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The relationship between the latent factors of posttraumatic stress disorder and distress tolerance

Brianna M. Byllesby
University of Toledo

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The Relationship Between the Latent Factors of Posttraumatic Stress Disorder and

Distress Tolerance

by

Brianna M. Byllesby

Submitted to the Graduate Faculty as partial fulfillment of the requirements for the

Masters of Arts Degree in Psychology

_____
Jon D. Elhai, PhD, Committee Chair

_____
Jason Levine, PhD, Committee Member

_____
Thomas Fine, M.A., L.P.C.C., Committee Member

_____
Patricia Komuniecki, PhD, Dean
College of Graduate Studies

The University of Toledo

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An Abstract of

The Relationship Between the Latent Factors of Posttraumatic Stress Disorder and
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Posttraumatic stress disorder (PTSD) has previously been found to be inversely

related to distress tolerance, which is the ability to tolerate negative or aversive emotional

states (Simons & Gaher, 2005), in trauma-exposed samples. The vast majority of the

studies examining the relationship between these two constructs have used *DSM-IV*

PTSD criteria. Additionally, although previous research has considered their relationship

at the symptom cluster level (Fetzner et al., 2014; Vujanovic et al., 2013), this is the first

study to examine it at the latent level of analysis. Confirmatory factor analysis (CFA) was

used to determine whether the *DSM-5* model of PTSD or the dysphoria model of PTSD

provided a better fit for the data. CFA was also used to test the five-factor hierarchical

model of the Distress Tolerance Scale (DTS; Simons & Gaher, 2005), and then Wald

tests of parameter constraints were utilized to determine if the magnitude of the

relationships between individual PTSD factors and the second-order DTS factor differed

significantly. Results indicated that the four-factor dysphoria model of PTSD provided a

significantly better fit compared to the *DSM-5* four-factor model of PTSD. Additionally,

all four factors of PTSD (re-experiencing, avoidance, dysphoria, and arousal) were

negatively correlated with the higher-order general distress tolerance factor of the DTS. However, when these factor correlations were compared pairwise using Wald tests of parameter constraints, none of them were differentially related to overall distress tolerance. Clinical and research considerations are addressed for both PTSD and distress tolerance.

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Introduction

Posttraumatic stress disorder (PTSD) is a mental disorder that can occur following exposure to a potentially traumatic event, and it affects 3.5% of the United States population each year, with a 7% lifetime prevalence rate (Kessler, Chiu, Demier, & Walters, 2005). As research continues to study the unique developmental, maintenance, and treatment variables related to the disorder, focus increasingly turns to understanding the underlying latent structure of PTSD to inform diagnosis and treatment. Similarly, related external constructs, such as emotion regulation (Boden et al., 2013; Schreiber, Grant, & Odlaug, 2012; Tull, Barrett, McMillan, & Roemer, 2007) and distress tolerance (Anestis, Tull, Bagge, & Gratz, 2012; Marshall-Berenz, Vujanovic, Bonn-Miller, Bernstein, & Zvolensky, 2010; Tull, Gratz, Coffey, Weiss, & McDermott, 2013) are being considered in association with PTSD to better understand its development and maintenance.

PTSD Factor Structure

Several factor structure models for PTSD have been proposed to increase understanding of PTSD's underlying symptom dimensions using confirmatory factor analysis (CFA). The three-factor model of PTSD proposed in *DSM-IV* (American Psychiatric Association, 2000), which was divided into re-experiencing, effortful avoidance/emotional numbing, and hyperarousal, proved to be a poor fit of the PTSD symptom structure (Asmundson et al., 2000; Elhai & Palmieri, 2011; Ullman & Long, 2008; Yufik & Simms, 2010), and consequently, alternative models have been proposed.

In response, two four-factor models have emerged. First, King, Leskin, King, and Weathers (1998) proposed an emotional numbing model of PTSD that consisted of four factors: re-experiencing, avoidance, numbing, and arousal. This model differed from the previous three-factor model because it divided the avoidance/numbing cluster into distinct effortful avoidance and emotional numbing factors, based on research showing that avoidance and numbing are distinct (Asmundson, Stapleton, & Taylor, 2004). This four-factor model has been supported in various trauma-exposed samples, including college students (Elhai, Biehn, Naifeh, & Frueh, 2011; Gauci & MacDonald, 2012; Hoyt & Yeater, 2010), military veterans (Elhai, Palmieri, Biehn, Frueh, & Magruder, 2010; Maestas, Benge, Pastorak, Lemaire, & Darrow, 2011), community adults (Elhai, Grubaugh, Kashdan, & Frueh, 2008), adolescents (Ford, Elhai, Ruggiero, & Frueh, 2009), and civilian war survivors (Morina, Bohme, Morina, & Asmundson, 2011).

Similar to the emotional numbing model, the dysphoria model of PTSD was proposed by Simms, Watson, and Doebbelling (2002). This four-factor model consists of re-experiencing, avoidance, dysphoria, and arousal factors. The eight-item dysphoria factor is a combination of the five numbing symptoms and three arousal symptoms, which reflects the general distress and dysphoria of anxiety and mood disorders (Simms et al., 2002). The dysphoria model has revealed support in trauma-exposed samples of college students (Elhai et al., 2011; Elhai et al., 2009), military veterans (Engdahl, Elhai, Richardson, & Frueh, 2011; Naifeh, Richardson, Del Ben, & Elhai, 2010; Pietrzak, Goldstein, Malley, Rivers, & Southwick, 2010), disaster workers (Palmieri, Weathers, Difede, & King, 2007), sexual assault victims (Elklit, Armour, & Shevlin, 2010; Ullman & Long, 2008), bereaved individuals (Boelen, van den Hout, & van den Bout, 2008;

Elklit et al., 2010), interpersonal violence victims (Krause, Kaltman, Goodman, &

Dutton, 2007), and community adults (Armour & Shevlin, 2009; Carragher, Mills, Slade,

Teesson, & Silove, 2010). A meta-analysis conducted by Yufik and Simms (2010) found

that the emotional numbing and dysphoria models of PTSD provided superior fit relative

to other models, and the dysphoria model also fit marginally better than the emotional

numbing model.

The conceptualization of PTSD has again been altered for the newly published

DSM-5 (see Table 1 for comparison). *DSM-5* has added three additional PTSD

symptoms, persistent distorted blame, persistent negative trauma-related emotions, and

reckless behavior, for a total of 20 symptoms. Additionally, PTSD now comprises four

symptom clusters: intrusions (or re-experiencing), avoidance, negative alterations in

mood and cognition (NAMC), and marked alterations in arousal and reactivity (AAR;

American Psychiatric Association, 2013). Because of its recent publication, limited

research has been completed concerning the validity of this new four-factor model, which

is based on the emotional numbing model (King et al., 1998).

Table 1. *DSM-5 Adjusted Dysphoria Model Compared to the DSM-5 Model of PTSD*

	Model	
PTSD Symptom	Dysphoria	*DSM-5*
B1: Intrusive thoughts	R	R
B2: Nightmares	R	R
B3: Reliving trauma	R	R
B4: Emotional cue reactivity	R	R
B5: Physiological cue reactivity	R	R
C1: Avoidance of thoughts	A	A
C2: Avoidance of external reminders	A	A
D1: Trauma-related amnesia	D	NAMC
D2: Negative beliefs	D	NAMC
D3: Distorted blame	D	NAMC
D4: Persistent negative emotional state	D	NAMC
D5: Lack of interest	D	NAMC
D6: Feeling detached	D	NAMC

D7: Inability to experience positive emotions	D	NAMC
E1: Irritability/anger	D	AAR
E2: Recklessness	H	AAR
E3: Hypervigilance	H	AAR
E4: Easily startled	H	AAR
E5: Difficulty concentrating	D	AAR
E6: Difficulty sleeping	D	AAR

Note. R = Re-experiencing; A = Avoidance; D = Dysphoria; H = Hyperarousal; NAMC = Negative alterations in mood and cognition; AAR = Alterations in arousal and reactivity.

Distress Tolerance Factor Structure

A key process that is related to PTSD is distress tolerance. Zvolensky, Vujanovic, Bernstein, and Leyro (2010) define distress tolerance as "the perceived capacity to withstand negative emotional and/or other aversive (e.g. physical discomfort) and the behavioral act of withstanding distressing internal states elicited by some type of stressor" (p. 406). Distress tolerance has been linked to various cognitive-affective processes, such as affect intensity (Cougle, Bernstein, Zvolensky, Vujanovic, & Macatee, 2013; Simons & Gaher, 2005; Vujanovic et al., 2013) and experiential avoidance (Leyro, Zvolensky, & Bernstein, 2010; Schmidt, Richey, & Fitzpatrick, 2006). Bernstein, Zvolensky, Vujanovic, and Moos (2009) found that distress tolerance is a unique variable relative to anxiety sensitivity and discomfort intolerance. In addition, other studies have supported the idea that distress tolerance is able to stand on its own relative to other anxiety constructs such as anxiety sensitivity (Bernstein et al., 2009; Keough, Riccardi, Timpano, Mitchell, & Schmidt, 2010) and physical discomfort intolerance (Anestis et al., 2011; Bardeen, Fergus, & Orcutt, 2013).

