

Relations Between PTSD and Distress Dimensions in an Indian Child/Adolescent Sample Following the 2008 Mumbai Terrorist Attacks

Ateka A. Contractor · Panna Mehta · Mojisola F. Tihamiyu · Joseph D. Hovey · Andrew L. Geers · Ruby Charak · Marijo B. Tamburrino · Jon D. Elhai

Published online: 5 January 2014
© Springer Science+Business Media New York 2014

Abstract Posttraumatic stress disorder's (PTSD) four-factor dysphoria model has substantial empirical support (reviewed in Elhai & Palmieri, *Journal of Anxiety Disorders*, 25, 849–854, 2011; Yufik & Simms, *Journal of Abnormal Psychology*, 119, 764–776, 2010). However, debatable is whether the model's dysphoria factor adequately captures all of PTSD's emotional distress (e.g., Marshall et al., *Journal of Abnormal Psychology*, 119(1), 126–135, 2010), which is relevant to understanding the assessment and psychopathology of PTSD. Thus, the present study assessed the factor-level relationship between PTSD and emotional distress in 818 children/adolescents attending school in the vicinity of the 2008 Mumbai terrorist attacks. The effective sample had a mean age of 12.85 years ($SD=1.33$), with the majority being male ($n=435$, 53.8 %). PTSD and emotional distress were measured by the UCLA PTSD Reaction Index (PTSD-RI) and Brief Symptom Inventory-18 (BSI-18) respectively. Confirmatory factor analyses (CFA) assessed the PTSD and BSI-18 model fit; Wald tests assessed hypothesized PTSD-distress latent-level relations; and invariance testing examined PTSD-distress parameter

differences using age, gender and direct exposure as moderators. There were no moderating effects for the PTSD-distress structural parameters. BSI-18's depression and somatization factors related more to PTSD's dysphoria than PTSD's avoidance factor. The results emphasize assessing for specificity and distress variance of PTSD factors on a continuum, rather than assuming dysphoria factor's complete accountability for PTSD's inherent distress. Additionally, PTSD's dysphoria factor related more to BSI-18's depression than BSI-18's anxiety/somatization factors; this may explain PTSD's comorbidity mechanism with depressive disorders.

Keywords PTSD · India · Children/adolescents · Confirmatory factor analyses · Emotional distress

Posttraumatic stress disorder's (PTSD) four-factor dysphoria model has substantial empirical support (reviewed in Elhai and Palmieri 2011; Yufik and Simms 2010). Some debate continues regarding the dysphoria factor's differential relation to external measures of emotional distress compared to other PTSD dimensions (e.g., Marshall et al. 2010). Thus, we explored differential relations of PTSD's dysphoria factor with a refined external measurement of distress. Unique to the PTSD literature, this study used a large younger non-Western sample with PTSD assessed shortly after exposure to terrorist attacks.

PTSD in Children and Adolescents

According to DSM-IV, PTSD requires feelings of fear, helplessness or horror in response to a directly/indirectly experienced traumatic event, coupled with a tripartite set of symptoms including re-experiencing (e.g., nightmares), avoidance of trauma-related triggers and numbing (e.g., detachment), and

A. A. Contractor (✉) · M. F. Tihamiyu · J. D. Hovey · A. L. Geers · J. D. Elhai
Department of Psychology, University of Toledo, Toledo, OH, USA
e-mail: atscon60@hotmail.com

J. D. Elhai
URL: www.jon-elhai.com

P. Mehta
Department of Psychology, Mithibai College of Arts, Mumbai, India

R. Charak
Department of Psychology, Vrije Universiteit, Amsterdam, Netherlands

M. B. Tamburrino · J. D. Elhai
Department of Psychiatry, University of Toledo, Toledo, OH, USA

hyperarousal (e.g., hypervigilance) (American Psychiatric Association 2000). A nationally representative US epidemiological study indicated a 6-month PTSD prevalence of 6.3 % for girls and 3.7 % for boys (Kilpatrick et al. 2003).

PTSD, in children and adolescents is commonly comorbid with mood and other anxiety disorders (Copeland et al. 2007), with common explanations being symptom similarity (Spitzer et al. 2007) and the most empirically tested *common latent factor* explanation (Clark and Watson 1991; Watson 2009). Additionally, PTSD is comorbid with somatic symptoms (Agustini et al. 2011) and largely related to physical health problems (meta-analyzed in Pacella et al. 2013). Some explanations for the aforementioned comorbidity include somatic symptoms as a part of the non-specific distress following trauma exposure (Ursano et al. 2009), and somatic symptoms consequent to inadequate and avoidant coping of the traumatic event (PTSD dual-representation theory; Brewin et al. 1996).

Underlying Dimensions of PTSD

The tripartite DSM-IV PTSD model consisting of criterion B re-experiencing symptoms (B1-B5), criterion C effortful avoidance/numbing symptoms (C1-C7), and criterion D hyperarousal symptoms (D1-D5) does not adequately account for PTSD's underlying dimensions with younger samples and adults (reviewed in Elhai and Palmieri 2011; Yufik and Simms 2010). Thus, alternative four-factor models, including the dysphoria model (Simms et al. 2002) were developed.

