Factor Structure of the PTSD Checklist for *DSM-5*

Relationships Among Symptom Clusters, Anger, and Impulsivity

Cherie Armour, PhD, Ateka Contractor, MA,†‡ Tracie Shea, PhD,‡§*
Jon D. Elhai, PhD,†‖ and Robert H. Pietrzak, PhD, MPH¶

Abstract: Scarce data are available regarding the dimensional structure of *Diagnostic and Statistical Manual of Mental Disorders, 5th Edition* (*DSM-5*) posttraumatic stress disorder (PTSD) symptoms and how factors relate to external constructs. We evaluated six competing models of *DSM-5* PTSD symptoms, including Anhedonia, Externalizing Behaviors, and Hybrid models, using confirmatory factor analyses in a sample of 412 trauma-exposed college students. We then examined whether PTSD symptom clusters were differentially related to measures of anger and impulsivity using Wald chi-square tests. The seven-factor Hybrid model was deemed optimal compared with the alternatives. All symptom clusters were associated with anger; the strongest association was between externalizing behaviors and anger ($r = 0.54$). All symptom clusters, except reexperiencing and avoidance, were associated with impulsivity, with the strongest association between externalizing behaviors and impulsivity ($r = 0.49$). A seven-factor Hybrid model provides superior fit to *DSM-5* PTSD symptom data, with the externalizing behaviors factor being most strongly related to anger and impulsivity.

Key Words: PTSD, PCL-5, anger, impulsivity, *DSM-5*, confirmatory factor analysis

(*J Nerv Ment Dis* 2016;204: 108–115)

The debate over the optimal structural model of the underlying symptom dimensions of posttraumatic stress disorder (PTSD), which began in *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition* (*DSM-IV*; (reviewed in Elhai and Palmieri, 2011; *e.g.*, Yufik and Simms, 2010), continues with *DSM-5* (*e.g.*, Contractor et al., 2014; Liu et al., 2014). The emphasis on identifying the optimal structural model of PTSD is important for two central reasons: a) PTSD's factor structure influences diagnostic algorithms and, thereby, PTSD prevalence rates (Miller et al., 2013) and b) PTSD's factor structure helps assess comorbidity mechanisms with other psychopathology (Armour et al., 2014; Contractor et al., 2014), thus influencing transdiagnostic, trauma-focused treatments. The current study focuses on identifying the most refined conceptualization of *DSM-5* PTSD symptoms while simultaneously assessing symptom clusters as they relate to common external correlates of PTSD—anger and impulsivity constructs. Of note, when examining PTSD's factor structure, studies examine the factor structure of a measure, which we hope represents the underlying construct of PTSD. In the current study, we examine the factor structure of the PTSD Checklist for *DSM-5* (PCL-5; Weathers et al., 2013).

*School of Psychology, University of Ulster, Coleraine, Northern Ireland, UK; †Department of Psychology, University of Toledo, OH; ‡Department of Psychiatry and Human Behavior, Warren Alpert Medical School of Brown University, and §Veterans Affairs Medical Center, Providence, RI; ‖Department of Psychiatry, University of Toledo, OH; and ¶Department of Psychiatry, Yale University School of Medicine, New Haven, and US Department of Veterans Affairs, National Center for Posttraumatic Stress Disorder, Clinical Neurosciences Division, VA Connecticut Healthcare System, West Haven, CT.

Send reprint requests to Cherie Armour, PhD, School of Psychology, Coleraine Campus, University of Ulster, Coleraine, Northern Ireland, UK BT52 1SA. E-mail: armour.cherie@gmail.com.

ISSN: 0022-3018/16/20402–0108
DOI: 10.1097/NMD.0000000000000430

Dimensions—*DSM-IV* PTSD

Starting with *DSM-IV* (American Psychiatric Association, 1994), one of the most pertinent criticisms was that the underlying dimensions of PTSD were not adequately represented by only three factors of reexperiencing, avoidance and numbing, and hyperarousal (reviewed in Elhai and Palmieri, 2011; Yufik and Simms, 2010). Consequently, several alternative models were developed. Two four-factor models gathered the greatest level of empirical support, namely, the Emotional Numbing model (King et al., 1998) and the Dysphoria model (Simms et al., 2002). The Emotional Numbing model (King et al., 1998) divided the avoidance and numbing factor of *DSM-IV* PTSD symptoms into separate factors (*i.e.*, effortful avoidance and emotional numbing), which represented different mechanisms in PTSD's symptomatology (Asmundson et al., 2004). The Dysphoria model (Simms et al., 2002) retained the reexperiencing and avoidance factors from the Emotional Numbing model and combined several arousal (D1–D3) and numbing symptoms (C3–C7) to create a dysphoria factor distinct from hyperarousal symptoms of hypervigilance and exaggerated startle response (D4–D5). The rationale for this separation was that the dysphoria factor represented nonspecific dysphoric symptoms, which accounted for high comorbidity with affective disorders (Watson, 2009). A meta-analysis indicated a slightly better fit for the Dysphoria than the Emotional Numbing model (reviewed in Yufik and Simms, 2010).

To help reconcile minor differences between the two four-factor models of *DSM-IV* PTSD symptoms, Elhai et al. (2011) proposed a five-factor Dysphoric Arousal PTSD model. While retaining the reexperiencing, avoidance, and numbing factors of the Emotional Numbing model, this model separated D1–D3 symptoms (dysphoric arousal) and D4–D5 symptoms (anxious arousal), with the former better predicted by depression, and the latter, by anxiety (Elhai et al., 2013). This model has been found to provide a significantly better fit compared with both four-factor PTSD models in a broad range of trauma survivors, including children/adolescents (Bennett et al., 2014; Contractor et al., 2015b; Wang et al., 2011a, 2011b, 2012) and adults (Armour et al., 2012; Elhai et al., 2011; Harpaz-Rotem et al., 2014; Pietrzak et al., 2014, 2012).

Underlying Dimensions of *DSM-5* PTSD Symptoms

In the recently published *DSM-5*, there are four clusters of PTSD symptoms, which most closely resemble the *DSM-IV* Emotional Numbing model of PTSD (Friedman et al., 2011). In addition to having four instead of three symptom clusters, this model distinguishes between avoidance and numbing symptoms. The new numbing cluster is relabeled as "negative alterations in cognitions and moods" (NACM), adding several new dysphoria-related symptoms, and the arousal cluster, relabeled as "alterations in arousal and reactivity" (AAR), adds a symptom of reckless and self-destructive behaviors. This model has been shown to fit well in trauma data (Hafstad et al., 2014). In addition, however, the four-factor *DSM-5* model has been compared with another four-factor model conceptually and structurally similar to the *DSM-IV* Dysphoria model (Miller et al., 2013). Whereas some studies indicate better fit for the *DSM-5* model (Biehn et al., 2013b; Contractor et al., 2014; Elhai et al., 2012), others have found support

for the *DSM-5* Dysphoria model (Miller et al., 2013). The unresolved debate regarding the comparative fit for these two models thus continues with the *DSM-5*. Efforts were also made to test the *DSM-5* equivalent of the *DSM-IV* Dysphoric Arousal model; the arousal factor was separated into Anxious Arousal (hypervigilance, startle responses) and Dysphoric Arousal (sleep problems, concentration problems, anger, reckless behaviors) factors. This *DSM-5* Dysphoria model has demonstrated better fit than the *DSM-5* model has (Liu et al., 2014; Tsai et al., 2014).