Distress tolerance has also been linked to psychopathology and is a component of various therapeutic interventions. Distress tolerance has been associated with major depressive disorder (MDD; Ehring, Fischer, Schnulle, Bosterling, & Tuschen-Caffier,

2008; Mennin, Holaway, Fresco, Moore, & Heimberg, 2007; Rottenberg, Gross, & Gotlib, 2005), generalized anxiety disorder (GAD; Mennin, McLaughlin, & Flanagan, 2009), panic disorder (Marshall et al., 2008; Telch, Jacquin, Smits, & Powers, 2003), substance use disorders (Daughters et al., 2005), and borderline personality disorder (Gaher, Hofman, Simons, & Hunsaker, 2013; Iverson, Follette, Pistorello, & Fruzzetti, 2012; Linehan, 1993). Because of its prominent role in the conceptualization of various psychological phenomena, distress tolerance is also directly addressed in therapeutic interventions, including dialectical behavior therapy (DBT; Linehan, 1993), unified protocol for transdiagnostic treatment of emotional disorders (Barlow, Allen, & Choate, 2004), and acceptance-based emotion regulation group therapy (Gratz & Gunderson, 2006).

The latent structure of distress tolerance has not been explored as extensively as that of PTSD. The Distress Tolerance Scale (DTS; Simons & Gaher, 2005) was developed specifically to measure distress tolerance for negative emotional states. Simons and Gaher (2005) found a hierarchical model of distress tolerance using confirmatory factor analysis, with four lower-order factors (tolerance, appraisal, absorption, and regulation) subsumed by a second-order general distress tolerance factor. The four factors of the DTS are highly related, but tap distinct processes of experiencing distress. Tolerance relates to how much the individual perceives distress as unbearable; Absorption is associated with the tendency to have attention absorbed by focusing on the distressing aspects of the situation; Regulation addresses the change in affect regulation strategies to alleviate distress; and Appraisal relates to how an individual's inability to accept distress exacerbates his or her suffering (Simons & Gaher, 2005). This structure

has been replicated (Leyro, Bernstein, Vujanovic, McLeish, & Zvolensky, 2011), but most research using the DTS has used observed variables instead of latent factors. Therefore, additional research confirming the latent structure of distress tolerance is necessary.

PTSD and Distress Tolerance

Traumatic stress and distress tolerance have several commonalities that suggest their relationship requires further investigation, and there are several theoretical ways that they could be related. Vujanovic, Bernstein, and Litz (2010) proposed that low levels of distress tolerance might be related to a predisposition for greater emotion dysregulation, which resulted from an insufficient capacity to experience and tolerance trauma-related distress. Similarly, some researchers have theorized that experiential avoidance and avoidant coping could underlie the relationship between distress tolerance and PTSD (Lynch & Mizon, 2010). Experiential avoidance involves the inability or unwillingness to experience aversive internal experiences such as emotions and memories, which is very similar to the intolerance associated with distress and trauma (Tull & Roemer, 2003). Lower distress tolerance has been hypothesized to lead to experiential avoidant coping or reflect a predisposition for experiential avoidance (Lynch & Mizon, 2010). In addition to avoidance being a latent factor of PTSD, individuals with PTSD have been found to avoid person and threatening information in order to regulate or avoid potential negative mood states (Dalgleish, Rolfe, Golden, Dunn, & Barnard, 2008). Similarly, experiential avoidance is associated with increased PTSD symptom severity (Foa & Kozak, 1986).

Besides experiential avoidance, distress has been linked to PTSD as an underlying factor associated with internalizing disorders. Internalizing disorders, such as anxiety

disorders, PTSD, and unipolar depression, have a common core of negative emotionality (reviewed in Stander, Thomsen, & Highfill-McRoy, 2014). Watson proposed that there are three major categories of disorders: bipolar, distress, and fear disorders (Watson, 2005, 2009). PTSD could fit into the distress disorder category, along with dysthymia, MDD, and GAD (Watson, 2005). Arguably, PTSD could also be placed in the fear disorder category because of the fear conditioning associated with trauma exposure, but the present study is concerned with negative emotionality associated with distress rather than fear (Lockwood & Forbes, 2014). Distress disorders, also called anxious-misery disorders, are characterized by a large component of non-specific negative affectivity (Watson, O'Hara, & Stuart, 2008). The ability to tolerate negative emotional states, as measured by distress tolerance, should theoretically be negatively associated with PTSD, but previous research has not considered how these latent factors could be differentially related to the different factors of PTSD.

Previous studies have considered the relationship between distress tolerance and overall PTSD severity or PTSD symptom cluster summed scores, but not the latent factors underlying PTSD. The relationship between PTSD and distress tolerance reveals and inverse relationship in which PTSD symptom severity increases when distress tolerance is lower (Fetzner, Peluso, & Asmundson, 2014; Marshall-Berenz et al., 2010; Vujanovic, Bonn-Miller, Potter, Marshall, & Zvolensky, 2011; Vujanovic et al., 2013). For example, greater ability to tolerate distress (indicated by higher scores on the DTS) is associated with less severe PTSD symptoms (indicated by lower scores on measures of PTSD). Vujanovic et al. (2013) investigated relations between distress tolerance and PTSD severity as a function of negative affect intensity, and the authors reported that

distress tolerance had the strongest relationship with PTSD symptom severity when negative affect intensity was high. Related to PTSD symptom clusters, it has been found that individuals reporting lower levels of distress tolerance report higher levels of re-experiencing, avoidance, and arousal symptoms, compared to individuals reporting higher levels of distress tolerance, and the largest effect size of these symptom clusters was found for the arousal subscale (Vujanovic et al., 2011). Distress tolerance has also been found to have a significant inverse relationship to the re-experiencing and emotional numbing symptom clusters, in that higher levels of distress tolerance are associated with lower symptom severity on the re-experiencing and emotional numbing subscales (Vujanovic et al., 2013). Finally, a relationship was found between distress tolerance and alcohol use behavior indirectly through PTSD's arousal symptom cluster (Duranceau, Fetzner, & Carleton, 2014).

Present Study Aims and Hypotheses

The present study aimed to add to the current understanding of PTSD and distress tolerance, as well as the relationship between the two constructs at the latent level of analysis. The two broad aims of the proposed study were to relate model fit comparison, for both PTSD and distress tolerance, and to compare the relationships between PTSD latent factors and distress tolerance.

The first aim for model fit comparison used confirmatory factor analysis (CFA) to compare the model fit of two PTSD factor structure models. The present study adds to the current literature by testing the fit of the new *DSM-5* latent structure model of PTSD and the *DSM-5* adapted dysphoria model of PTSD. It was hypothesized that the dysphoria model would provide a better fit of the data, consistent with the findings of Yufik and

Simms (2010). Similarly, a CFA was conducted to determine the fit of the hierarchical latent structure of distress tolerance using the hierarchical model proposed by Simons and Gaher (2005).

The second aim of the study related to the differential relationship between the different PTSD factors with the second-order general distress tolerance factor. In general, it was predicted that all four factors of PTDS, regardless of which measure was used in the secondary analyses, would be significantly negatively correlated with the DTS higher order factor (Anestis et al., 2012; Fetzner et al., 2014; Vujanovic et al., 2013). The better fitting PTSD model was tested in conjunction with distress tolerance, and each PTSD factor was examined using correlations and Wald chi-square constraint tests to determine if the correlations between factors of PTSD and distress tolerance differed significantly. If the dysphoria model was determined to be the best fit, and therefore used in the subsequent analyses, it was hypothesized that the re-experiencing, avoidance, and arousal factors would have a stronger relationship with distress tolerance, and the dysphoria factor would be the least correlated with distress tolerance. If the *DSM-5* factor structure was determined to be the best fit and used in subsequent analyses, it was hypothesized that the re-experiencing, avoidance, and alterations in arousal and reactivity factors would be more related to distress tolerance than the negative alterations in mood and cognition factor is related to distress tolerance (Anestis et al., 2012; Fetzner et al., 2014; Vujanovic et al., 2011).

Chapter Two

Method

Participants

Subjects were undergraduate students enrolled at the University of Toledo in an Introductory Psychology course. Only individuals 18 years or older who endorsed trauma exposure were eligible for participation. Recruitment continued until at least 225 individuals with trauma-exposure meeting *DSM-5* criteria completed the study materials. Previous research has shown that 132 participants represent an adequate number of subjects considering the typical fit statistics associated with PTSD factor structure (Elhai & Palmieri, 2011).

Procedure

Subject Recruitment. Participants were recruited from the undergraduate population. They each had an account on the University's SONA Systems platform, which is a program for managing psychological research participation. A brief abstract was provided, which stated, "This study is a 30 minute web survey inquiring about stressful life events and emotional functioning." Each individual who completed the study materials received 0.5 research credits toward their class requirement.