The dysphoria model (Simms et al. 2002) retains the re-experiencing dimension of the DSM-IV model. However, the model's hyperarousal factor includes only DSM-IV PTSD items D4 (hypervigilance) and D5 (startle responses). The remaining DSM-IV criterion D hyperarousal symptoms (sleep and concentration difficulties, irritability) load on a dysphoria factor which also has some numbing symptoms (items C3-C7). A separate avoidance factor is also present, comprising of DSM-IV's avoidance symptoms (items C1-C2). Table 1 indicates the item mappings for the dysphoria model. PTSD's dysphoria model has received empirical support with children/adolescents and adults (reviewed in Elhai and Palmieri 2011; Yufik and Simms 2010). The dysphoria factor is purported to represent PTSD's non-specific distress, in contrast to other PTSD factors representing more trauma-specific symptoms. Given evidence of this model's slightly better fit (meta-analyzed in Yufik and Simms 2010) and dysphoria factor's conceptualization as a non-specific distress component of PTSD, the current study examines the dysphoria model.

PTSD's Dysphoria Model and Emotional Distress

Initial attempts at understanding the PTSD-distress relationship began with the tripartite model, which indicated that anxiety and depressive disorders share emotional distress,

Table 1 Standardized factor loadings of the PTSD-RI items per the dysphoria model

PTSD symptoms	Dyphoria model mapping
	Re-experiencing
B1. Intrusive recollections (PTSD-RI #3)	0.65
B2. Nightmares (PTSD-RI #5)	0.67
B3. Reliving traumas (PTSD-RI #6)	0.62
B4. Psychological reactivity to cues (PTSD-RI #2)	0.59
B5. Physiological reactivity to cues (PTSD-RI #18)	0.66
	Avoidance
C1. Avoidance of thoughts, feelings and conversations (PTSD-RI #9)	0.63
C2. Avoidance of people, places and activities (PTSD-RI #17)	0.68
	Dysphoria
C3. Amnesia for traumatic event (PTSD-RI #15)	0.64
C4. Loss of interest (PTSD-RI #7)	0.54
C5. Detachment (PTSD-RI #8)	0.66
C6. Restricted affect (PTSD-RI #10, 11)	0.56, 0.63
C7. Foreshortened future (PTSD-RI #19, 21)	0.57, 0.62
D1. Sleep difficulties (PTSD-RI #13)	0.60
D2. Irritability/anger (PTSD-RI #4, 20)	0.57, 0.56
D3. Concentration difficulties (PTSD-RI #16)	0.64
	Hyperarousal
D4. Hypervigilance (PTSD-RI #1)	0.50
D5. Exaggerated startle (PTSD-RI #12)	0.54

For all factor loadings, $p < 0.001$

with their specific components being physiological arousal and absence of positive affect respectively (Clark and Watson 1991). The most recent model, the quantitative hierarchical model, proposes a higher-order emotional disorders factor encompassing the subclasses of 1) bipolar disorders, 2) distress disorders with a greater distress component (major depressive disorder, PTSD, dysthymia, generalized anxiety disorder), and 3) fear disorders including panic disorder and phobias (Watson 2005, 2009).

Debatable in the current literature is whether PTSD's dysphoria factor represents all of PTSD's inherent distress, possibly explaining PTSD's relation with other "distress disorders." Some evidence supports dysphoria's central role in explaining PTSD's comorbidity with other distress disorders (Forbes et al. 2011; Gootzeit and Markon 2011; Simms et al. 2002), with other studies failing to demonstrate support (Elhai et al. 2008; Marshall et al. 2010). The aforementioned unsettled question opens up avenues to assess structural relationships between PTSD's dysphoria factor and factors of distress. Moreover, unique to this study is the focus on the impact of terrorism, subsequently explained in detail.

The 2008 Mumbai Terrorist Attacks

Well-known in recent world history are the November 26, 2008 Mumbai terrorist attacks. During this incident, terrorists attacked several targets, including two nationally and internationally popular hotels, the busiest commuting network, a café popular with foreign tourists, and a Jewish community center (Acharya et al. 2009). About 166 people (citizens from India, U.K., USA, etc.) were killed, 304 people were wounded, and property worth approximately \$8,691,667 was destroyed (excluding the Taj Mahal hotel costs) (Duraphe 2009). Given that the 2008 Mumbai terrorist attacks impacted Indian residents for the most part, it is important to consider Indian cultural factors influencing PTSD symptoms in children and adolescents.