Most recently, two six-factor models, namely, the Anhedonia model (Liu et al., 2014) and the Externalizing Behavior (EB) model (Tsai et al., 2014), both of which are novel to *DSM-5* PTSD symptoms, have been proposed and supported. Common to both models is that they retain the difference between dysphoric and anxious arousal symptoms per the Dysphoric Arousal model (Elhai et al., 2011). The EB model conceptualizes the arousal factor to be composed of an additional factor called *externalizing behaviors* (irritability/aggression and risky behaviors). The rationale was that these *DSM-5* criterion E symptoms represent possible difficulties in emotional regulation and impulse control and have behavioral manifestations that make them unique in PTSD's symptomatology. The EB factor has been found to be most strongly related to hostility compared with other PTSD factors (Tsai et al., 2014). The Anhedonia model (Liu et al., 2014) separates Criterion D symptoms into increased negative affect (NA)/general distress and decreased positive affect (PA)/anhedonia; this is based on existing empirical and theoretical literature suggesting that PA and NA are independent constructs (Watson, 2005, 2009).

The most recent development in the confirmatory factor analysis (CFA) literature on *DSM-5* PTSD is an integration of the key aspects of the six-factor Anhedonia and EB models into a newly proposed Hybrid model (Armour et al., 2015). This model retains the *DSM-5* symptom clusters of reexperiencing and avoidance symptoms, separates the *DSM-5* negative cognitions and mood cluster into NA and anhedonia symptoms (Liu et al., 2014, and separates the *DSM-5* alterations in arousal and reactivity clusters into EB, anxious arousal, and dysphoric arousal clusters (Elhai et al., 2011) (Tsai et al., 2014). In a study conducted on samples of trauma-exposed young adults and a nationally representative sample of US military veterans (Armour et al., 2015), the authors demonstrated a better fit of the Hybrid model compared with all competing four-, five-, and six-factor models in the literature. However, given the lack of studies assessing the fit of the Hybrid model across PTSD measures, further exploration of this model is required. Table 1 shows item mappings for each of the *DSM-5* PTSD models.

Taking this one step ahead, it would be helpful to assess if the Hybrid model has differential relations with other external constructs, as would be predicted. Assessing for convergent validity in such a manner could help match treatment protocols to PTSD symptoms in a more refined manner and would outline treatment monitoring as one would know what PTSD factors to track contingent on the person's comorbid symptoms. To date, only two studies have assessed convergent validity of the Hybrid model. Pietrzak et al. (2015) assessed the differential relations of each of the factors with psychiatric comorbidities, suicidal ideation, hostility, and functioning and quality of life. In particular, it was revealed that the EB factor was most strongly related to hostility, whereas Anhedonia was most strongly related to current depression, in addition to reduced mental functioning and quality of life. Wang et al. (2015) assessed how the individual factors of the Hybrid model related to major depression disorder and panic disorder symptoms, revealing some unique associations. Novel to the current study, therefore, is an assessment of the differential relations of the EB factor compared with other PTSD factors in relation to the external constructs of anger and impulsivity. Knowledge regarding differential associations between *DSM-5* PTSD symptom clusters and external measures of clinical importance in trauma survivors, such as anger and impulsivity, can help inform etiologic models of this disorder, as well as the development of personalized approaches to assessment and treatment.

TABLE 1. *DSM-5* PTSD Symptom Distribution Across Six Competing Latent Models

PTSD Symptoms (*DSM-5*)	*DSM-5* (Four Factors)	*DSM-5* Dysphoria (Four Factors)	*DSM-5* Dysphoric Arousal (Five Factors)	Anhedonia (Six Factors)	Externalizing (Six Factors)	Hybrid (Seven Factors)
1. Intrusive thoughts	IN	IN	IN	IN	IN	IN
2. Recurrent nightmares	IN	IN	IN	IN	IN	IN
3. Flashbacks	IN	IN	IN	IN	IN	IN
4. Emotional reactivity	IN	IN	IN	IN	IN	IN
5. Physiological reactivity	IN	IN	IN	IN	IN	IN
6. Avoidance of thoughts	A	A	A	A	A	A
7. Avoidance of reminders	A	A	A	A	A	A
8. Memory impairment	NACM	D	NACM	NACM	NACM	NA
9. Negative beliefs	NACM	D	NACM	NACM	NACM	NA
10. Blame of self or others	NACM	D	NACM	NACM	NACM	NA
11. Negative trauma-related emotions	NACM	D	NACM	NACM	NACM	NA
12. Loss of interest	NACM	D	NACM	An	NACM	An
13. Detachment	NACM	D	NACM	An	NACM	An
14. Restricted range of affect	NACM	D	NACM	An	NACM	An
15. Irritability/anger	AAR	D	DA	DA	EB	EB
16. Self-destructive/reckless behavior	AAR	AAR	AA	DA	EB	EB
17. Hypervigilance	AAR	AAR	AA	AA	AA	AA
18. Exaggerated startle response	AAR	AAR	AA	AA	AA	AA
19. Difficulty concentrating	AAR	D	DA	DA	DA	DA
20. Difficulty sleeping	AAR	D	DA	DA	DA	DA

IN indicates intrusion; A, avoidance; NACM, negative alterations in cognitions and mood; An, anhedonia; AA, anxious arousal; DA, dysphoric arousal.

PTSD and Anger

There is a well-established empirical relationship between PTSD and anger (Contractor et al., 2015a; Olatunji et al., 2010; Teten et al., 2010). Trauma victims with PTSD struggle with suppressing, inhibiting, and regulating anger feelings (Olatunji et al., 2010; Orth and Wieland, 2006); anger also impedes therapeutic progress in trauma treatment (Foa et al., 1995; Forbes et al., 2008).

One theory explaining the PTSD-anger relationship is the "survival mode" theory, which posits that the survival value of anger in traumatic and threatening situations becomes maladaptive when people perceive threat in otherwise non–life-threatening situations and consequently react with hostility, arousal, and aggression (Chemtob et al., 1997; Novaco and Chemtob, 2002). Alternatively, the fear avoidance theory states that anger represents an attempt to avoid dealing with the trauma-related emotion of fear (Foa et al., 1995). Given that the arousal subcomponent of EB conceptually has more of the anger and irritability components coupled with the expectation that it differentiates well with the other PTSD dimensions, we hypothesize a significantly greater relation between EB and anger.

