is, item loadings, intercepts, error uniqueness terms, as well as factor variances and covariances were invariant from baseline to annual follow-up, indicating observed changes in Veterans' DTI scores reflected changes in the latent factor means (Edwards & Wirth, 2009) and the

structural relation between the two DTI scales was stable over time. The stability of the DTI provides key support for its factorial validity within Military Veterans, as longitudinal invariance is a prerequisite for mean comparisons over-time. Moreover, results suggest the DTI may be particularly ideal for use in longitudinal studies evaluating changes in physical and emotional distress tolerance in Military Veterans over-time. Given its long-term stability, further use of the measure may improve understanding of the malleability of *both* emotional and physical distress tolerance (Kiselica, Webber, Bornovalova, 2014), particularly in response to treatment. However, as the present study evaluates longitudinal invariance of the course of one year, future studies should test invariance of the DTI over shorter intervals to establish short-term temporal sensitivity. Finally, to our knowledge, this study is the first to provide evidence of longitudinal measurement invariance for a measure of physical and emotional distress tolerance in any population—addressing a considerable research gap contributing to the paucity of longitudinal research within the distress tolerance literature.

Differential correlates were assessed to examine the convergent properties of the DTI within a Veteran population. Excluding action-oriented coping, emotional distress tolerance correlated moderately strongly with all theoretically-related variables including posttraumatic stress symptoms—consistent with established evidence of the transdiagnostic protective role of emotional distress tolerance within Military populations. Of note, the negative correlation between trait neuroticism and emotional distress tolerance was considerably high, with shared variance reaching nearly 50% between each subscale. Though direct empirical examination of this relation is limited, other studies have noted a similarly large zero-order correlation between emotional distress tolerance and trait neuroticism (Marshall-Berenz, Vujanovic, Bonn-Miller, Bernstein, & Zvolensky, 2010; Kaiser, Milich, Lynam, & Charnigo, 2012). The magnitude of the relationship suggests considerable overlap, which makes theoretical sense as neuroticism reflects the tendency to experience negative affect, while emotional distress tolerance reflects the capability to tolerate negative affect.

Physical distress tolerance was weakly but positively correlated with resilience, and negatively correlated with neuroticism, as expected. However, the lack of correlation between anxiety and physical distress tolerance was unexpected, as prior works have noted a moderate positive relationship between anxiety-related variables and intolerance to physical discomfort measured using the Discomfort Intolerance Scale (DIS; Schmidt et al., 2006)—a similar variable to the physical distress tolerance subscale of the DTI (Bonn-Miller, Zvolensky & Bernstein, 2009). The DIS is multidimensional, however, with two factors reflecting avoidance of uncomfortable situations and intolerance of discomfort and pain. In prior studies examining the relation, the avoidance dimension of the DIS was moderately correlated with symptoms of anxiety, whereas the intolerance dimension was not. Comparing the physical DTI subscale items to the DIS items at face value, the DTI items appear more consistent with the intolerance rather than the avoidance dimension of DIS.

Importantly, one of the physical distress tolerance items excluded due during initial exploratory analysis of the DTI appeared more consistent with pain or physical distress *avoidance* rather than tolerance (i.e. “I’ll take fairly extreme measures to stop physical pain...”). Consistent with the factor structure of the DIS, this particular item may actually be

tapping an unmeasured lower-order pain avoidance factor of physical and emotional distress tolerance. Thus, the DTI may benefit from further item development aimed at elucidating the avoidance/tolerance differentiation of physical distress tolerance, particularly in the context of Military and Veteran populations.

While promising, the psychometric properties of the DTI should be considered in light of several study limitations. First, our sample size was small relative to the complexity of the analyses, although we argue that a split-sample was necessary to replicate the factor solution derived in exploratory analyses following data-reduction. Future studies should replicate the DTI factor structure and longitudinal invariance of the measure in a larger study using confirmatory factor analysis. Second, our study sample consisted of a relatively homogenous group of post-9/11 Veterans (i.e., primarily young, male, army Veterans); thus, generalizability to civilians or Veterans from other war theatres is unknown. Moreover, it is feasible that the physical distress tolerance correlations were particularly weak within this study because participants reported, on average, relatively high physical distress tolerance, and thus may have had restricted range for their physical distress tolerance scores. Therefore, future studies should evaluate the psychometric properties of the 10-item DTI within non-Veteran samples. Third, while the emotional distress tolerance factor of the DTI was comprised of indicators reflecting both avoidance and acceptance of emotional distress, the physical distress tolerance factor considerably narrower, primarily tapping pain tolerance. Based on the limited convergent evidence of the physical distress tolerance sub-factor within this study, further item development focusing on enriching the physical distress tolerance dimensions of the scale (while being mindful of the brief nature of the measure) would be a particularly important focus of future research efforts.