The Indian Cultural Context

With no known PTSD epidemiological studies in the Indian culture, PTSD prevalence rates based on individual child/adolescent studies in India range from 30.6 % (Kar et al. 2007) to 81.6 % (John et al. 2007). The vast range for a PTSD diagnosis could be a function of differences in measures and methodology of the studies, lack of structured diagnostic interviews, and differences in referenced traumatic events. The Indian culture has some distinct social characteristics and values that can serve as risk or buffering factors for PTSD. Buffering factors include the Indian cultural values of community interdependence, societal/family bonding (Bhushan and Kumar 2007; Kayser et al. 2008), and religious coping (Rajkumar et al. 2008). Risk factors include loss of family and community support (Bhushan and Kumar 2007), external locus of control resulting in lesser effort to cope with the after-effects of traumatic events (Suar et al. 2010), and stigma attached to help-seeking for mental health concerns (Varma et al. 2007).

Current Study

The current study differs from the existing literature in several ways. First, the study adds to the literature on the developmental manifestation of PTSD (reviewed in Pynoos et al. 2009) by using a child/adolescent sample not as widely researched as other age groups (reviewed in Elhai and Palmieri 2011; Yufik and Simms 2010) for factor-analytic research. Second, the current study assesses the relation between PTSD's dysphoria factor and distress factors of somatization, depression and anxiety using underlying dimensions, which to our knowledge has not been researched. Third, the impact of terrorist attacks in India is not well researched compared to natural disasters (Kar et al. 2007), even though these incidents are on the rise (Pathak 2007). Fourth, the current study uses an Indian cultural sample, different from mainstream work in Western cultures (Galea and Maxwell 2009). In fact, Asian Americans (including Indians) are one of the fastest growing ethnic groups in the U.S. (The Associated

Press 2012), yet underrepresented in the PTSD literature (Pole et al. 2008).

Our first research question was: Does PTSD's dysphoria factor better account for emotional distress compared to other PTSD dysphoria model factors? First, it is hypothesized that the somatic distress factor will be more related to PTSD's dysphoria factor than to other PTSD factors (Hypothesis 1), based on research indicating frequent expression of distress as somatic symptoms in Eastern cultures such as India (Kar et al. 2007; Pole et al. 2008). Further, depression's somatic factor has a stronger relation to PTSD's dysphoria factor compared to other PTSD dysphoria model factors (Elhai et al. 2011). Second, it is hypothesized that the anxious distress factor will be more related to PTSD's dysphoria factor than to other PTSD factors (Hypothesis 2) based on similar previous research (Gootzeit and Markon 2011; Marshall et al. 2010; Simms et al. 2002). Third, it is hypothesized that the depressive distress factor will be more related to PTSD's dysphoria factor than to other PTSD factors (Hypothesis 3) based on similar prior studies (Gootzeit and Markon 2011; Simms et al. 2002; Watson 2009).

Our second research question was: Which component of emotional distress has the greatest association with PTSD's dysphoria factor? It is hypothesized that PTSD's dysphoria factor will be more related to somatic distress than to depressive distress (Hypothesis 4) and anxious distress factors (Hypothesis 5) given evidence of distress expression through somatic symptoms in Eastern cultures such as India (Kar et al. 2007; Pole et al. 2008) and presence of somatic symptoms such as headaches (Kar et al. 2007) following traumatic event exposure in an Indian sample. Further, dysphoria has a stronger relationship with depression's somatic factor than its non-somatic factor (Biehn et al. 2013; Elhai et al. 2011). Lastly, it is hypothesized that PTSD's dysphoria factor will be more related to depressive than anxious distress (Hypothesis 6) based on prior research (Elhai et al. 2013; Watson 2009).

We additionally assessed for differences in item severity and factor loading parameters for PTSD and distress using age, gender and direct exposure variables as moderators. We hypothesized no gender differences in item severity and factor loadings, a mixed pattern of item severity among adolescents and pre-adolescents, and no age differences in factor loadings per similar studies (Contractor et al. 2013). Lastly we hypothesized greater item severity among participants with direct exposure (Giannopoulou et al. 2006), with no specific hypothesis regarding differences in factor loadings using exposure as a moderating variable.

Method

Participants/Procedure

In the current study, we sampled children and adolescents (5th through 10th grades) attending five English-medium

schools in the vicinity of the 2008 Mumbai terrorist attack targets. Out of the 1,616 participants, 48 refused to participate resulting in a response rate of 97.02 %. Data collection occurred between January 1st and 15th, 2009. The aforementioned project was approved by the Department of Psychology (Mithibai college, Mumbai, India), and the principals of the targeted schools. Participants were not offered any monetary compensation. Original data collection procedure in the Indian setting did not require consent by parents. Use of archival data for the current study was approved by University of Toledo's IRB.

Detailed information about demographics is provided in Table 2. After applying the exclusionary criteria as described below, the effective sample of 818 participants had a mean age

of 12.85 years ($SD = 1.33$), with the majority of participants being male ($n = 435$, 53.8 %). Most participants were enrolled in 6th ($n = 224$, 28.1 %) and 7th ($n = 260$, 32.7 %) school grades. Further, a majority reported their religion to be Hinduism ($n = 513$, 65.9 %), followed by 129 participants indicating Islam (16.6 %). Using a 5-point Likert scale, the majority reported family income to be average ($n = 316$, 47.7 %) compared to the average Indian family. Fewer respondents endorsed direct exposure to the terrorist attacks ($n = 229$, 28.3 %). Further, 787 participants gave a rating of 2 or greater (either "felt it a little" or more) on items assessing for fear, helplessness or horror in relation to the terrorist attacks (96.2 %).