Participant Screening. Prior to completing any research studies for the semester, students completed a pre-screen questionnaire to determine their eligibility for the different studies being offered. Only two of these screening questions were used to determine eligibility in the present study. First, students had to endorse that they were at least 18 years of age. Second, the Structured Clinical Interview for *DSM-IV* PTSD Trauma Screen (discussed below) was used to determine if the student potentially had

trauma exposure. This single-question screener required a forced "yes" or "no" response, and only individuals who responded "yes" were eligible to participate in the study.

Data Collection. The present study was conducted as a web-based survey. Subjects were able to sign up for the study on the university's SONA Systems website, and they were routed to complete the materials on PsychData. PsychData is a web survey creation and delivery platform, writing data to a research database system that securely stores all study information. The computer servers are password protected, encrypted, and secured to ensure participants' privacy. Participation was anonymous and conducted in a private location of their own choosing at their leisure. The study should not have exceeded 30 minutes per person to complete. All downloaded data are de-identified and were stored securely.

Measures

Demographics Survey. Information regarding participants' gender, age, race, ethnicity, education, employment status, relationship status, and household income were collected.

Structured Clinical Interview for *DSM-IV* (SCID) PTSD Trauma Screen. The SCID (First, Spitzer, Gibbon, & Williams, 2002) is a structured diagnostic interview for Axis I diagnoses. Only the PTSD module's screen for trauma exposure was presented, and it is a single-sentence probe concerning exposure to a traumatic event, providing specific examples of potentially traumatic events. Only subjects who endorsed a trauma on this prescreen question were able to participate in the study. The SCID PTSD trauma screen has demonstrated 65.5% sensitivity, 87.2% specificity, and 72.3% diagnostic power in an undergraduate sample (Elhai, Franklin, & Gray, 2008).

Stressful Life Events Screening Questionnaire (SLESQ). The SLESQ

(Goodman, Corcoran, Turner, Yuan, & Green, 1998) is a self-report measure assessing

lifetime trauma exposure. It includes 12 categories of potentially traumatic events that

meet *DSM-IV* PTSD's Criterion A, as well as an "other" category. Elhai et al. (2012)

modified the SLESQ, adapting the trauma queries to be consistent with *DSM-5* criteria

for a traumatic event, to be used in the present study. Similarly, the modified SLESQ

included a prompt to nominate a most distressing traumatic event, and the individual was

instructed to keep that event in mind when rating his or her symptoms of PTSD. The

SLESQ has demonstrated good test-retest reliability across the event categories, with a

mean kappa value of .73 (Goodman et al., 1998). In addition, it has been found to have

good convergent and concurrent validity ($r = .77$) when compared to an extensive

interview concerning trauma exposure (Goodman et al., 1998).

PTSD Checklist for *DSM-5* (PCL-5). The PCL (Weathers, Litz, Herman, Huska,

& Keane, 1993) is a self-report measure examining PTSD symptom severity. With the

new publication of *DSM-5*, the PCL has been adapted for the new symptom criteria for

PTSD (Weathers et al., 2013). Each question asked the subject to indicate the amount of

their distress, over the last month, on a five-point Likert-type scale (0 = "Not at all" to 4

= "Extremely"). Preliminary results for the PCL-5 suggest excellent internal consistency

with alpha = .94 and convergent validity compared to the Posttraumatic Stress Diagnostic

Scale (PDS) and the original PCL, $r = .90$ and .87, respectively (Blevins, Weathers,

Witte, & Davis, 2012). The original PCL based on *DSM-IV* has shown good internal

consistency in an undergraduate sample with Cronbach's alpha of .94 for total PCL score,

as well as .85 for re-experiencing, .85 for avoidance, and .87 for the hyperarousal

subscale (Ruggiero, Del Ben, Scotti, & Rabalais, 2003). Convergent validity was found in an undergraduate sample with high correlations (all rs > .75) between the PCL, the Impact of Events Scale (IES), and the Mississippi Scale for PTSD-Civilian Version (MS-C; Ruggiero et al., 2003). It similarly has a moderate correlation with interview-based PTSD measures (r = .65; Adkins, Weathers, McDevitt-Murphy, & Daniels, 2008).

Distress Tolerance Scale (DTS). The DTS (Simons & Gaher, 2005) is a 15-item self-report measure examining an individual's ability to tolerate emotional and psychological distress. Each item is rated on a five-point Likert-type scale (1 = "Strongly Agree" to 5 = "Strongly Disagree"), with lower scores indicative of less distress tolerance. The scale is further broken down into four subscales: perceived ability to tolerate emotional distress (Tolerance), attention being absorbed by negative emotions (Absorption), subjective appraisal of distress (Appraisal), and regulation of efforts to alleviate distress (Regulation). Good internal consistency has been found in undergraduate samples, with Cronbach's alpha of .89 (Cougle et al., 2013; Simons & Gaher, 2005). Cougle et al. (2013) also found adequate to good internal consistency for the subscales with alpha values of .80 (Appraisal), .78 (Absorption), .70 (Regulation), and .64 (Tolerance). The DTS total score shows a good intra-class correlation (r = .61) for test-retest over a six-month interval (Simons & Gaher, 2005). The DTS has been found to have good divergent validity from measures of affective distress (r = -.59) and emotional lability (r = -.51), and in regard to convergent validity, it is positively related to negative mood regulation (r = .54) (Simons & Gaher, 2005).

Data Analysis

Data were downloaded from the secure PsychData application and screened for missing data. Individuals who did not qualify as trauma-exposed according to *DSM-5* criteria were excluded, as well as individuals who did not endorse a most distressing trauma. Data for participants were excluded if more than 50% of item responses were missing from either the PCL-5 or DTS, and a pairwise present approach was used to estimate any additional missing value items in Mplus.

Confirmatory factor analyses (CFA) were conducted using Mplus 7.1 software. Because both the PCL-5 and DTS items have five response options, they were treated as ordinal, and therefore a polychoric covariance matrix and probit regression coefficients were generated in the CFA (Wirth & Edwards, 2007). Because the data were treated as ordinal, robust weighted least squares estimation with a mean- and variance-adjusted chi-square (WLSMV) for the CFA was implemented. Residual error variances were fixed to zero, and in order to scale the factors, all factor variances were fixed to one. Standardized parameter estimates were interpreted.

For goodness of fit, comparative fit index (CFI), Tucker-Lewis Index (TLI), and root mean square error of approximation (RMSEA) estimated are reported. Excellent model fit is characterized by CFI and TLI $\geq .95$ and RMSEA $\leq .06$ (Hu & Bentler, 1999). A total of four CFAs were conducted. First, the four-factor dysphoria model of PTSD was examined, adapted for *DSM-5* PTSD criteria. Second, the four-factor *DSM-5* model of PTSD was examined. The four-factor model providing the best fit of the data was used in subsequent analyses. Next, the latent structure of the DTS was examined with CFA to verify the fit of the accepted hierarchical factor structure. Finally, the combined PTSD/DTS five-factor model was tested for model fit.

The better fitting PTSD model was determined by comparing the fit indices of the *DSM-5* four-factor model with the dysphoria *DSM-5* adjusted four-factor model. These two models are non-nested, and therefore they could not be compared using chi-square difference testing. Instead, Bayesian Information Criterion (BIC) values were obtained by re-running both models using maximum likelihood (ML) estimation. A lower BIC value is indicative of better fit, and a difference of ten points is strong support for a distinguishable difference between the compared models (Kass & Raftery, 1995).

Six Wald tests of parameter constraints were then conducted and used to test for significant differences in the correlations between the best-fitting PTSD model's four factors and the single DTS second-order factor. These Wald chi-square constraint tests examined all possible correlation pairs to determine if the correlations between distress tolerance and PTSD were significantly different (e.g. the difference between the correlation of a) the DTS higher order factor and PTSD's re-experiencing factor and b) the DTS higher order factor and PTSD's avoidance factor). Correlations between PTSD factors and the DTS are presented.

<center>**Chapter Three**</center>

<center>**Results**</center>

Sample Characteristics

The full sample was collected over three academic semesters (from Spring 2014 to Spring 2015) and consisted of 509 undergraduate psychology students. Of those, 18 opted out of the study and provided no data. Additionally, 243 participants were eliminated for not endorsing a most distressing trauma on the SLESQ. Of the remaining subjects, six were excluded for not endorsing a *DSM-5* Criterion A qualifying trauma: one individual reported witnessing a traumatic event, but only through electronic media; five individuals reported repeated exposure to traumatic content through media only, but not as part of their occupation. The final sample therefore consisted of 242 trauma-exposed individuals, which is 47.5% of the total sample endorsing trauma exposure. The death of a close family member or friend ($n = 100$, 41.3%) was the most frequently endorsed index trauma, which PTSD symptoms were rated against. See Table 2 for frequencies of each type of reported traumatic event within this sample.