PTSD and Impulsivity

Impulsivity is also associated with PTSD (Ledgerwood and Petry, 2006; Weiss et al., 2012). The disinhibition model of impulsivity posits that individuals with PTSD symptoms have difficulty stopping behaviors on reward perception (Casada and Roache, 2005). Similarly, the "emotional dysregulation" model indicates that people with PTSD symptoms may have difficulty controlling impulsive tendencies when experiencing emotional distress (Weiss et al., 2013, 2012), which is related to physiological reactivity to traumatic reexposure cues (van der Kolk et al., 1985). Consequently, they engage in impulsive maladaptive behaviors (Marshall-Berenz et al., 2011).

Impulsivity possibly underlies PTSD criterion E's reckless and self-destructive behaviors symptom. In fact, PTSD symptoms represented in the *DSM-5* EB cluster, namely, irritability/anger and self-destructive/reckless behavior, are related to impulsivity, such as anger, suicidal risk (Kotler et al., 2001), self-mutilative behaviors (Sacks et al., 2008), and substance use (Moeller et al., 2001). Thus, when considering specific *DSM-5* PTSD subscales, we hypothesize that the *DSM-5* EB cluster will be most strongly related to impulsivity.

Current Study

The aims of the current study are twofold: 1) to use CFAs to evaluate model fit across a number of *DSM-5* specific models, including the newly proposed Hybrid model, and 2) to assess the convergent validity of the Hybrid model in relation to anger and impulsivity. We hypothesized that the Hybrid model will have the best comparative fit compared with the *DSM-5* and *DSM-5* Dysphoria, Dysphoric Arousal, EB, and Anhedonia models. We further expected that the EB factor would be significantly more strongly related to external constructs of anger and impulsivity compared with other PTSD factors.

METHODS

Participants

Participants were 911 Midwestern undergraduate students. The study and its procedures received approval from the university's institutional review board. The sample was recruited during the fall of 2011 through to the fall of 2012 semesters. Using a password-protected university Web site requiring participants' university e-mail addresses and personal passwords for access (through Sona systems), participants completed an online questionnaire. The Sona system was set to exclude participants who had already participated in the study. Before study participation, all participants first provided informed consent. The students received course credit for study participation. Of note, cases of students with no reported trauma exposure (n = 190) were excluded from the analysis, resulting in a sample of 721 participants. Those who did not endorse a "worst" trauma (so if they did not have item 1–13 on the Stressful Life Events Screening Questionnaire [SLESQ]) were also excluded (n = 309), resulting in an effective sample of 412 participants. This did not exclude people who reported one traumatic event that was endorsed as their worst trauma.

Assessments

All participants were queried in relation to demographic information, including age, sex, education, employment status, ethnic and racial background, and socioeconomic status.

Stressful Life Events Screening Questionnaire

The SLESQ (Goodman et al., 1998) is a 13-item self-report questionnaire assessing exposure to traumatic events per the definition of a Criterion A1 event of the *DSM-IV PTSD* diagnostic criteria. In the current study, we retained 12 of the original questions, which assessed for the presence of a variety of traumatic events. In line with the *DSM-5*'s stipulations of Criterion A-qualifying traumas, we added a probe of whether exposure to traumatic events was via the media. Specifically, this was added to the questions "witnessed a traumatic event" and "repeated exposure to details of a traumatic event." In relation to the latter event, we also queried whether exposure was part of one's occupational role. Participants were also instructed to indicate their most distressing event (if they endorsed more than one event), and after doing so, participants were instructed to report their symptomatology based on either the indexed event or the most distressing event (if more than one event was endorsed). The measure had good test-retest reliability for a 2-week period (ranging from 0.31 to 1.00) and adequate convergent validity (median kappa of 0.64). Prevalence rates for the traumatic events indicated by the SLESQ are comparable with prevalence rates found by Kessler et al. (1995); this indicates good concurrent validity (Goodman et al., 1998).

PTSD Checklist for *DSM-5*

The original PCL assessed the 17 *DSM-IV PTSD* items based on a 5-point Likert-scale (1 = "not at all" to 5 = "extremely"). The current study used the PCL-5, which assesses 20 *DSM-5* PTSD symptoms. Each symptom is measured on a 5-point Likert-type scale (0 = "not at all" to 4 = "extremely"). Good internal consistency has been demonstrated for the PCL in an undergraduate sample; alpha coefficients are 0.94 for PCL total score, 0.85 for reexperiencing, 0.85 for avoidance, and 0.87 for hyperarousal subscales (Ruggiero et al., 2003). High internal consistency (r = 0.95) for the total scale was demonstrated by Contractor et al. (2015a) in a sample of 251 trauma-exposed undergraduate students. Internal consistency of the PCL-5 in the current study was also high at 0.96. Note that given the change in scoring from 1 to 5 per item across 17 items for the PCL to 0 to 4 across 20 items for the PCL-5, mean scores from one to the other are not directly comparable.

Dimensions of Anger Reaction Scale-5

The Dimensions of Anger Reaction Scale-5 (DARS-5; Forbes et al., 2014) is a five-item self-report questionnaire assessing for dimensions of anger reactions. In particular, it assesses an individual's disposition toward anger in stressful situations. The five items of the DARS-5 are measured on a 5-point Likert scale ranging from 1 ("none of the time") to 4 ("all of the time"). Although anger is included in the criterion for PTSD via the anger/irritability item, research has shown that anger as measured by the DARS-5 and anger as measured by the PCL are highly related yet independent constructs. Specifically,

Forbes et al. (2004) reported correlations between the DARS-5 and anger/irritability item of the PCL of 0.52/0.53 at intake and 0.70/0.71 at follow-up. This measure has good convergent validity; the reliability alpha of the scale in the current study was 0.84. Anger is measured by items such as "I found myself getting angry at people or situations" and "When I got angry at someone, I wanted to hit them."

UPPS Impulsivity Scale

The UPPS Impulsivity Scale (UPPS; Whiteside and Lynam, 2001) is a self-report measure composed of 45 items, which are measured on a Likert scale ranging from 1 ("agree strongly") to 4 ("disagree strongly"). Four dimensions of impulsivity are measured: lack of premeditation (11 items), urgency (12 items), sensation seeking (12 items), and perseverance (10 items). In the current study, items were queried in relation to symptoms occurring in the past month. The UPPS has been reported as having good internal consistency, with high alphas across subscales: lack of premeditation, 0.91; urgency, 0.86; sensation seeking, 0.90; lack of perseverance scales, 0.82 (Whiteside and Lynam, 2001). The overall alpha reliability coefficient in the current study was 0.80. Impulsivity is measured by items such as "I am not one of those people who blurt out things without thinking" and "It is hard for me to resist acting on my feelings."

Missing Data

The rate of missing data on the PCL items for the 412 participants was low: 24 participants were missing a single item and 3 participants were missing two items; all other participants had complete data. Missing data on PCL-5 items were therefore estimated using maximum likelihood procedures in Mplus 7. With regard to the DARS-5, 13 participants were missing data on one item only. Seventy-nine individuals were missing data on the UPPS (66 were missing one item and the remaining were missing between two and four items). In these instances, we used list wise deletion.