Instrumentation

Assessments relevant to the current study's hypotheses are described in detail.

Demographic Information Information regarding one's age, gender, school grade, religion, and family income was obtained.

Experience with the 2008 Mumbai Terrorist Attacks When assessing the impact of terrorist attacks, one needs to consider indirect effects such as shared damage, perceived threat, concern about loved ones being injured/killed, and witnessing death/injury (Norris et al. 2002) in addition to direct effects. Thus, information was obtained regarding one's personal experiences of direct exposure (e.g., being physically hurt by the terrorist event), and that of friends/relatives/family members referencing indirect exposure (e.g., family members/friends/relatives being physically hurt/experiencing death, knowing someone personally who was hurt by the events, being close to the place of the attacks, being in personal contact with victims) with the 2008 Mumbai terrorist attacks. Additionally, we assessed reactions to the 2008 Mumbai attacks (feelings of fear, helplessness and/or horror) using a five-point Likert scale.

The UCLA PTSD Reaction Index (PTSD-RI) The PTSD-RI (Steinberg et al. 2004) is a 22-item self-report questionnaire, assessing PTSD symptoms in children and adolescents. Referencing the past month, items are rated on a 5-point Likert-type scale ranging from 0 (*none of the time*) to 4 (*most of the time*). Twenty items reflect the 17 DSM-IV PTSD symptoms, with a pair of items (two alternative items) assessing each of the DSM-IV PTSD symptoms C6, C7, and D2. For the current study, the two additional items assessing PTSD's associated features (fear of recurrence and trauma-related guilt) were excluded to be consistent with the DSM-IV PTSD criteria. The current study's PTSD-RI questions referenced the 2008 Mumbai terrorist attack incident. The PTSD-RI has excellent internal

Table 2 Demographic information of 818 participants

Variable	Categories	Frequency (<i>n</i>)	Percentage
Gender	Boy	435	53.8
	Girl	373	46.2
Class	4	2	0.3
	5	52	6.5
	6	224	28.1
	7	260	32.7
	8	82	10.3
	9	176	22.1
Religion	Hindu	513	65.9
	Muslim	129	16.6
	Christian	60	7.7
	Jain	24	3.1
	Other	52	6.7
Own family income compared to average Indian family	Much higher than average	71	10.7
	Higher than average	184	27.8
	Average	316	47.7
	Lower than average	59	8.9
	Much lower than average	33	5.0
Direct exposure	Physically hurt by the terrorist attacks	229	28.3
Indirect exposure	Family member/relatives hurt	138	16.9
	Death of a person (family/relatives).	81	10.0
	A friend was hurt	201	24.6
	Death of a friend	86	10.6
	Knowing anyone personally that was hurt by the terrorist attacks	407	50.2
	Being close to the place of attacks	541	66.6
	In personal contact with disaster victims	184	23.4

consistency as reflected in a Cronbach’s alpha ranging from 0.85 to 0.90 (Jensen et al. 2009; Steinberg et al. 2013) (0.91 in the current study), with good convergent and adequate discriminant validity (Ellis et al. 2006; Steinberg et al. 2013).

Brief Symptom Inventory-18 (BSI-18) The BSI-18 is an 18-item self-report measure of psychological distress referencing the past week, with items rated on a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). Scores are obtained for the three dimensions of somatization (perception of bodily problems causing psychological distress), depression (anhedonia, sad affect), and anxiety (nervousness, apprehension, tension) in addition to an overall Global Severity Index (GSI) score (Derogatis 2001). Item mappings are indicated in Table 3. The BSI-18 has good full-scale internal consistency as reflected in a Cronbach’s alpha of 0.89 in current and prior studies (Derogatis 2001; Durá et al. 2006). There is adequate internal consistency for the anxiety (0.71–0.79), depression (0.84–0.88) and somatization (0.74–0.80) scales (Derogatis 2001; Durá et al. 2006). The scales have adequate convergent and discriminant validity (Derogatis 2001; Petkus et al. 2010). Among several studies on the BSI-18’s factor structure, most empirical support exists for the aforementioned three-factor

conceptualization (e.g., Derogatis 2001; Petkus et al. 2010; Wiesner et al. 2010); this is the model used in the current study.

Analysis

To assess the PTSD-distress hypotheses, we used a factor analytic approach. Factor analysis examines a correlation matrix to identify patterns of similarity in responding, and could be exploratory (EFA) or confirmatory (CFA) in nature. CFA involves testing the statistical fit between an hypothesized population and sample’s observed covariance matrix (Kline 2011); it is statistically superior to EFA. To test specific PTSD-distress paths for comparative significance, we used Wald tests of parameter constraints. Thus, primary analyses with Mplus 6.12 entailed two steps.