Table 2. *Frequencies of Reported Index Traumas Within Sample*

Traumatic Event	n	%
Life-threatening illness	20	8.3
Life-threatening accident	20	8.3
Physical force in robbery or mugging	5	2.1
Death of an immediate family member or close friend due to accident, homicide, or suicide	100	41.3
Physically forced used to have intercourse against wishes in childhood or adulthood	21	8.7
Physical force or threat used to attempt to have intercourse or inappropriate sexual contact against wishes	18	7.4
Physically harmed or beaten by parent or caregiver	4	1.7
Physically harmed or beaten by romantic partner, date, stranger, or someone else	11	4.5
Threatened with a deadly weapon	6	2.5

Being present when someone was killed, injured, or assaulted	21	8.7
Repeated exposure to vivid trauma details	9	3.7
Other situation involving serious injury or life endangerment, including combat or war zone	7	2.9

There were some differences between the individuals with trauma exposure compared to individuals that were excluded for not endorsing a traumatic experience based on *DSM-5* criteria. Males and females did not differ in their likelihood of being trauma exposed, $\chi^2(1) = .054$, $p = .816$, $\phi = .011$. Individuals with trauma exposure were significantly older than the group of individuals excluded for no trauma exposure ($M = 19.59$, $SD = 3.334$), $F(1, 484) = 6.408$, $p = .012$, $\eta_p^2 = .007$. Finally, the trauma-exposed group had a significantly lower overall DTS score ($M = 46.06$, $SD = 13.10$) when compared to the mean of the non-trauma exposed group ($M = 49.22$, $SD = 11.53$), $F(1, 485) = 8.083$, $p = .005$, $\eta_p^2 = .008$.

The effective sample was mostly white ($n = 202$, 83.5%) and female ($n = 168$, 69.4%). The mean age was 20.67 years old ($SD = 5.816$), and most of the participants were college freshman (years of education after first grade; $M = 13.06$, $SD = 1.54$). Most participants were employed part time ($n = 118$, 48.8%) or identified as unemployed students ($n = 93$, 38.4%), and approximately half self-reported being single ($n = 124$, 51.2%). Comprehensive demographic information is given in Table 3.

Table 3. *Sample Demographics*

	n, %	*M (SD)*	Range
Gender			
Male	74, 30.6%		
Female	168, 69.4%		
Age		20.67 (5.82)	18-56
Race/Ethnicity			
Caucasian or White	202, 83.5%		
African American or Black	42, 17.4%		
Hispanic	16, 6.6%		

Asian	4, 1.7%	
Native American	8, 3.3%	
Native Hawaiian or Pacific Islander	3, 1.2%	
Unknown	5, 2.1%	
Education		13.06 (1.54) 11-18
Employment Status		
Employed part time	118, 48.8%	
Employed full time	24, 9.9%	
Retired	1, 0.4%	
Unemployed	5, 2.2%	
Unemployed student	93, 38.4%	
Relationship Status		
Single, never married	124, 51.2%	
In a relationship, not living together	82, 33.9%	
In a relationship, living together	18, 7.4%	
Married	14, 5.8%	
Divorced, separated, or widowed	2, 0.8%	
Annual Household Income		
Less than $15,000	56, 23.1%	
$15,000 to $29,999	37, 15.3%	
$30,000 to $44,999	21, 8.7%	
$45,000 to $59,999	29, 12.0%	
$60,000 to $74,999	37, 15.3%	
$75,000 to $89,999	27, 11.2%	
$90,000 or higher	34, 14.0%	

Note. Some percentages do not add up to 100% because of missing values. Race and ethnicity categories are not mutually exclusive, as participants could choose as many as applied. Education rated as years of education since the first grade.

Preliminary Data Analyses

The mean PCL score was 24.43 ($SD = 18.20$), skew = 0.649 ($SE = 0.16$), kurtosis = -0.382 ($SE = 0.31$). The PCL for the present sample also had good internal consistency, Cronbach's alpha = .952. About a third (n = 85, 35.1%) met probable PTSD diagnosis based on the *DSM-5* diagnostic algorithm (Cook, Thompson, Coyne, & Sheikh, 2003), and the mean number of years since the target trauma was 3.47 ($SD = 4.35$). For the PCL, 86.0% ($n = 208$) had no item-level missing data, 11.2% ($n = 27$) were missing a single item on the PCL, and no one was missing more than five of the 20 items.

The mean DTS score was 46.04 (SD = 13.10), skew = 0.045 (SE = 0.16), kurtosis

= -0.204 (SE = 0.31). The DTS had good internal consistency, Cronbach's alpha = .917.

For the DTS, 87.2% (n = 211) had no item-level missing data, 11.2% (n = 27) were

missing a single item, and no individual was missing more than three of the 15 items.

Confirmatory Factor Analyses

Two CFAs were conducted for the competing PTSD factor models. The first

CFA, for the four-factor *DSM-5* PTSD model, indicated good fit, robust χ^2 (164, N = 242)

= 236.065, p < .001, CFI = .978, TLI = .974, RMSEA = .060 (90% CI = .042 - .077).

Next, the CFA for the four-factor dysphoria model was found to have good fit, robust χ^2

(164, N = 242) = 233.940, p < .001, CFI = .978, TLI = .975, RMSEA = .059 (90% CI =

.041 - .076). The two CFAs were then reanalyzed using ML estimation instead of

WLSMV in order to obtain BIC values to compare model fit. The difference in BIC

values between the *DSM-5* model (5653.467) and dysphoria model (5641.672) was

greater than ten (11.795), indicating that the dysphoria model had significantly better fit

than the *DSM-5* PTSD model and was therefore used in subsequent analyses.

Next, the model fit for the DTS was tested using a hierarchical model, with four-

factor factors subsumed by a higher order general distress tolerance factor. Results

indicated adequate fit, robust χ^2 (86, N = 242) = 353.441, p < .001, CFI = .960, TLI =

.952, RMSEA = .113 (90% CI = .101 - .126). Finally, the full model was tested, which

combined the four-factor dysphoria model of PTSD with the higher order DTS model.

This five-factor model met criteria for excellent fit, robust χ^2 (546, N = 242) = 834.927, p

< .001, CFI = .970, TLI = .967, RMSEA = .047 (90% CI = .040 - .053). Factor loadings

for the PCL and DTS are presented in Tables 4 and 5, respectively, and factor

correlations are presented in Table 6.

Table 4. *PCL Item Mappings for Tested Models*

	Model	
PTSD Symptom	Dysphoria	*DSM-5*
B1: Intrusive thoughts	0.859	0.860
B2: Nightmares	0.787	0.787
B3: Reliving trauma	0.863	0.863
B4: Emotional cue reactivity	0.812	0.812
B5: Physiological cue reactivity	0.790	0.789
C1: Avoidance of thoughts	0.929	0.929
C2: Avoidance of external reminders	0.942	0.942
D1: Trauma-related amnesia	0.731	0.746
D2: Negative beliefs	0.809	0.824
D3: Distorted blame	0.756	0.769
D4: Persistent negative emotional state	0.846	0.862
D5: Lack of interest	0.859	0.871
D6: Feeling detached	0.894	0.907
D7: Inability to experience positive emotions	0.863	0.875
E1: Irritability/anger	0.845	0.876
E2: Recklessness	0.926	0.832
E3: Hypervigilance	0.785	0.720
E4: Easily startled	0.897	0.807
E5: Difficulty concentrating	0.841	0.871
E6: Difficulty sleeping	0.724	0.748

Table 5. *DTS Factor Loadings*

Item	Factor	Loading
1. Feeling distressed is unbearable to me	TOL	0.773
3. I can't handle feeling distressed	TOL	0.770
5. There's nothing worse than feeling distressed	TOL	0.705
2. When I feel distressed, all I can think about is how bad I feel	ABS	0.811
4. My feelings of distress are so intense that they completely take over	ABS	0.784
15. When I feel distressed, I can't help but concentrate on how bad the distress actually feels	ABS	0.861
6. I can tolerate being distressed as well as most people*	APP	0.288
7. My feelings of distress are not acceptable	APP	0.641
9. Other people seem to be able to tolerate feeling distressed better than I can	APP	0.748
10. Being distressed is always a major ordeal for me	APP	0.827
11. I am ashamed of myself when I feel distressed	APP	0.757
12. My feelings of distress scare me	APP	0.729
8. I'll do anything to avoid feeling distressed	REG	0.793

13. I'll do anything to stop feeling distressed		REG	0.869
14. When I feel distressed, I must do something about it immediately		REG	0.788
Tolerance		DT	0.989
Absorption		DT	0.978
Appraisal		DT	0.920
Regulation		DT	0.737

Note. *Item 6 is reverse scored; DTS = Distress Tolerance Scale; TOL = Tolerance; ABS = Absorption; APP = Appraisal; REG = Regulation; DT = Second-order factor of distress tolerance.

Table 6. *Correlations Between PCL and DTS Factors*

	REEX	AV	DYS	AR	TOL	ABS	APP	REG
REEX	-							
AV	0.778	-						
DYS	0.873	0.729	-					
AR	0.781	0.681	0.835	-				
TOL	-0.411	-0.394	-0.448	-0.406	-			
ABS	-0.426	-0.456	-0.482	-0.340	0.991	-		
APP	-0.475	-0.448	-0.507	-0.456	0.896	0.888	-	
REG	-0.243	-0.384	-0.318	-0.242	0.690	0.696	0.719	
DT	-0.443	-0.465	-0.496	-0.412				

Note. All correlations are significant at $p < .01$ level; PCL = PTSD Checklist; DTS = Distress Tolerance Scale; REEX = Re-experiencing; AV = Avoidance; DYS = Dysphoria; AR = Arousal; TOL = Tolerance; ABS = Absorption; APP = Appraisal; REG = Regulation; DT = Second-order factor of distress tolerance.