Data Analysis

Six competing CFA models (see Table 1) were specified and estimated in Mplus 7 (Muthén and Muthén, 2012). All indicators in the CFA models were treated as ordinal categorical using a polychoric covariance matrix and probit coefficients for factor loadings. Residual error covariances were fixed to 0 and all factor variances were fixed to 1. Models were estimated using the weighted least squares estimation with a mean and variance-adjusted chi-square estimator; this is the preferred option for ordinal data (Flora and Curran, 2004; Wirth and Edwards, 2007). Models were assessed based on a series of fit indices, including the comparative fit index (CFI), the Tucker-Lewis fit index (TLI), and the root-mean-square error of approximation (RMSEA). Based on established guidelines, higher values of the CFI and the TLI and lower values of the RMSEA indicate more optimal fitting models, with CFI and TLI values exceeding 0.95 and RMSEA values lower than 0.06 providing excellent fit to the data (Hu and Bentler, 1999). To further assess which of the models provided optimal fit, we used the corrected scaled chi-square difference test (Satorra and Bentler, 2001) and the Bayesian information criteria (BIC) to compare nested and nonnested models, respectively. Lower values on the BIC indicate better fitting models, with a 6-to-10–point difference providing strong support and a difference of more than 10 points providing very strong support (Raftery, 1995).

Subsequent to selecting the optimal model, we used Wald χ^2 tests of parameter constraints to assess the null hypothesis that the difference between pairs of correlations is 0. In doing so, we assessed each of the PTSD factors and their associations with observed total scores on the DARS-5 and UPPS. In an attempt to minimize the possibility of type 1 error, we set the alpha level to 0.01.

RESULTS

Effective Sample Characteristics

The mean (SD) age of the effective sample was 20.1 (4.4) years (range, 18–55 years). Most were female (n = 278, 67.5%). Most were single (n = 331, 80.3%), whereas a smaller proportion were living with a significant other (n = 58, 14.1%), married (n = 18, 4.4%), or divorced/widowed (n = 5, 1.2%). On average, participants had received 12.8 (SD, 1.2; range, 10–18) years of education. Most were employed on a part-time basis (n = 198, 48.2%) or were unemployed students (n = 166, 40.4%). A large proportion of the sample identified their racial background as either Caucasian or white (n = 297, 72.1%). The most prevalent of assessed trauma exposures was death of a family member, peer, or partner from accident, homicide, or suicide (n = 190, 46.3%), physical assault (n = 138, 33.5%), and sexual assault (n = 131, 31.8%).

The mean (SD) PCL-5 score in the current sample was 21.6 (16.9; range, 0–79); the recommended clinical cutoff score is 38 (Weathers et al., 2013). The mean (SD) scores on the DARS-5 assessing anger severity and UPPS assessing impulsivity severity were 12.6 (4.4; range, 3–25) and 104.4 (14.7; range, 64–154), respectively. Anger severity scores averaged around the recommended clinical cutoff of 12 (Forbes et al., 2014). On the basis of the current *DSM-5* diagnostic algorithm by which individuals must meet one reexperiencing, one avoidance, two negative cognitions and mood, and two arousal symptoms rated as 2 or higher (Weathers et al., 2013), (n = 28, 6.8%) of the effective sample met criteria for probable PTSD.

CFA of Six Competing Models

Table 2 shows fit indices for all six competing models of *DSM-5* PTSD symptom structure. Using the aforementioned guidelines, the six-factor Anhedonia and the seven-factor Hybrid model provided excellent fit to the data. The remaining four models provided adequate fit to the data. The seven-factor Hybrid model had the highest CFI and TLI values and the lowest RMSEA value.

In assessing nested and nonnested models using chi-square difference tests and BIC values, the five-factor Dysphoric Arousal model provided better fit compared with the four-factor *DSM-5* model,

TABLE 2. Fit Indices for Six Competing *DSM-5* PTSD Models

Fit Statistics	*DSM-5* (Four Factors)	*DSM-5* Dysphoria (Four Factors)	*DSM-5* Dysphoric Arousal (Five Factors)	Anhedonia (Six Factors)	Externalizing (Six Factors)	Hybrid (Seven Factors)
χ^2 (df)	726.670 (164)	777.444 (164)	693.187 (160)	410.592 (155)	607.597 (155)	364.226 (149)
RMSEA	0.091	0.095	0.090	0.063	0.084	0.059
CFI	0.960	0.957	0.962	0.982	0.968	0.985
TLI	0.954	0.950	0.955	0.978	0.961	0.981
BIC	22009.515	22025.974	21969.511	21692.537	21900.380	21666.667

TABLE 3. Factor Loading of Each PTSD Item Across the Seven-Factor Hybrid Model of *DSM-5* PTSD Symptoms

PTSD Symptoms (*DSM-5*)	Hybrid Model (Seven Factors)	Factor Loadings
1. Intrusive thoughts	IN	0.841
2. Recurrent nightmares	IN	0.774
3. Flashbacks	IN	0.763
4. Emotional reactivity	IN	0.818
5. Physiological reactivity	IN	0.845
6. Avoidance of thoughts	A	0.899
7. Avoidance of reminders	A	0.923
8. Memory impairment	NA	0.670
9. Negative beliefs	NA	0.846
10. Blame of self or others	NA	0.799
11. Negative trauma-related emotions	NA	0.922
12. Loss of interest	An	0.860
13. Detachment	An	0.899
14. Restricted range of affect	An	0.890
15. Irritability/anger	EB	0.902
16. Self-destructive/reckless behavior	EB	0.750
17. Hypervigilance	AA	0.849
18. Exaggerated startle response	AA	0.931
19. Difficulty concentrating	DA	0.927
20. Difficulty sleeping	DA	0.883

IN indicates intrusion; A, avoidance; An, anhedonia; AA, anxious arousal; DA, dysphoric arousal.

$\Delta\chi^2(4) = 39.17$, $p < 0.001$, and the four-factor *DSM-5* Dysphoria model, $\Delta\chi^2(4) = 74.51$, $p < 0.001$. The four-factor *DSM-5* model provided superior fit to the four-factor Dysphoria model based on BIC value comparisons (a point difference of 16.46).

Both the six-factor EB and Anhedonia models provided a significantly better fit than did the four-factor *DSM-5* model, $\Delta\chi^2(9) = 115.49$, $p < 0.001$, and $\Delta\chi^2(9) = 174.30$, $p < 0.001$, respectively; the four-factor *DSM-5* Dysphoria model, $\Delta\chi^2(9) = 160.29$, $p < 0.001$, and $\Delta\chi^2(9) = 197.77$, $p < 0.001$, respectively; and the five-factor *DSM-5* Dysphoric Arousal model, $\Delta\chi^2(5) = 91.80$, $p < 0.001$, and $\Delta\chi^2(5) = 130.23$, $p < 0.001$, respectively. The six-factor Anhedonia model provided superior fit to the six-factor EB model based on BIC value comparisons (a point difference of 207.84).