CFA The first set of CFAs estimated fit of PTSD’s dysphoria model and DSM-IV’s three-factor model using the PTSD-RI items. Noteworthy is that for the PTSD-RI’s alternative versions of the DSM-IV PTSD symptoms C6, C7 and D2, residual error variances were allowed to correlate for each pair based on wording similarity and the pair contributing to the same PTSD symptom (Cole et al. 2007). The second CFA assessed fit of the BSI-18 inter-correlated three-factor model. The third CFA assessed the fit of the model combining PTSD’s dysphoria model and BSI-18’s three-factor inter-correlated model.

For all CFAs, factor variances were scaled to 1, and factor loadings were freely estimated. Alpha levels of 0.05 and two-tailed tests were used. Further, the PTSD-RI and BSI-18 items were treated as continuous given their five response options; thus using Pearson covariance matrices and linear regression paths to estimate factor loadings (Rhemtulla et al. 2012; Wirth and Edwards 2007). Finally, assessment of model fit used recommended fit indices (Hu and Bentler 1999). A well-fitting (adequate) model had Comparative Fit Index (CFI) and Tucker Lewis Index (TLI) values ≥ 0.95 (0.90–0.94), Root Mean Square Error of Approximation (RMSEA) value ≤ 0.06 (0.07–0.08), and Standardized Root Mean Square Residual (SRMR) value ≤ 0.08 (0.09–0.10) (Hu and Bentler 1999). Bayesian Information Criterion (BIC) and Akaike information Criterion (AIC) values were used for non-nested model comparisons. A 10-point BIC difference represents a 150:1 likelihood and “very strong” ($p < 0.05$) support for the model with the smaller BIC value as the best fitting one; a difference of 6–9 points indicates “strong” support (Kass and Raftery 1995). Some BSI-18 items had skewness > 2 (6 items), and kurtosis > 7 (2 items); hence we used a mean-adjusted Maximum Likelihood (MLM) derived Satorra-Bentler (S-B) chi-square statistic to correct for non-normality (Satorra and Bentler 2001).

Wald Chi-Square Tests of Parameter Constraints This second step tested hypothesized PTSD-BSI-18 latent-level relations (Hypotheses 1–6). The Wald chi-square test assesses the null

Table 3 Standardized factor loadings of the BSI-18 items per BSI-18’s three factor inter-correlated model

BSI-18 items	BSI-18 three factor model mapping
	Anxiety
Nervousness/shakiness (Item 3)	0.56
Feeling tense or keyed (Item 6)	0.55
Scared for no reason (Item 9)	0.67
Terror/panic (Item 12)	0.62
Restlessness (Item 15)	0.55
Fearful (Item 18)	0.68
	Depression
No interest (Item 2)	0.45
Lonely (Item 5)	0.47
Blue (Item 8)	0.54
Worthlessness (Item 11)	0.52
Hopeless about the future (Item 14)	0.64
Thoughts of ending life (Item 17)	0.66
	Somatization
Faintness/dizziness (Item 1)	0.48
Pains in heart/chest (Item 4)	0.48
Nausea/upset stomach (Item 7)	0.63
Trouble breathing (Item 10)	0.61
Numbness/tingling (Item 13)	0.64
Weakness in parts of the body (Item 16)	0.66

For all factor loadings, $p < 0.001$

hypothesis that the difference between two correlations is zero. We used an alpha level of 0.01 to control for Type I error across analyses.

In addition to the primary analyses, we conducted three separate sets of invariance tests for the following moderators: gender (male vs. female), age using 12 years as the cut-off point representing a developmental transition from pre-puberty to adolescence (Scheeringa et al. 2006), and direct exposure to the terrorist attacks (presence/absence of being physically hurt by the event) using established procedures (Gregorich 2006; Meredith and Teresi 2006). The current study used both rules of (1) a significant chi-square difference test value ($p < 0.05$) (Gregorich 2006), and (2) a CFI value difference equal/greater than 0.01 (Cheung and Rensvold 2002) to robustly test the non-equivalence of all statistical parameters.

Results

Exclusions and Treatment of Missing Data

The total sample of 1,568 participants was first restricted to those equal or older than 11 years of age consistent with BSI-18 recommendations of a sixth grade reading level (Pearson Education Inc 2012) resulting in a truncated sample of 1,103 participants. This subsample was restricted to those endorsing direct/indirect exposure to the Mumbai terrorist attacks ($n = 868$ participants). Lastly, this subsample was further restricted to those not missing more than 30 % of items on the PTSD-RI or on the BSI-18 (six items or greater) ensuring sufficient items for missing value estimation (Graham 2009), resulting in an effective sample of 818 participants. Little's Missing Completely at Random (MCAR) test indicated a non-MCAR missing data pattern, Little's MCAR test $\chi^2(5,187) = 6917.3, p < 0.001$. Hence, missing data were imputed using Multiple Imputation (MI) (Graham 2009; Schafer and Graham 2002).