Wald Tests

Wald tests of parameter constraints were then conducted with the four factors of PTSD, which compared the magnitude of relationships between the DTS higher-order factor and PTSD factors (see Table 7). Distress tolerance was not significantly more related to re-experiencing ($r = -.443$) than avoidance ($r = -.465$), Wald χ^2 (1) = 0.129, $p = .719$. Similarly, distress tolerance was not significantly more related to re-experiencing than dysphoria ($r = -.496$), Wald χ^2 (1) = 1.403, $p = .236$, or arousal ($r = -.412$), Wald χ^2 (1) = 0.357, $p = .550$. Distress tolerance was not more related to avoidance than

dysphoria, Wald χ^2 (1) = 0.256, p = .613, or arousal, Wald χ^2 (1) = 0.582, p = .446.

Finally, distress tolerance was not more related to dysphoria compared to arousal, Wald χ^2 (1) = 2.369, p = .1238.

Table 7. *Results of the Wald Tests of Parameter Constraints Using DSM-5 Adapted Dysphoria Model of PTSD*

Correlation 1	r	Correlation 2	r	Wald χ^2 (p value)
DT & Re-exp	-0.443	DT & Avoid	-0.465	0.129 (.719)
DT & Re-exp	-0.443	DT & Dysphoria	-0.496	1.403 (.236)
DT & Re-exp	-0.443	DT & Arousal	-0.412	0.357 (.550)
DT & Avoid	-0.465	DT & Dysphoria	-0.496	0.256 (.613)
DT & Avoid	-0.465	DT & Arousal	-0.412	0.582 (.446)
DT & Dysphoria	-0.496	DT & Arousal	-0.412	2.369 (.124)

Note. DT = Second-order factor of distress tolerance; Re-exp = Re-experiencing; Avoid = Avoidance.

Chapter Four

Discussion

Summary of Results and Hypotheses

The aims of the present study were twofold: to compare the model fit of two competing latent factor models of PTSD using *DSM-5* criteria and to examine the relationships between the latent factors of PTSD and distress tolerance. Both the *DSM-5* model of PTSD and the *DSM-5* adjusted dysphoria model of PTSD provided good fit for the latent structure of PTSD in the present sample, but as hypothesized, the dysphoria model fit significantly better. The hierarchical model of the DTS, characterized by four factors subsumed by a general distress tolerance second-order factor, provided good fit to the data, as expected from previous research. Also congruent with the hypotheses, all four PTSD factors of the dysphoria model were significantly and negatively associated with the DTS higher-order factor.

However, when the PTSD correlations with the DTS were examined, none of the paired comparisons showed significant differences. It was hypothesized that the re-experiencing and avoidance factors of PTSD would be more highly correlated to distress tolerance, and the dysphoria factor of PTSD would be the least strongly correlated with distress tolerance. All four PTSD factors should negatively correlate with distress tolerance, but no single factor was significantly more or less related than any other. .

Implications for PTSD and Distress Tolerance Research

The present findings do not support previous research indicating that the dysphoria factor of PTSD is more related to generalized distress or other types of psychopathology, such as depression (Contractor et al., 2014; Elklit et al., 2010; Simms

et al., 2002). The dysphoria factor contains symptoms that are not specific to PTSD, such as difficulty concentrating, irritability, loss of interest, and feelings of detachment, which are also seen in depression and anxiety disorders. Of the three new symptoms added to the PTSD diagnostic criteria for *DSM-5*, two of them (persistent or distorted blame and persistent negative emotional state) load onto the dysphoria factor. Therefore, the degree of specificity of the dysphoria factor, when compared to other external constructs, remains relevant to investigation. The present study found that none of the four factors of PTSD, including dysphoria, were differentially related to the external construct of distress tolerance, which is in line with some findings using *DSM-IV* PTSD criteria where dysphoria was just as related to distress as the other three factors (Marshall, Schell, & Miles, 2010; Miller et al., 2010). Additionally, because previous studies used symptom clusters, no previous investigation of distress tolerance and PTSD's dysphoria factor has been conducted. Therefore, more research concerning distress tolerance and dysphoria is needed.

PTSD and distress tolerance are highly related, with high PTSD symptom severity related to less tolerance for negative emotional states (i.e. lower distress tolerance). The pattern of relationships between PTSD and distress tolerance suggest more support for the generalized distress as the shared variance underlying internalizing disorders than for the theory of experiential avoidance. PTSD's avoidance factor was not more related to distress tolerance than the other factors of PTSD. Previous studies have conceptualized experiential avoidance and avoidant coping to underlie the PTSD-distress tolerance relationship (Lynch & Mizon, 2010; Tull & Roemer, 2003). However, if experiential avoidance acted as an underlying mechanism, it would be expected that the avoidance

and arousal (because of the hypervigilance to environmental cues) to trauma factors of PTSD would show stronger relationships with distress tolerance than the dysphoria factor, characterized by feelings of detachment, general negative affect, and trouble sleeping and concentrating, which was not supported in the present study. In line with the present findings, Vujanovic et al. (2013) found that avoidance and distress tolerance were significantly related at the correlational level, but this significance was lost after controlling for anxiety sensitivity. Therefore, the findings from the present study suggest that factors such as negative affect or generalized distress could influence the underlying relationship between distress tolerance and PTSD.

In contrast, it appears that the inability to tolerate distress and negative emotional states is related to PTSD symptomatology overall. The present findings support the generalized distress or negative emotionally proposed to underlie internalizing disorders (Clark & Watson, 2006; Watson et al., 2008). Future research should be sure to account for distress or negative emotionality in the study of the PTSD and its latent relationships with other constructs.

Because the present study was the first to compare the latent relationships of the PCL-5 and DTS, it is not entirely surprising that the same results found in previous studies using observed variables were not supported (Duranceau et al., 2014; Fetzner et al., 2014; Vujanovic et al., 2011; Vujanovic et al., 2013). Although previous research has found that the avoidance and hyperarousal symptom clusters of PTSD are more related to distress tolerance than other PTSD symptom clusters, using latent modeling (which allows for non-observable constructs to be examined, shared variance to be accounted for, and correcting for effects of measurement error) these relationships are not

supported. Instead, it appears that distress, and one's ability to tolerate it, is related to PTSD at its core and not its subcomponents.

Clinical Implications

The present findings have several implications for clinical practice. Distress tolerance is consistently and negatively associated with all four factors of PTSD, which indicates that it is an important construct related to this disorder. As a distress disorder (Watson, 2005), PTSD is highly comorbid with major depressive disorder, generalized anxiety disorder, and other disorders characterized by high levels of generalized distress. In fact, about three out of four individuals with a principal diagnosis of PTSD have comorbid depression, anxiety, or both (Ginzburg, Ein-Dor, & Solomon, 2010). These disorders have also been found to have significant relations with distress tolerance, which could help explain their co-occurrence and the general shared variance consistently found across internalizing disorders.

Clinically speaking, because individuals presenting with PTSD are highly likely to also exhibit depression and anxiety symptoms, it could be beneficial for clinicians to address the underlying mechanism of distress. Distress tolerance skills have been incorporated into several manualized treatments, particularly DBT (Linehan, 1993). Distress tolerance is one of the core skills addressed in DBT because individuals with borderline personality disorder tend to lack skills in this domain. Preliminary information is available on the utility of DBT in trauma-exposed samples, usually for comorbid PTSD and BPD, but the effectiveness of this line of treatment requires further investigation (Wagner & Linehan, 2006). Additionally, no current studies have examined changes in distress tolerance, using the DTS, over the course of DBT or any other empirically

supported treatment with a distress tolerance component. Therefore, a components analysis of distress tolerance skill change pre- and post-treatment is an avenue for future research.

Additionally, distress tolerance, as measured by the DTS, is generally considered a relatively stable trait-like quality (Simons & Gaher, 2005) compared to psychopathology, such as PTSD. The ability to withstand negative emotional states should precede the symptoms of PTSD following trauma. Therefore, it could be clinically relevant to screen for distress tolerance in individuals following a trauma exposure in order to make sure that the most vulnerable individuals (i.e. those scoring low in distress tolerance) have access to services and skills related to distress prior to full-criteria PTSD developing. Future research should consider if there are different latent profiles of distress tolerance and how these could potentially influence the development and maintenance of PTSD and other psychological symptoms following trauma exposure.

Limitations

The present study had some limitations that should be addressed and could limit the generalizability of the findings. First, the sample consisted of undergraduate students from the United States, which resulted in a more homogeneous sample than if the sample was pulled from the general population. These individuals all endorsed a *DSM-5* qualifying trauma, but in general, the sample was not severely traumatized. Similarly, although the sample should have been adequately powered, it was still relatively small for a latent model. The correlations compared using the Wald tests could have shown more differentiation if there was additional power to estimate the parameters. Finally, this study examined one's perceived tolerance of distress via self-report; however,

incorporating behavioral measures of distress and discomfort intolerance would add to the validity of the findings (Cougle et al., 2013). Behavioral indices of distress tolerance include bio-behavioral measures (such as thermal stress tolerance) and cognitive-based tolerance tasks, like the mirror tracing task (Leyro et al., 2010).