The seven-factor Hybrid model provided a significantly better fit than all other models did, including the four-factor *DSM-5* model, $\Delta\chi^2(15) = 228.14$, $p < 0.001$, the four-factor *DSM-5* Dysphoria model, $\Delta\chi^2(15) = 255.50$, $p < 0.001$, the five-factor *DSM-5* Dysphoric Arousal model, $\Delta\chi^2(11) = 191.73$, $p < 0.001$, the six-factor EB model, $\Delta\chi^2(6) = 115.61$, $p < 0.001$, and the six-factor Anhedonia model, $\Delta\chi^2(6) = 43.73$, $p < 0.001$). Standardized factor loadings and factor correlations of the seven-factor Hybrid model are presented in Tables 3 and 4.

Wald χ^2 Tests of Parameter Constraint; Assessing PTSD Factor Associations With DARS-5 and UPPS Scores

Table 5 presents the correlation coefficients in relation to PTSD factor associations with DARS-5 and UPPS scores, as well as results of the Wald χ^2 tests of parameter constraints. All PTSD factors were significantly associated with DARS-5 scores, the strongest of which was between EB ($r = 0.54$); this association was significantly larger than the association between anger and all other PTSD factors, as evidenced by the Wald χ^2 tests. All PTSD factors, except intrusions and avoidance, were significantly associated with UPPS scores. Again, the strongest association was between EB and UPPS scores ($r = 0.49$); this association was also significantly larger than the association between impulsivity and all other PTSD factors, as evidenced by the Wald χ^2 tests.

TABLE 4. Correlations Among the Seven Factors of the PTSD Hybrid Model

	IN	A	NA	An	EB	AA
IN	—	—	—	—	—	—
A	0.868	—	—	—	—	—
NA	0.769	0.773	—	—	—	—
An	0.678	0.647	0.757	—	—	—
EB	0.640	0.612	0.732	0.885	—	—
AA	0.734	0.671	0.728	0.706	0.779	—
DA	0.757	0.664	0.764	0.832	0.873	0.763

Note: The top diagonal correlations are from the veteran sample and the lower diagonal correlations are from the student sample.

IN indicates intrusion; A, avoidance; An, anhedonia; AA, anxious arousal; DA, dysphoric arousal.

DISCUSSION

The current study assessed the dimensional structure of *DSM-5* PTSD symptoms. A total of six competing *DSM-5* PTSD models were compared, including three recently proposed models: the six-factor Anhedonia model (Liu et al., 2014), the six-factor EB model (Tsai et al., 2014), and the seven-factor Hybrid model (Armour et al., 2015). Given that each of these models is in their infancy, we additionally tested the four-factor *DSM-5* model, the four-factor Dysphoria model, and the five-factor Dysphoric Arousal model. Each of these has found support in the extant literature (Biehn et al., 2013a; Contractor et al., 2014; Miller et al., 2013; Wang et al., 2011b, 2012) using both *DSM-IV* and *DSM-5* data (given the *DSM-5* model is a close approximation of the Emotional Numbing model). Further to assessing refinements of *DSM-5* PTSD's latent structure, we assessed

TABLE 5. Wald's Chi-Square Test of Parameter Constraints Comparing the Relation Between Each PTSD Factor With Observed Scores of Anger and Impulsivity

Correlated Factors	*r*	Correlated Factors	*r*	Wald Test (*p*)
Anger with EB	0.543	**Anger with IN**	**0.343**	**16.876 (0.000)**
		Anger with A	**0.303**	**22.018 (0.000)**
		Anger with NA	**0.374**	**12.775 (0.000)**
		Anger with An	**0.399**	**12.695 (0.000)**
		Anger with AA	**0.408**	**8.912 (0.002)**
		Anger with DA	**0.402**	**12.201 (0.000)**
Impulsivity with EB	0.486	Impulsivity with IN*	0.072	
		Impulsivity with A*	0.140	
		Impulsivity with NA	**0.181**	**29.261 (0.000)**
		Impulsivity with An	**0.237**	**30.512 (0.000)**
		Impulsivity with AA	**0.229**	**21.205 (0.000)**
		Impulsivity with DA	**0.283**	**15.776 (0.000)**

Note: All correlations were significant ($p < 0.001$), with the exception of those marked by *. Significantly different correlated pairs ($p < 0.01$) are in bold.

IN indicates intrusion; A, avoidance; An, anhedonia; AA, anxious arousal; DA, dysphoric arousal.

whether the factors of our optimal model would have differential relations with the external constructs of anger and impulsivity.

Factor Structure of *DSM-5* PTSD Symptoms

A total of 6.8% of the sample screened positive for probable *DSM-5* PTSD based on past-month symptomatology. Despite this study's using a trauma-exposed student sample, this rate is within the range of a nationally representative study of US veterans, of which 5.2% met the criteria for past-month PTSD and 12.0% met the criteria for lifetime PTSD (Tsai et al., 2014). Using another epidemiological sample, 6.4% of adults met lifetime criteria for PTSD (Pietrzak et al., 2011). In examining the fit of six competing models of *DSM-5* PTSD, the four-factor *DSM-5* model provided superior fit to the four-factor Dysphoria model. This finding supports the *DSM-5*'s adoption of a model that closely resembles the Emotional Numbing as opposed to the Dysphoria model. However, the five-factor Dysphoric Arousal model provided better fit compared with both the four-factor *DSM-5* model and the four-factor *DSM-5* Dysphoria model. This result concurs with a wealth of CFA literature on the dimensional structure of *DSM-IV* PTSD symptomatology, which found superior fit of the Dysphoric Arousal model compared with both the Emotional Numbing (akin to the *DSM-5* model) and the Dysphoria models (Armour et al., 2012; Contractor et al., 2016; Wang et al., 2011b, 2012). The results of the current study provide further empirical support for the separation of the PTSD hyperarousal factor into distinct dysphoric and anxious arousal clusters.

Further refinements of PTSD structural models include two newly proposed six-factor models. Of these, the six-factor Anhedonia model (Liu et al., 2014) provided superior fit to the six-factor EB model (Tsai et al., 2014). This finding replicates the results of Armour et al. (2015), who similarly found superior fit of the Anhedonia model in both a trauma-exposed undergraduate sample and a nationally representative sample of US military veterans. Both the six-factor EB and Anhedonia models provided a significantly better fit than did the four-factor *DSM-5* model, the four-factor *DSM-5* Dysphoria model, and the five-factor *DSM-5* Dysphoric Arousal model, suggesting that although the EB model is an improvement to preexisting models, the Anhedonia model is perhaps, in comparison, a superior representation of *DSM-5* PTSD symptoms.