Conclusions

A relative paucity of brief, parsimonious multidimensional measures of distress tolerance presents a considerable limitation to refining the construct. The present study addressed this research gap through an examination of the psychometric properties of the DTI (Telch, 1998), a novel, brief measure of emotional and physical distress tolerance, within a longitudinal sample of post-9/11 Veterans. The DTI demonstrated a temporally stable two-factor structure measuring emotional and psychological distress tolerance, with subscales that demonstrated good internal consistency and convergent and discriminant validity. Additional research on this measure in independent samples, and further item development intended to broaden and enrich the physical distress dimension assessed within the DTI is warranted.

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Table 1

10 – item Distress Tolerance Inventory

<i>Emotional Distress Tolerance</i>
1. I can usually handle feelings of emotional upset quite well.
2. I usually face emotionally upsetting situations head on.
3. I usually follow through with tasks that are emotionally upsetting
4. I am able to handle feelings of emotional upset as well as most people
5. When faced with the choice of either facing an upsetting situation or avoiding it, I usually avoid it even if facing the situation is in my best interest.
<i>Physical Distress Tolerance</i>
6. I'll take fairly extreme measures to stop physical pain or other unpleasant physical feelings.
7. I am a real wimp when it comes to handling any kind of physical discomfort.
8. I have a high threshold for pain and other forms of physical discomfort
9. I can handle quite a bit of physical pain or physical discomfort
10. Pain and other forms of physical distress do not bother me much.

Note: Measured on a 1 (Strongly agree) to 6 (Strongly disagree) Likert Scale. Instructions: “For each of the statements listed below, please select the response that *best* describes how much you agree or disagree with the statement as it applies to how you are normally. Please read each statement carefully before responding and keep in mind that there are no right or wrong answers.”

Table 2

Factor Loadings for 7-item DTI

	Factor 1		Factor 2	
	Estimate	S.E.	Estimate	S.E.
I can handle feelings of emotional upset well.	0.842	0.06	0.007	0.03
If given a choice, I will avoid emotionally upsetting situations.	0.429	0.09	– 0.004	0.08
I usually face emotionally upsetting situations head on.	0.560	0.09	0.286	0.09
I usually handle feelings of emotional upset as well as most others	0.848	0.06	– 0.021	0.07
I have a high threshold for physical pain	–0.016	0.03	0.924	0.04
I can handle a lot of physical pain	0.005	0.05	0.987	0.02
Pain doesn't really bother me much.	0.161	0.09	0.512	0.08

Note: Significant standardized loadings > |.30| are in boldface.

Table 3

Exploratory Structural Equation Modeling - Temporal Invariance Test

Nested Models	χ^2	df	χ^2 (df)	p	RMSEA	CFI	SRMR
Model A - Loadings Constrained	80.5	64	7.5 (10)	0.68	.04 (.00, .07)	0.973	.06
Model B - Loadings, Intercepts Constrained	90.0	71	9.5 (7)	0.22	.04 (.00, .06)	0.969	.06
Model C - Loadings, Intercepts, Uniqueness Constrained	106.7	78	11.1 (7)	0.14	.05 (.02, .07)	0.954	.07
Model D - Loadings, Intercepts, Uniqueness, and FCOV Constrained	108.4	81	4.5 (3)	0.21	.05 (.02, .07)	0.956	.08

Note: Model A is nested within the Configural model, with $r\chi^2$ (54, N=164), 73.2, $p < .05$, $RMSEA = .05$ (.01, .07), $CFI = .969$, $SRMR = .052$. Nested models compared using Satorra-Bentler Chi-square difference test for robust maximum likelihood estimation.

Table 4

Differential Correlations

	Distress Tolerance Inventory	
	Emotional Distress Tolerance	Physical Distress Tolerance
<i>Distress-Tolerance Related</i>	Action-oriented coping	-.102
	Avoidant coping	-.054
	Experiential avoidance	-.079
<i>Personality Characteristics</i>	Neuroticism	-.173*
	Resilience	.187*
<i>Mental Health</i>	Depression	-.014
	Anxiety	-.075
	Stress	-.104
	Posttraumatic Stress	-.067

*
 $p < .05$ **
 $p < .001$ $N = 163$