Primary Analyses

Total PTSD-RI scores (20 items) averaged 19.50 ($SD = 15.97$), with scores ranging from 0 to 80. Using the PTSD DSM-IV diagnostic algorithm of at least one re-experiencing symptom, three avoidance/numbing symptoms and two hyperarousal symptoms endorsed as "3" or higher (Steinberg et al. 2004), 12.7 % ($n = 104$) of these trauma-exposed participants had a probable PTSD diagnosis. Total BSI-18 scores averaged 12.08 ($SD = 11.21$), with scores ranging from 0 to 64. Additionally, participants not missing more than 30 % of items on any measure did not differ significantly in age, gender, religion and income than participants missing more than 30 % of items on any measure. Further information on the statistics can be requested from the first author of the study.

CFA CFA indicated a well-fitting PTSD DSM-IV tripartite model, S-B $\chi^2(df = 164, N = 818) = 405.23, p < 0.001$, CFI = 0.94, TLI = 0.92, RMSEA = 0.04, SRMR = 0.04, AIC value = 49893.978 and a well-fitting PTSD dysphoria model according to majority of the fit indices, S-B $\chi^2(df = 161, N = 818) = 362.639, p < 0.001$, CFI = 0.95, TLI = 0.94, RMSEA = 0.04, SRMR = 0.04, AIC value = 49834.602. Table 1 shows factor loadings for the DSM-IV dysphoria model PTSD-RI items. Bayesian Information Criteria (BIC) values for the DSM-IV tripartite model (50204.55) was more than 10 points greater than the dysphoria model (50159.291), indicating the latter as a better-fitting model.

Further, CFA indicated an adequately-fitting BSI-18 three-factor model according to majority of the fit indices, S-B $\chi^2(df = 132, N = 818) = 292.962, p < 0.001$, CFI = 0.93, TLI = 0.92, RMSEA = 0.04, SRMR = 0.04, AIC value = 39142.608. Table 3 indicates the factor loadings of the BSI-18 items. Lastly, a combined CFA of PTSD's dysphoria model and BSI-18's three-factor intercorrelated model fit the data adequately, S-B $\chi^2(df = 641, N = 818) = 1291.967, p < 0.001$, CFI = 0.91, TLI = 0.90, RMSEA = 0.04, SRMR = 0.04.

Wald Chi-Square Tests of Parameter Constraints Table 4 presents the results of the Wald tests and Table 5 indicates correlational patterns between the PTSD and distress factors. The first research question addressed if PTSD's dysphoria factor better accounts for emotional distress compared to other PTSD factors. The first hypothesis stating that the BSI-18's somatization factor will be more related to PTSD's dysphoria compared to other PTSD factor was partly supported. The second hypothesis stating that the BSI-18's anxiety factor would be more related to PTSD's dysphoria than other PTSD factors was not supported. The third hypothesis stating that BSI-18's depression factor would be more related to PTSD's dysphoria compared to other PTSD factors was partly supported.

The second research question addressed which component of emotional distress has the greatest association with PTSD's dysphoria. The fourth hypothesis stating that PTSD's dysphoria will be more related to BSI-18's somatization compared to its depression factor was not supported; in fact, PTSD's dysphoria factor was significantly more related to BSI-18's depression than its somatization factor. The fifth hypothesis stating that PTSD's dysphoria will be more related to BSI-18's somatization than its anxiety factor was not supported. Lastly, results supported the sixth hypothesis stating that PTSD's dysphoria factor will be more related to BSI-18's depression than its anxiety factor.

Invariance testing evaluated between-group differences of the PTSD-distress model using age (pre-adolescence, $n = 266$ versus adolescence, $n = 551$), gender (boys, $n = 435$ versus girls, $n = 373$) and direct exposure as moderators (presence, $n = 229$ versus absence, $n = 579$). Referencing Table 6, results suggested

Table 4 Results of the wald tests of parameter constraints

Path	<i>r</i> (<i>p</i> value)	Path	<i>r</i> (<i>p</i> value)	Wald test (<i>p</i> value)
Somat with Dysph	0.639 (<i>p</i> <0.001)	Somat with Reexp	0.576 (<i>p</i> <0.001)	3.75 (<i>p</i> =0.053)
Somat with Dysph	0.639 (<i>p</i> <0.001)	Somat with Avoid	0.532 (<i>p</i> <0.001)	7.025 (<i>p</i> =0.008)
Somat with Dysph	0.639 (<i>p</i> <0.001)	Somat with Arousal	0.621 (<i>p</i> <0.001)	0.077 (<i>p</i> =0.781)
Anx with Dysph	0.656 (<i>p</i> <0.001)	Anx with Reexp	0.701 (<i>p</i> <0.001)	2.293 (<i>p</i> =0.13)
Anx with Dysph	0.656 (<i>p</i> <0.001)	Anx with Avoid	0.667 (<i>p</i> <0.001)	0.08 (<i>p</i> =0.778)
Anx with Dysph	0.656 (<i>p</i> <0.001)	Anx with Arousal	0.735 (<i>p</i> <0.001)	1.73 (<i>p</i> =0.189)
Dep with Dysph	0.78 (<i>p</i> <0.001)	Dep with Reexp	0.705 (<i>p</i> <0.001)	6.023 (<i>p</i> =0.014)
Dep with Dysph	0.78 (<i>p</i> <0.001)	Dep with Avoid	0.655 (<i>p</i> <0.001)	10.556 (<i>p</i> =0.001)
Dep with Dysph	0.78 (<i>p</i> <0.001)	Dep with Arousal	0.667 (<i>p</i> <0.001)	3.313 (<i>p</i> =0.069)
Dysph with Somat	0.639 (<i>p</i> <0.001)	Dysph with Dep	0.780 (<i>p</i> <0.001)	16.391 (<i>p</i> =0.0001)
Dysph with Dep	0.78 (<i>p</i> <0.001)	Dysph with Anx	0.656 (<i>p</i> <0.001)	19.505 (<i>p</i> <0.001)
Dysph with Somat	0.639 (<i>p</i> <0.001)	Dysph with Anx	0.656 (<i>p</i> <0.001)	0.324 (<i>p</i> =0.57)