The seven-factor Hybrid model provided a significantly better fit than all other models did in the current study, suggesting that it provides the optimal representation of *DSM-5* PTSD symptoms. Of note, the Hybrid model is named as such because it is a hybrid of both the Anhedonia and EB models, in addition to the Dysphoric Arousal model's splitting of AAR into dysphoric and anxious arousal factors. Notably, standardized factor loadings and factor correlations of the seven-factor hybrid model were all significant and large in magnitude. The lowest factor loading was 0.67 for psychogenic amnesia, which is consistent with results from Armour et al. (2015), in which the lowest loading was again for memory impairment across two samples (veterans, 0.39; trauma exposed students, 0.48). These findings, as they relate to the low loading of the psychogenic amnesia item, mirror those reported across a wide range of studies assessing *DSM-IV* PTSD models (Armour and Shevlin, 2010; Charak et al., 2014; Wang et al., 2012). Interfactor correlations for the Hybrid model in the current study showed a high degree of association, with correlation coefficients ranging from 0.61 (Avoidance with EB) to 0.87 (EB with Dysphoric Arousal). Given that these factors underlie the overarching PTSD construct, correlation coefficients of these magnitudes are expected.

The results of the current study indicate that a clinician may benefit from assessing symptom endorsement in each of the PTSD's seven subscales rather than confirming to PTSD's four-factor conceptualization as indicated by the *DSM-5*. This may aid in capturing more symptom heterogeneity and, subsequently, in tailoring treatment protocols to the patient's specific needs and concerns. For example, regarding the EB symptom cluster, a person with an anger/irritability endorsement may have a different symptom profile and may benefit from a different treatment protocol compared with a person with a risky behaviors symptom endorsement. Such a detailed analysis may be lost if the clinician would follow the *DSM-5* conceptualization of the AAR symptom cluster. Results of the current study promote such future clinical research.

EB, Anger, and Impulsivity

The EB symptom cluster from the seven-factor Hybrid model of *DSM-5* PTSD symptoms showed the strongest magnitude associations with external measures of anger and impulsivity. This finding, which is consistent with literature indicating that PTSD is associated with increased anger (Olatunji et al., 2010; Teten et al., 2010) and impulsivity (Kotler et al., 2001; Ledgerwood and Petry, 2006; Weiss et al., 2012), suggests that a more refined conceptualization of *DSM-5* PTSD symptoms may provide greater specificity in assessing associations with external manifestations of anger and impulsivity in trauma-exposed individuals.

Although anger is included in the criterion for PTSD, previous research has indicated independence of the construct of anger as a PTSD symptom and as measured by the Dimensions of Anger Reactions Scale (Forbes et al., 2004; Novaco et al., 2012). However, we do see a correlation of 0.48 between the DARS-5 total score and the PTSD item of anger in the current study. However, this correlation does not necessarily imply construct and criterion equivalence, and hence, understanding the reason for the correlation rather than assuming a symptom overlap explanation or conceptual equivalence is pertinent. This can be an avenue for future research.

Three prominent implications should be noted. First, the EB construct may be involved in PTSD's comorbidity with several impulse-related problems, including substance usage (Drescher et al., 2003; Marshall-Berenz et al., 2011) and self-harm behaviors (Kotler et al., 2001; Sacks et al., 2008). Second, it indicates which specific arousal factor may account for arousal's relation with anger and impulsivity as already established in the literature (Contractor et al., 2015a). Arousal's relation with anger follows the "survival mode" theory (Chemtob et al., 1997; Novaco and Chemtob, 2002), whereas the relation between arousal and impulsivity aligns with the "emotional dysregulation" theory (Weiss et al., 2012).

In clinical work, one could expect parallel intensity of anger, impulsivity, and EB scores in clients and possibly expect similar changes in all such constructs during treatment. Furthermore, it is possible that assessing for the EB cluster symptoms may help assess for possible comorbid anger and impulsivity; individuals with prominent EB symptoms may benefit from interventions incorporating treatment of anger and tendency to engage in risky behaviors. Lastly, the differential relations provide more justification to the hybrid model conceptualization—mainly that the EB factor is probably different from other PTSD factors in its relation to anger and impulsivity constructs as expected.

Limitations and Future Research

Methodological limitations of this study must be noted. First, use of self-report assessments leads to the possibility that response bias and social desirability could have influenced the results. Second, there is limited generalizability of results, given that the sample was restricted to college students. Future research would benefit from testing similar research questions in clinical and culturally diverse samples. Lastly, it would be interesting to test the mediation effects of variables involved in the EB-anger/impulsivity relation.

In conclusion, the results of this study suggest that the seven-factor Hybrid model of *DSM-5* PTSD symptoms provided the best fit to the data compared to five alternative *DSM-5* PTSD latent models. They further suggest that the EB factor from this model most strongly predicts anger and impulsivity and thereby provide support for the convergent validity of this model. Further research is needed to replicate these analyses in other trauma-exposed samples, to evaluate the validity of the seven-factor Hybrid model in relation to other measures of etiologic and clinical significance (*e.g.*, biological measures, treatment response), and to assess the utility of the seven-factor model in personalizing treatment for trauma survivors with PTSD.

DISCLOSURE

The authors declare no conflict of interest.

REFERENCES

American Psychiatric Association (1994) *Diagnostic and Statistical Manual of Mental Disorders DSM-IV* (4th ed). Washington, DC: American Psychiatric Association.

Armour C, Contractor AA, Palmieri PA, Elhai JD (2014) Assessing latent level associations between PTSD and dissociative factors: Is depersonalization and derealization related to PTSD factors more so than alternative dissociative factors? *Psychol Inj Law*. 7:131–142.

Armour C, Elhai JD, Richardson D, Ractliffe K, Wang L, Elklit A (2012) Assessing a five factor model of PTSD: Is dysphoric arousal a unique PTSD construct showing differential relationships with anxiety and depression? *J Anxiety Disord*. 26:368–376.

Armour C, Shevlin M (2010) Testing the dimensionality of PTSD and the specificity of the dysphoria factor. *J Loss Trauma*. 15:11–27.

Armour C, Tsai J, Durham TA, Charak R, Biehn TL, Elhai JD, Pietrzak RH (2015) Dimensional structure of *DSM-5* posttraumatic stress symptoms: Support for a hybrid anhedonia and externalizing behaviors model. *J Psychiatr Res*. 61:106–113.

Asmundson GJ, Stapleton JA, Taylor S (2004) Are avoidance and numbing distinct PTSD symptom clusters? *J Trauma Stress*. 17:467–475.

Bennett DC, Kerig PK, Chaplo SD, McGee AB, Baucom BR (2014) Validation of the five-factor model of PTSD symptom structure among delinquent youth. *Psychol Trauma Theory Res Pract Policy*. 6:438–447.

Biehn TL, Contractor A, Elhai JD, Tamburrino M, Fine TH, Prescott MR, Shirley E, Chan PK, Slembarski R, Liberzon I, Calabrese JR, Galea S (2013a) Relations between the underlying dimensions of PTSD and major depression using an epidemiological survey of deployed Ohio National Guard soldiers. *J Affect Disord*. 144:106–111.