Despite these limitations, the present study adds to the current literature in three important ways. First, the present study used *DSM-5* data for the new PTSD criteria and examined the model fit for the newly published criteria. Both the *DSM-5* and dysphoria models of PTSD provided good fit, but in this sample the dysphoria model fit the data significantly better. Next, the hierarchical model of the Distress Tolerance Scale was supported, which increases its psychometric support and utility in research. Finally, the current study was the first study to examine the latent relationships between PTSD and distress tolerance instead of using symptom clusters or total scores. The use of latent variables instead of observed variables allowed for more accurate estimation of the relationships between the constructs.

Future Directions

Based on the present findings, there are several avenues for future research to pursue. Primarily, additional research is required between PTSD and distress tolerance at the latent level, in order to determine if PTSD's factors are differentially related to distress tolerance in other samples. Additionally, instead of only using the higher-order factor of distress tolerance, the other four factors - tolerance, absorption, appraisal, and regulation - could be examined to determine if one of the individual distress tolerance factors is more or less related to posttraumatic stress. Other factors related to generalized distress, such as negative affect, emotion dysregulation, and anxiety sensitivity, should

also be examined in order to determine the most accurate representation of the

relationships between PTSD, distress, and distress tolerance. Future research should also

consider the pre-trauma variables, such as childhood victimization, rumination, or social

support, which could possibly predispose individuals to be more distress intolerant. Of

clinical and empirical importance would be examining how emotion regulation strategies

and affective vulnerabilities contribute to the development and maintenance of PTSD

symptomatology over time, as well as mechanisms and treatments to address the

emotional distress-related symptoms of PTSD.

References

Adkins, J. W., Weathers, F. W., McDevitt-Murphy, M. E., & Daniels, J. B. (2008).
Psychometric properties of seven self-report measures of posttraumatic stress
disorder in college students with mixed civilian trauma exposure. *Journal of
Anxiety Disorders, 22*(8), 1393-1402. doi: 10.1016/j.janxdis.2008.02.002

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental
disorders* (4th, text revision ed.): American Psychiatric Publishing.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental
disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.

Anestis, M. D., Lavender, J. M., Marshall-Berenz, E. C., Gratz, K. L., Tull, M. T., &
Joiner, T. E. (2011). Evaluating distress tolerance measures: Interrelations and
associations with impulsive behaviors. *Cognitive Therapy and Research, 36*(6),
593-602. doi: 10.1007/s10608-011-9377-8

Anestis, M. D., Tull, M. T., Bagge, C. L., & Gratz, K. L. (2012). The moderating role of
distress tolerance in the relationship between posttraumatic stress disorder
symptom clusters and suicidal behavior among trauma exposed substance users in
residential treatment. *Archives of Suicide Research, 16*(3), 198-211. doi:
10.1080/13811118.2012.695269

Armour, C., & Shevlin, M. (2009). Testing the dimensionality of PTSD and the
specificity of the dysphoria factor. *Journal of Loss and Trauma, 15*(1), 11-27. doi:
10.1080/15325020903373110

Asmundson, G. G., Frombach, I., McQuaid, J., Pedrelli, P., Lenox, R., & Stein, M. B.
(2000). Dimensionality of posttraumatic stress symptoms: A confirmatory factor

analysis of DSM-IV symptom clusters and other symptom models. *Behaviour Research and Therapy, 38*(2), 203-214. doi: 10.1016/S0005-7967(99)00061-3

Asmundson, G. G., Stapleton, J. A., & Taylor, S. (2004). Are avoidance and numbing distinct PTSD symptom clusters? *Journal of Traumatic Stress, 17*(6), 467-475. doi: 10.1007/s10960-004-5795-7

Bardeen, J. R., Fergus, T. A., & Orcutt, H. K. (2013). Testing a hierarchical model of distress tolerance. *Journal of Psychopathology and Behavioral Assessment, 35*(4), 495-505. doi: 10.1007/s10862-013-9359-0

Barlow, D. H., Allen, L. B., & Choate, M. L. (2004). Toward a unified treatment for emotional disorders. *Behavior Therapy, 35*(2), 205-230. doi: 10.1016/S0005-7894(04)80036-4

Bernstein, A., Zvolensky, M. J., Vujanovic, A. A., & Moos, R. (2009). Integrating anxiety sensitivity, distress tolerance, and discomfort intolerance: A hierarchical model of affect sensitivity and tolerance. *Behavior Therapy, 40*, 291-301. doi: 10.1016/j.beth.2008.08.001

Blevins, C. A., Weathers, F. W., Witte, T. K., & Davis, M. T. (2012). *The Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5): Preliminary psychometric analysis in trauma-exposed college students*. Paper presented at the International Society for Traumatic Stress Studies, Los Angeles, CA.

Boden, M. T., Westermann, S., Mcrae, K., Kuo, J., Alvarez, J., Kulkarni, Madhur R., . . . Bonn-Miller, M. O. (2013). Emotion regulation and posttraumatic stress disorder: A prospective investigation. *Journal of Social and Clinical Psychology, 32*(3), 296-314. doi: 10.1111/j.1521-0391.2012.12018

Boelen, P. A., van den Hout, M. A., & van den Bout, J. (2008). The factor structure of posttraumatic stress disorder symptoms among bereaved individuals: A confirmatory factor analysis study. *Journal of Anxiety Disorders, 22*(8), 1377-1383. doi: 10.1016/j.janxdis.2008.01.018

Carragher, N., Mills, K., Slade, T., Teesson, M., & Silove, D. (2010). Factor structure of posttraumatic stress disorder symptoms in the Australian general population. *Journal of Anxiety Disorders, 24*(5), 520-527. doi: 10.1016/j.janxdis.2010.03.009

Clark, L. A., & Watson, D. (2006). Distress and fear disorders: An alternative empirically based taxonomy of the "mood" and "anxiety" disorders. *The British Journal of Psychiatry, 189*, 481-483. doi: 10.1192/bjp.bp.106.03825

Contractor, A. A., Durham, T. A., Brennan, J. A., Armour, C., Wutrick, H. R., Frueh, B. C., & Elhai, J. D. (2014). DSM-5 PTSD's symptom dimensions and relations with major depression's symptom dimensions in a primary care sample. *Psychiatry Research, 215*(1), 146-153. doi: 10.1016/j.psychres.2013.10.015

Cook, J. M., Thompson, R., Coyne, J. C., & Sheikh, J. I. (2003). Algorithm versus cut-point derived PTSD in ex-prisoners of war. *Journal of Psychopathology and Behavioral Assessment, 25,* 267-271. doi: 10.1023/A:1025851129948

Cougle, J. R., Bernstein, A., Zvolensky, M. J., Vujanovic, A. A., & Macatee, R. J. (2013). Validation of self-report measures of emotional and physical distress tolerance. *Journal of Psychopathology and Behavioral Assessment, 35*(1), 76-84. doi: 10.1007/s10862-012-9317-2

Dalgleish, T., Rolfe, J., Golden, A., Dunn, B. D., & Barnard, P. J. (2008). Reduced autobiographical memory specificity and posttraumatic stress: Exploring the

contributions of impaired executive control and affect regulation. *Journal of*
Abnormal Psychology, 117(1), 236-241. doi: 10.1037/0021-843X.117.1.236

Daughters, S. B., Lejuez, C. W., Bornovalova, M. A., Kahler, C. W., Strong, D. R., &
Brown, R. A. (2005). Distress tolerance as a predictor of early treatment dropout
in a residential substance abuse treatment facility. *Journal of Abnormal*
Psychology, 114(4), 729-734. doi: 10.1037/0021-843X.114.4.729

Duranceau, S., Fetzner, M. G., & Carleton, R. N. (2014). Low distress tolerance and
hyperarousal posttraumatic stress disorder symptoms: A pathway to alcohol use?
Cognitive Therapy and Research, 38(3), 280-290. doi: 10.1007/s10608-013-9591-
7

Ehring, T., Fischer, S., Schnulle, J., Bosterling, A., & Tuschen-Caffier, B. (2008).
Characteristics of emotion regulation in recovered depressed versus never
depressed individuals. *Personality and Individual Difference, 44*(7), 1574-1584.
doi: 10.1016/j.paid.2008.01.013

Elhai, J. D., Biehn, T. L., Naifeh, J. A., & Frueh, B. C. (2011). Posttraumatic stress
disorder instrument wording content is associated with differences in factor
structure. *Journal of Traumatic Stress, 24*(2), 208-212. doi: 10.1002/jts.20628

Elhai, J. D., Engdahl, R. M., Palmieri, P. A., Naifeh, J. A., Schweinle, A., & Jacobs, G.
A. (2009). Assessing posttraumatic stress disorder with or without reference to a
single, worst traumatic event: Examining differences in factor structure.
Psychological Assessment, 21(4), 629-634. doi: 10.1037/a0016677

Elhai, J. D., Franklin, C. L., & Gray, M. J. (2008). The SCID PTSD module's trauma

screen: Validity with two samples in detecting trauma history. *Depression and*

Anxiety, 25(9), 737-741. doi: 10.1002/da.20318

Elhai, J. D., Grubaugh, A. L., Kashdan, T. B., & Frueh, B. C. (2008). Empirical

examination of a proposed refinement to DSM-IV posttraumatic stress disorder

symptom criteria using the National Comorbidity Survey Replication data.