Somat is BSI-18’s somatization factor; Anx is BSI-18’s anxiety factor; Dep is BSI-18’s depression factor; Reexp is PTSD-RI’s re-experiencing factor; Avoid is PTSD-RI’s avoidance factor; Dysph is PTSD-RI’s dysphoria factor

equivalence for factor loadings and item intercepts across all tested moderating variables inconsistent with some proposed hypotheses.

Discussion

We analyzed PTSD-BSI-18 latent-level relations in 818 Indian children and adolescents with direct/indirect exposure to the 2008 Mumbai terrorist attacks. Results indicated partial support for the proposed hypotheses. Noteworthy is that none of the moderating variables of age, gender and direct exposure to the terrorist attacks were significant in influencing PTSD-distress item-level severity and factor loadings.

Does Dysphoria Solely Account for PTSD’s General Emotional Distress?

Results of hypotheses 1-3 regarding dysphoria’s relation with somatic, depressive, and anxious distress compared to their

relation with other PTSD factors did not support any existing viewpoint in the literature. Rather, PTSD’s dysphoria factor captured somatic and depressive distress only when compared to PTSD’s avoidance factor.

Somatization The first hypothesis stating that somatic distress would relate more significantly to PTSD’s dysphoria compared to other PTSD factors was partly supported. Distress expression in Eastern cultures predominantly via somatic symptoms (Bhui et al. 2002) could account for the somatic distress captured by PTSD’s dysphoria compared to PTSD’s avoidance. Further, PTSD’s avoidance as maladaptive coping does not represent somatic symptoms but rather leads to more

Table 5 Patterns of correlations between PTSD and distress factors

	1	2	3	4	5	6	7
1. PTSD-RI Re-experiencing	–						
2. PTSD-RI Avoidance	0.96	–					
3. PTSD-RI Dysphoria	0.876	0.891	–				
4. PTS-RI Hyperarousal	1.029	0.881	0.901	–			
5. BSI-18 Somatization	0.576	0.532	0.639	0.621	–		
6. BSI-18 Anxiety	0.701	0.667	0.656	0.735	0.887	–	
7. BSI-18 Depression	0.705	0.655	0.78	0.667	0.888	0.947	–

For all results *p*<0.01

Table 6 Invariance testing using age (≤12 and >12), gender, and direct exposure (yes/no) as moderator of the PTSD-distress model parameter estimates

Model comparisons	Chi-square difference test values (χ^2_{diff})	Degrees of freedom	BIC value difference	CFI value difference
Age				
A vs. B	45.50*	31	130.97	0.002
B vs. C	65.36**	31	143.19	0.004
Gender				
A vs. B	24.54 (<i>p</i> =0.79)	31	165.50	0.001
B vs. C	76.29**	31	131.382	0.005
Direct exposure				
A vs. B	29.98 (<i>p</i> =0.52)	31	159.24	0.001
B vs. C	45.97*	31	161.20	0.003

Descriptions of the models are as follows: Model A (all parameters allowed to vary-configural invariance); Model B (constrained factor loadings-metric invariance); Model C (Model B constraints with constrained item-level intercepts-scalar invariance); **p*<0.05; ** *p*< 0.001

PTSD distress as somatic symptoms and physiological arousal (reviewed in Brewin and Holmes 2003).

When compared to PTSD's re-experiencing and hyperarousal factors, PTSD's dysphoria did not relate more to somatic distress, with two possible explanations. First, PTSD's hyperarousal or re-experiencing may represent more somatic symptoms, consistent with prior research (Asmundson et al. 2004). Alternatively, it is possible that compared to other PTSD factors, dysphoria is more related to somatic distress, but that the present study's instrumentation did not tap into the type of culturally influenced "somatic distress" in question.