Biehn TL, Elhai JD, Seligman LD, Tamburrino M, Armour C, Forbes D (2013b) Underlying dimensions of *DSM-5* posttraumatic stress disorder and major depressive disorder symptoms. *Psychol Inj Law*. 6:290–298.

Casada JH, Roache JD (2005) Behavioral inhibition and activation in posttraumatic stress disorder. *J Nerv Ment Dis*. 193:102–109.

Charak R, Armour C, Elklit A, Koot HM, Elhai JD (2014) Assessing the latent factor association between the dysphoria model of PTSD and positive and negative affect in trauma victims from India. *Psychol Inj Law*. 7:122–130.

Chemtob CM, Novaco RW, Hamada RS, Gross DM, Smith G (1997) Anger regulation deficits in combat-related posttraumatic stress disorder. *J Trauma Stress*. 10:17–36.

Contractor AA, Armour C, Forbes D, Elhai JD (2016) Posttraumatic stress disorder's underlying dimensions and their relation with impulsivity facets. *J Nerv Ment Dis*. 204:20–25.

Contractor AA, Armour C, Wang X, Forbes D, Elhai JD (2015a) The mediating role of anger in the relationship between PTSD symptoms and impulsivity. *Psychol Trauma*. 7:138–145.

Contractor AA, Claycomb MA, Byllesby BM, Layne CM, Kaplow JB, Steinberg AM, Elhai JD (2015b) Hispanic ethnicity and Caucasian race: Relations with PTSD's factor structure in clinic-referred youth. *Psychol Trauma Theory Res Pract Policy*. 7:456–464.

Contractor AA, Durham TA, Brennan JA, Armour C, Wutrick HR, Frueh BC, Elhai JD (2014) *DSM-5* PTSD's symptom dimensions and relations with major depression's symptom dimensions in a primary care sample. *Psychiatry Res*. 215: 146–153.

Drescher KD, Rosen CS, Burling TA, Foy DW (2003) Causes of death among male veterans who received residential treatment for PTSD. *J Trauma Stress*. 16: 535–543.

Elhai JD, Biehn TL, Armour C, Klopper JJ, Frueh BC, Palmieri PA (2011) Evidence for a unique PTSD construct represented by PTSD's D1–D3 symptoms. *J Anxiety Disord*. 25:340–345.

Elhai JD, Layne CM, Steinberg AM, Brymer MJ, Briggs EC, Ostrowski SA, Pynoos RS (2013) Psychometric properties of the UCLA PTSD reaction index. Part II: Investigating factor structure findings in a national clinic-referred youth sample. *J Trauma Stress*. 26:10–18.

Elhai JD, Miller ME, Ford JD, Biehn TL, Palmieri PA, Frueh BC (2012) Posttraumatic stress disorder in *DSM-5*: Estimates of prevalence and symptom structure in a nonclinical sample of college students. *J Anxiety Disord*. 26:58–64.

Elhai JD, Palmieri PA (2011) The factor structure of posttraumatic stress disorder: A literature update, critique of methodology, and agenda for future research. *J Anxiety Disord*. 25:849–854.

Flora DB, Curran PJ (2004) An empirical evaluation of alternative methods of estimation for confirmatory factor analysis with ordinal data. *Psychol Methods*. 9: 466–491.

Foa EB, Riggs DS, Massie ED, Yarczower M (1995) The impact of fear activation and anger on the efficacy of exposure treatment for posttraumatic stress disorder. *Behav Ther*. 26:487–499.

Forbes D, Alkemade N, Mitchell D, Elhai JD, McHugh T, Bates G, Novaco RW, Bryant R, Lewis V (2014) Utility of the Dimensions of Anger Reactions-5 (DAR-5) scale as a brief anger measure. *Depress Anxiety*. 31:166–173.

Forbes D, Hawthorne G, Elliott P, McHugh T, Biddle D, Creamer M, Novaco RW (2004) A concise measure of anger in combat-related posttraumatic stress disorder. *J Trauma Stress*. 17:249–256.

Forbes D, Parslow R, Creamer M, Allen N, McHugh T, Hopwood M (2008) Mechanisms of anger and treatment outcome in combat veterans with posttraumatic stress disorder. *J Trauma Stress*. 21:142–149.

Friedman MJ, Resick PA, Bryant RA, Brewin CR (2011) Considering PTSD for *DSM-5*. *Depress Anxiety*. 28:750–769.

Goodman LA, Corcoran C, Turner K, Yuan N, Green BL (1998) Assessing traumatic event exposure: General issues and preliminary findings for the Stressful Life Events Screening Questionnaire. *J Trauma Stress*. 11:521–542.

Hafstad GS, Dyb G, Jensen TK, Steinberg AM, Pynoos RS (2014) PTSD prevalence and symptom structure of DSM-5 criteria in adolescents and young adults surviving the 2011 shooting in Norway. *J Affect Disord*. 169:40–46.

Harpaz-Rotem I, Tsai J, Pietrzak RH, Hoff R (2014) The dimensional structure of posttraumatic stress symptomatology in 323,903 U.S. veterans. *J Psychiatr Res*. 49:31–36.

Hu L, Bentler PM (1999) Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Struct Equation Model*. 6:1–55.

Kessler RC, Sonnega A, Bromet E, Hughes M, Nelson CB (1995) Posttraumatic stress disorder in the National Comorbidity Survey. *Arch Gen Psychiatry*. 52: 1048–1060.

King DW, Leskin GA, King LA, Weathers FW (1998) Confirmatory factor analysis of the Clinician-Administered PTSD scale: Evidence for the dimensionality of posttraumatic stress disorder. *Psychol Assess*. 10:90–96.

Kotler M, Iancu I, Efroni R, Amir M (2001) Anger, impulsivity, social support, and suicide risk in patients with posttraumatic stress disorder. *J Nerv Ment Dis*. 189:162–167.

Ledgerwood DM, Petry NM (2006) Posttraumatic stress disorder symptoms in treatment-seeking pathological gamblers. *J Trauma Stress*. 19:411–416.

Liu P, Wang L, Cao C, Wang R, Zhang J, Zhang B, Wu Q, Zhang H, Zhao Z, Fan G, Elhai JD (2014) The underlying dimensions of *DSM-5* posttraumatic stress

disorder symptoms in an epidemiological sample of Chinese earthquake survivors. *J Anxiety Disord*. 28:345–351.

Marshall-Berenz EC, Vujanovic AA, Macpherson L (2011) Impulsivity and alcohol use coping motives in a trauma-exposed sample: The mediating role of distress tolerance. *Pers Individ Dif*. 50:588–592.

Miller MW, Wolf EJ, Kilpatrick D, Resnick H, Marx BP, Holowka DW, Keane TM, Rosen RC, Friedman MJ (2013) The prevalence and latent structure of proposed *DSM-5* posttraumatic stress disorder symptoms in U.S. national and veteran samples. *Psychol Trauma Theory Res Pract Policy*. 5:501–512.