Journal of Clinical Psychiatry, 69, 597-602. doi: 10.4088/JCP.v69n0411

Elhai, J. D., Miller, M. E., Ford, J. D., Biehn, T. L., Palmieri, P. A., & Frueh, B. C.

(2012). Posttraumatic stress disorder in DSM-5: Estimates of prevalence and

symptom structure in a nonclinical sample of college students. *Journal of Anxiety*

Disorders, 26(1), 58-64. doi: 10.1016/j.janxdis.2011.08.013

Elhai, J. D., & Palmieri, P. A. (2011). The factor structure of posttraumatic stress

disorder: A literature update, critique of methodology, and agenda for future

research. *Journal of Anxiety Disorders, 25*(6), 849-854. doi:

10.1016/j.janxdis.2011.04.007

Elhai, J. D., Palmieri, P. A., Biehn, T. L., Frueh, B. C., & Magruder, K. M. (2010).

Posttraumatic stress disorder's frequency and intensity ratings are associated with

factor structure differences in military veterans. *Psychological Assessment, 22*(4),

723-728. doi: 10.1037/a0020643

Elklit, A., Armour, C., & Shevlin, M. (2010). Testing alternative factor models of PTSD

and the robustness of the dysphoria factor. *Journal of Anxiety Disorders, 24*(1),

147-154. doi: 10.1016/j.janxdis.2009.10.002

Engdahl, R. M., Elhai, J. D., Richardson, J. D., & Frueh, B. C. (2011). Comparing

    posttraumatic stress disorder's symptom structure between deployed and

    nondeployed veterans. *Psychological Assessment, 23*(1), 1-6. doi:

    10.1037/a0020045

Fetzner, M. G., Peluso, D. L., & Asmundson, G. J. G. (2014). Tolerating distress after

    trauma: Differential associations between distress tolerance and posttraumatic

    stress symptoms. *Journal of Psychopathology and Behavioral Assessment, 36*(3),

    475-484. doi: 10.1007/s10862-014-9413-6

First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J. B. W. (2002). Structural Clinical

    Interview for DSM-IV-TR, Research Version, Non-patient Edition. *Biometrics*

    Research, New York State Psychiatric Institute: New York.

Foa, E. B., & Kozak, M. J. (1986). Emotional processing of fear: Exposure to corrective

    information. *Psychological Bulletin, 99*(1), 20-35. doi: 10.1037/0033-

    2909.99.1.20

Ford, J. D., Elhai, J. D., Ruggiero, K. J., & Frueh, B. C. (2009). Refining the

    posttraumatic stress disorder diagnosis: Evaluation of symptom criteria with the

    National Survey of Adolescents. *Journal of Clinical Psychiatry, 70*, 748-755. doi:

    10.4088/JCP.08m04692

Gaher, R. M., Hofman, N. L., Simons, J. S., & Hunsaker, R. (2013). Emotion regulation

    deficits as mediators between trauma exposure and borderline symptoms.

    Cognitive Therapy and Research, 37(3), 466-475. doi: 10.1007/s10608-012-9515-

    y

Gauci, M. A., & MacDonald, D. A. (2012). Confirmatory factor analysis of the

      posttraumatic stress disorder checklist. *Journal of Aggression, Maltreatment &*

      Trauma, 21(3), 321-330. doi: 10.1080/10926771.2012.665429

Ginzburg, K., Ein-Dor, T., & Solomon, Z. (2010). Comorbidity of posttraumatic stress

      disorder, anxiety and depression: A 20-year longitudinal study of war veterans.

      Journal of Affective Disorders, 123(1-3), 249-257. doi: 10.1016/j.jad.2009.08.006

Goodman, L. A., Corcoran, C., Turner, K., Yuan, N., & Green, B. L. (1998). Assessing

      traumatic event exposure: General issues and preliminary findings for the

      Stressful Life Events Screening Questionnaire. *Journal of Traumatic Stress,*

      11(3), 521-542. doi: 10.1023/A:1024456713321

Gratz, K. L., & Gunderson, J. G. (2006). Preliminary data on an acceptance-based

      emotion regulation group intervention for deliberate self-harm among women

      with borderline personality disorder. *Behavior Therapy, 37*(1), 25-35. doi:

      10.1016/j.beth.2005.03.002

Hoyt, T., & Yeater, E. A. (2010). Comparison of posttraumatic stress disorder symptom

      structure models in hispanic and white college students. *Psychological Trauma:*

      Theory, Research, Practice, and Policy, 2(1), 19-30. doi: 10.1037/a0018745

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure

      analysis: Conventional criteria versus new alternatives. *Structural Equation*

      Modeling, 6, 1-55.

Iverson, K. M., Follette, V. M., Pistorello, J., & Fruzzetti, A. E. (2012). An investigation

      of experiential avoidance, emotion dysregulation, and distress tolerance in young

      adult outpatients with borderline personality disorder symptoms. *Personality*

Disorders: Theory, Research, and Treatment, 3(4), 415-422. doi: 10.1037/a0023703

Kass, R. E., & Raftery, A. E. (1995). Bayes factors. *Journal of American Statistical Association, 90*, 773-795.

Keough, M. E., Riccardi, C. J., Timpano, K. R., Mitchell, M. A., & Schmidt, N. B. (2010). Anxiety symptomatology: The association with distress tolerance and anxiety sensitivity. *Behavior Therapy, 41*, 567-574. doi: 10.1016/j.beth.2010.04.002

Kessler, R. C., Chiu, W. T., Demier, O., & Walters, E. E. (2005). Prevalence, severity, and comorbidity of twelve-month DSM-IV disorders in the National Comorbidity Survey Replication (NCS-R). *Archives in General Psychiatry, 62*, 617-627. doi: 10.1001/archpsyc.62.6.617

King, D. W., Leskin, G. A., King, L. A., & Weathers, F. W. (1998). Confirmatory factor analysis of the Clinician-Administered PTSD Scale: Evidence for the dimensionality of posttraumatic stress disorder. *Psychological Assessment, 10*, 90-96. doi: 10.1037/1040-3590.10.2.90

Krause, E. D., Kaltman, S., Goodman, L. A., & Dutton, M. A. (2007). Longitudinal factor structure of posttraumatic stress symptoms related to intimate partner violence. *Psychological Assessment, 19*(2), 165-175. doi: 10.1037/1040-3590.19.2.165

Leyro, T. M., Bernstein, A., Vujanovic, A. A., McLeish, A. C., & Zvolensky, M. J. (2011). Distress Tolerance Scale: A confirmatory factor analysis among daily

cigarette smokers. *Journal of Psychopathology and Behavioral Assessment, 33*(1), 47-57. doi: 10.1007/s10862-010-9197-2

Leyro, T. M., Zvolensky, M. J., & Bernstein, A. (2010). Distress tolerance and psychopathological symptoms and disorders: A review of the empirical literature among adults. *Psychological Bulletin, 136*(4), 576-600. doi: 10.1037/a0019712

Linehan, M. M. (1993). *Cognitive-behavioral treatment of borderline personality disorder*. New York: Guilford Press.

Lockwood, E., & Forbes, D. (2014). Posttraumatic stress disorder and comorbidity: untangling the Gordian knot. *Psychological Injury and Law, 7*(2), 108-121. doi: 10.1007/s12207-014-9189-8

Lynch, T. R., & Mizon, G. A. (2010). Distress Overtolerance and Distress Intolerance: A Behavioral Perspective *Distress Tolerance: Theory, Research, and Clinical Applications* (pp. 52-79). New York, NY: The Guilford Press.

Maestas, K. L., Benge, J. F., Pastorek, N. J., Lemaire, A., & Darrow, R. (2011). Factor structure of posttraumatic stress disorder symptoms in OEF/OIF veterans presenting to a polytrauma clinic. *Rehabilitation Psychology, 56*(4), 366-373. doi: 10.1037/a0025447

Marshall, E. C., Zvolensky, M. J., Vujanovic, A. A., Gregor, K., Gibson, L. E., & Leyro, T. M. (2008). Panic reactivity to voluntary hyperventilation challenge predicts distress tolerance to bodily sensations among daily cigarette smokers. *Experimental and Clinical Psychopharmacology, 16*(4), 313-321. doi: 10.1037/a0012752

Marshall, G. N., Schell, T. L., & Miles, J. N. (2010). All PTSD symptoms are highly

    associated with general distress: Ramifications for the dysphoria symptom cluster.

    Journal of Abnormal Psychology, 119, 126-135. doi: 10.1037/a0018477

Marshall-Berenz, E. C., Vujanovic, A. A., Bonn-Miller, M. O., Bernstein, A., &

    Zvolensky, M. J. (2010). Multimethod study of distress tolerance and PTSD

    symptom severity in a trauma-exposed community sample. *Journal of Traumatic*

    Stress, 23(5), 623-630. doi: 10.1002/jts.20568

Mennin, D. S., Holaway, R. M., Fresco, D. M., Moore, M. T., & Heimberg, R. G. (2007).

    Delineating components of emotion and its dysregulation in anxiety and mood

    psychopathology. *Behavior Therapy, 38*(3), 284-302. doi:

    10.1016/j.beth.2006.09.001

Mennin, D. S., McLaughlin, K. A., & Flanagan, T. J. (2009). Emotion regulation deficits

    in generalized anxiety disorder, social anxiety disorder, and their co-occurrence.

    Journal of Anxiety Disorders, 23(7), 866-871. doi: 10.1016/j.janxdis.2009.04.006

Miller, M. W., Wolf, E. J., Harrington, K. M., Brown, T. A., Kaloupek, D. G., & Keane,

    T. M. (2010). An evaluation of competing models for the structure of PTSD

    symptoms using external measures of comorbidity. *Journal of Traumatic Stress,*

    23(5), 631-638. doi: 10.1002/jts.20559

Morina, N., Bohme, H. F., Morina, L., & Asmundson, G. J. (2011). The structure of post-

    traumatic stress symptoms in young survivors of war. *Psychiatry Research,*

    186(2-3), 306-309. doi: 10.1016/j.psychres.2010.07.031

Naifeh, J. A., Richardson, J. D., Del Ben, K. S., & Elhai, J. D. (2010). Heterogeneity in the latent structure of PTSD symptoms among Canadian veterans. *Psychological Assessment, 22*(3), 666-674. doi: 10.1037/a0019783

Palmieri, P. A., Weathers, F. W., Difede, J., & King, D. W. (2007). Confirmatory factor analysis of the PTSD Checklist and the Clinician-Administered PTSD Scale in disaster workers exposed to the World Trade Center Ground Zero. *Journal of Abnormal Psychology, 116*(2), 329-341. doi: 10.1037/0021-843X.116.2.329

Pietrzak, R. H., Goldstein, M. B., Malley, J. C., Rivers, A. J., & Southwick, S. M. (2010). Structure of posttraumatic stress disorder symptoms and psychosocial functioning in veterans of Operations Enduring Freedom and Iraqi Freedom. *Psychiatry Research, 178*(2), 323-329. doi: 10.1016/j.psychres.2010.04.039

Rottenberg, J., Gross, J. J., & Gotlib, I. H. (2005). Emotion context insensitivity in major depressive disorder. *Journal of Abnormal Psychology, 114*(4), 627-639. doi: 10.1037/0021-843X.114.4.627

Ruggiero, K. J., Del Ben, K. S., Scotti, J. R., & Rabalais, A. E. (2003). Psychometric properties of the PTSD Checklist - Civilian Version. *Journal of Traumatic Stress, 16*(5), 495-502. doi: 10.1023/A:1025714729117

Schmidt, N. B., Richey, J. A., & Fitzpatrick, K. K. (2006). Discomfort intolerance: Development of a construct and measure relevant to panic disorder. *Journal of Anxiety Disorders, 20*(3), 263-280. doi: 10.1016/j.janxdis.2005.02.002

Schreiber, L. R., Grant, J. E., & Odlaug, B. L. (2012). Emotion regulation and impulsivity in young adults. *Journal of Psychiatric Research, 46*(5), 651-658. doi: 10.1016/j.jpsychires.2012.02.005

Simms, L. J., Watson, D., & Doebbelling, B. N. (2002). Confirmatory factor analyses of posttraumatic stress symptoms in deployed and nondeployed veterans of the Gulf War. *Journal of Abnormal Psychology, 111*(4), 637-647. doi: 10.1037/0021-843X.111.4.637

Simons, J. S., & Gaher, R. M. (2005). The Distress Tolerance Scale: Development and validation of a self-report measure. *Motivation and Emotion, 29*(2), 83-102. doi: 10.1007/s11031-005-7955-3

Stander, V. A., Thomsen, C. J., & Highfill-McRoy, R. M. (2014). Etiology of depression comorbidity in combat-related PTSD: A review of the literature. *Clinical Psychology Review, 34*(2), 87-98. doi: 10.1016/j.cpr.2013.12.002

Telch, M. J., Jacquin, K., Smits, J. A. J., & Powers, M. B. (2003). Emotional responding to hyperventilation as a predictor of agoraphobia status among individuals suffering from panic disorder. *Journal of Behavior Therapy and Experimental Psychiatry, 34*(2), 161-170. doi: 10.1016/S0005-7916(03)00037-5

Tull, M. T., Barrett, H. M., McMillan, E. S., & Roemer, L. (2007). A preliminary investigation of the relationship between emotion regulation difficulties and posttraumatic stress symptoms. *Behavior Therapy, 38*(3), 303-313. doi: 10.1016/j.beth.2006.10.001

Tull, M. T., Gratz, K. L., Coffey, S. F., Weiss, N. H., & McDermott, M. J. (2013). Examining the interactive effect of posttraumatic stress disorder, distress tolerance, and gender on residential substance use disorder treatment retention. *Psychology of Addictive Behaviors, 27*(3), 763-773. doi: 10.1037/a0029911

Tull, M. T., & Roemer, L. (2003). Alternative explanations of emotional numbing of posttraumatic stress disorder: An examination of hyperarousal and experiential avoidance. *Journal of Psychopathology and Behavioral Assessment, 25*(3), 147-154. doi: 10.1023/A:1023568822462

Ullman, S. E., & Long, S. M. (2008). Factor structure of PTSD in a community sample of sexual assault survivors. *Journal of Trauma & Dissociation, 9*(4), 507-524. doi: 10.1080/15299730802223370

Vujanovic, A. A., Bernstein, A., & Litz, B. T. (2010). Traumatic Stress *Distress Tolerance: Theory, Research, and Clinical Applications* (pp. 126-148). New York, NY: The Guilford Press.

Vujanovic, A. A., Bonn-Miller, M. O., Potter, C. M., Marshall, E. C., & Zvolensky, M. J. (2011). An evaluation of the relation between distress tolerance and posttraumatic stress within a trauma-exposed sample. *Journal of Psychopathology and Behavioral Assessment, 33*(1), 129-135. doi: 10.1007/s10862-010-9209-2

Vujanovic, A. A., Hart, A. S., Potter, C. M., Berenz, E. C., Niles, B., & Bernstein, A. (2013). Main and interactive effects of distress tolerance and negative affect intensity in relation to PTSD symptoms among trauma-exposed adults. *Journal of Psychopathology and Behavioral Assessment, 35*(2), 235-243. doi: 10.1007/s10862-012-9325-2

Wagner, C. A., & Linehan, M. M. (2006). Applications of dialectical behavior therapy to posttraumatic stress disorder and related problems. In V. C. Follette & J. I. Ruzek (Eds.), *Cognitive-Behavioral Therapies for Trauma* (2nd ed.). New York, NY: The Guilford Press.

Watson, D. (2005). Rethinking the mood and anxiety disorders: A quantitative

    hierarchical model for DSM-V. *Journal of Abnormal Psychology, 114*(4), 522-

    536. doi: 10.1037/0021-843X.114.4.522

Watson, D. (2009). Differentiating the mood and anxiety disorders: A quadripatrite

    model. *The Annual Review of Clinical Psychology, 5*, 221-247. doi:

    10.1146/annurev.clinpsy.032408.153510

Watson, D., O'Hara, M. W., & Stuart, S. (2008). Hierarchical structures of affect and

    psychopathology and their implications for the classification of emotional

    disorders. *Depression & Anxiety, 25*(4), 282-288. doi: 10.1002/da.20496

Weathers, F. W., Litz, B. T., Herman, D. S., Huska, J. A., & Keane, T. M. (1993). *The*

    PTSD Checklist (PCL): Reliability, validity, and diagnostic utility. Paper

    presented at the Annual Meeting of the International Society for Traumatic Stress

    Studies, San Antonio, TX.

Weathers, F. W., Litz, B. T., Keane, T. M., Palmieri, P. A., Marx, B. P., & Schnurr, P. P.

    (2013). The PTSD Checklist for DSM-5 (PCL-5).

Wirth, R. J., & Edwards, M. C. (2007). Item factor analysis: Current approaches and

    future directions. *Psychological Methods, 12*, 58-79. doi: 10.1037/1082-

    989X.12.1.58

Yufik, T., & Simms, L. J. (2010). A meta-analytic investigation of the structure of

    posttraumatic stress disorder symptoms. *Journal of Abnormal Psychology, 119*(4),

    764-776. doi: 10.1037/a0020981

Zvolensky, M. J., Vujanovic, A. A., Bernstein, A., & Leyro, T. (2010). Distress

    tolerance: Theory, measurement, and relations to psychopathology. *Current*

Directions in Psychological Science, 19(6), 406-410. doi:

10.1177/0963721410388642