Moeller FG, Barratt ES, Dougherty DM, Schmitz JM, Swann AC (2001) Psychiatric aspects of impulsivity. *Am J Psychiatry*. 158:1783–1793.

Muthén BO, Muthén LK (2012) *Mplus* (Version 7). Los Angeles, CA: Muthén & Muthén.

Novaco RW, Chemtob CM (2002) Anger and combat-related posttraumatic stress disorder. *J Trauma Stress*. 15:123–132.

Novaco RW, Swanson RD, Gonzalez OI, Gahm GA, Reger MD (2012) Anger and postcombat mental health: Validation of a brief anger measure with U.S. soldiers postdeployed from Iraq and Afghanistan. *Psychol Assess*. 24:661–675.

Olatunji BO, Ciesielski BG, Tolin DF (2010) Fear and loathing: A meta-analytic review of the specificity of anger in PTSD. *Behav Ther*. 41:93–105.

Orth U, Wieland E (2006) Anger, hostility, and posttraumatic stress disorder in trauma-exposed adults: A meta-analysis. *J Consult Clin Psychol*. 74:698–706.

Pietrzak RH, Feder A, Schechter CB, Singh R, Cancelmo L, Bromet EJ, Katz CL, Reissman DB, Ozbay F, Sharma V, Crane M, Harrison D, Herbert R, Levin SM, Luft BJ, Moline JM, Stellman JM, Udasin IG, El-Gabalawy R, Landrigan PJ, Southwick SM (2014) Dimensional structure and course of post-traumatic stress symptomatology in World Trade Center responders. *Psychol Med*. 44:2085–2098.

Pietrzak RH, Goldstein RB, Southwick SM, Grant BF (2011) Prevalence and axis I comorbidity of full and partial posttraumatic stress disorder in the United States: Results from Wave 2 of the National Epidemiologic Survey on Alcohol and Related Conditions. *J Anxiety Disord*. 25:456–465.

Pietrzak RH, Tsai J, Armour C, Mota N, Harpaz-Rotem I, Southwick SM (2015) Functional significance of a novel 7-factor model of DSM-5 PTSD symptoms: Results from the National Health and Resilience in Veterans Study. *J Affect Disord*. 174:522–526.

Pietrzak RH, Tsai J, Harpaz-Rotem I, Whealin JM, Southwick SM (2012) Support for a novel five-factor model of posttraumatic stress symptoms in three independent samples of Iraq/Afghanistan veterans: A confirmatory factor analytic study. *J Psychiatr Res*. 46:317–322.

Raftery AE (1995) Bayesian model selection in social research. *Sociol Methodol*. 25:111–163.

Ruggiero KJ, Del Ben K, Scotti JR, Rabalais AE (2003) Psychometric properties of the PTSD Checklist–Civilian Version. *J Trauma Stress*. 16:495–502.

Sacks MB, Flood AM, Dennis MF, Hertzberg MA, Beckham JC (2008) Self-mutilative behaviors in male veterans with posttraumatic stress disorder. *J Psychiatr Res*. 42:487–494.

Satorra A, Bentler PM (2001) A scaled difference chi-square test statistic for moment structure analysis. *Psychometrika*. 66:507–514.

Simms LJ, Watson D, Doebbeling BN (2002) Confirmatory factor analyses of posttraumatic stress symptoms in deployed and nondeployed veterans of the Gulf War. *J Abnorm Psychol*. 111:637–647.

Teten AL, Miller LA, Stanford MS, Petersen NJ, Bailey SD, Collins RL, Dunn NJ, Kent TA (2010) Characterizing aggression and its association to anger and hostility among male veterans with post-traumatic stress disorder. *Mil Med*. 175:405–410.

Tsai J, Harpaz-Rotem I, Armour C, Southwick SM, Krystal JH, Pietrzak RH (2014) Dimensional structure of *DSM-5* posttraumatic stress symptoms: Results from the National Health and Resilience in Veterans Study. *J Clin Psychiatry*. 76: 546–553.

van der Kolk B, Greenberg M, Boyd H, Krystal J (1985) Inescapable shock, neurotransmitters, and addiction to trauma: Toward a psychobiology of post traumatic stress. *Biol Psychiatry*. 20:314–325.

Wang L, Li Z, Shi Z, Zhang J, Zhang K, Liu Z, Elhai JD (2011b) Testing the dimensionality of posttraumatic stress responses in young Chinese adult earthquake survivors: Further evidence for "dysphoric arousal" as a unique PTSD construct. *Depress Anxiety*. 28:1097–1104.

Wang L, Long D, Li Z, Armour C (2011a) Posttraumatic stress disorder symptom structure in Chinese adolescents exposed to a deadly earthquake. *J Abnorm Child Psychol*. 39:749–758.

Wang L, Zhang L, Armour C, Cao C, Qing Y, Zhang J, Liu P, Zhang B, Wu Q, Zhao Z, Fan G (2015) Assessing the underlying dimensionality of DSM-5 PTSD symptoms in Chinese adolescents surviving the 2008 Wenchuan earthquake. *J Anxiety Disord*. 31:90–97.

Wang M, Elhai JD, Dai X, Yao S (2012) Longitudinal invariance of posttraumatic stress disorder symptoms in adolescent earthquake survivors. *J Anxiety Disord*. 26:263–270.

Watson D (2005) Rethinking the mood and anxiety disorders: A quantitative hierarchical model for *DSM-V*. *J Abnorm Psychol*. 114:522–536.

Watson D (2009) Differentiating the mood and anxiety disorders: A quadripartite model. *Annu Rev Clin Psychol*. 5:221–247.

Weathers FW, Litz BT, Keane TM, Palmieri PA, Marx BP, Schnurr PP (2013) The PTSD Checklist for *DSM-5* (PCL-5). Scale available from the National Center for PTSD at www.ptsd.va.gov.

Weiss NH, Tull MT, Anestis MD, Gratz KL (2013) The relative and unique contributions of emotion dysregulation and impulsivity to posttraumatic stress disorder among substance dependent inpatients. *Drug Alcohol Depend*. 128: 45–51.

Weiss NH, Tull MT, Viana AG, Anestis MD, Gratz KL (2012) Impulsive behaviors as an emotion regulation strategy: Examining associations between PTSD, emotion dysregulation, and impulsive behaviors among substance dependent inpatients. *J Anxiety Disord*. 26:453–458.

Whiteside SP, Lynam DR (2001) The Five Factor Model and impulsivity: Using a structural model of personality to understand impulsivity. *Pers Individ Dif*. 30: 669–689.

Wirth RJ, Edwards MC (2007) Item factor analysis: Current approaches and future directions. *Psychol Methods*. 12:58–79.

Yufik T, Simms LJ (2010) A meta-analytic investigation of the structure of posttraumatic stress disorder symptoms. *J Abnorm Psychol*. 119:764–776.