Anxiety The second hypothesis stating that anxious distress would relate more to PTSD's dysphoria compared to other PTSD factors was not supported. Given PTSD's classification as an anxiety disorder, and conceptualization as involving conditioned fear responses to generalized external/internal cues related to the traumatic event (Kirmayer 1996), all PTSD factors may account for anxious distress equally (Marshall et al. 2010). However, the current study results contrast with prior studies (Gootzeit and Markon 2011; Simms et al. 2002). The most substantial difference between the present and prior studies is that prior studies used anxiety as an overall construct rather than conceptualizing anxiety as a latent factor of distress. Further, prior studies used adult samples from Western cultures in contrast to a younger Indian sample in the current study.

Depression The third hypothesis stating that depressive distress would relate more significantly to PTSD's dysphoria compared to other PTSD factors was partly supported. A significantly greater relation between depressive distress and PTSD's dysphoria compared to its relation with PTSD's avoidance is consistent with prior studies using the overall construct of depression (Gootzeit and Markon 2011; Simms et al. 2002; Watson 2009). Further, the overlap between PTSD's dysphoria items and BSI-18's depression factor items (e.g., loss of interest, hopelessness about the future) may have contributed to these findings (Garber and Weersing 2010; Spitzer et al. 2007).

However, the present study's finding that depressive distress did not relate more to PTSD's dysphoria compared to PTSD's re-experiencing and hyperarousal factors differs from results of the aforementioned studies. Again prior studies have used depression as an overall construct rather than as a latent dimension of distress; and have used Western adult samples, possibly explaining the differences in findings.

Component of Distress with Greatest Association with PTSD's Dysphoria?

The last three hypotheses referenced dysphoria's comparative relation to somatic, anxious and depressive distress. Results

indicated that PTSD's dysphoria factor relates more to depressive distress than to somatic and anxious distress. Results indicating dysphoria's greater relation with depressive distress compared to anxious distress is supported by studies using depression and anxiety as single-score observed variables (Elhai et al. 2013; Watson 2009). Additionally, there is conceptual similarity between PTSD's dysphoria factor and BSI-18's depression factor, mainly that both represent general distress (Simms et al. 2002; Watson 2009). Thus, PTSD may belong partly to the "distress disorders" category, having greater shared variance with mood disorders (Watson 2009; Watson et al. 2005).

Implications

Theoretical First, results do not support the assertion that PTSD's dysphoria factor accounts for all of PTSD's distress compared to other PTSD factors, based on our conceptualization of distress as a heterogeneous construct. The question of whether PTSD's dysphoria is PTSD's non-specific factor may be contingent on (1) the conceptualization of latent factors of distress/psychopathology and (2) the specific PTSD factor as comparative reference. Second, it may be preferable to conceptualize specific and non-specific factors of PTSD as dimensional rather than categorical variables on aspects of PTSD specificity and accounting of distress variance (Gootzeit and Markon 2011; Watson 2009). Possible is that PTSD's dysphoria may in fact reflect a lack of normal psychological functioning rather than all of general distress (Marshall et al. 2010), and all PTSD factors may relate to different aspects of general distress for different reasons (causal/correlational) (Marshall et al. 2010); thus not supporting its proposed removal from PTSD's diagnostic criteria (Spitzer et al. 2007). This is consistent with the DSM-5's retention and expansion of the dysphoria factor items.

Third, given that dysphoria accounts for more depressive than anxious distress, it possibly indicates that PTSD's dysphoria may be contributing to PTSD's comorbidity with other mood disorders. However, PTSD's dysphoria accounts for more depressive distress only when compared to PTSD's avoidance factor, and does not account for more anxious distress when compared to other PTSD factors. It is possible that PTSD may not solely belong to the distress disorders category of the quadripartite model (no perfect fit for PTSD as a distress disorder) (e.g., Forbes et al. 2011).

Cultural The current study's results speak to the possible cross-cultural applicability of PTSD's dysphoria model and BSI-18's three-factor model in India. Interestingly, the current study's PTSD prevalence rate, ranging from 12 to 19 % is lower than that found in prior studies using younger Indian samples (30–80 %) (John et al. 2007; Kar et al. 2007). Differences in types of traumatic events assessed, type and language of PTSD measures could account for differences in PTSD

prevalence rates. Future research could assess pattern/magnitude of PTSD factor loadings cross-culturally.

Clinical In a younger sample, a clinician will benefit from (1) assessing four dimensions of PTSD (dysphoria model), and (2) assessing depression symptoms comorbid with PTSD following group trauma exposure. Further, a clinician working with a client from an Indian culture may understand PTSD as represented by four latent dimensions and focus more on comorbid depressive distress following trauma exposure; rather than assume that distress following trauma exposure is essentially via somatic symptoms.

Limitations and Future Research

First, although the schools used for data collection in the current study had English as a medium of instruction, future research would benefit by using a back-translated measure to assess if the Western defined PTSD symptoms have cultural equivalence in the Indian language (Beins 2011; Brislin 1970). Second, future research could explore the influence of cultural variables specific to Indian values/beliefs, such as social and familial support (Bhushan and Kumar 2007) and stigma attached to help seeking (Varma et al. 2007). Third, given the influence of response styles and social desirability on self-report measures (Furnham 1986), it would have been preferable to use multi-method assessments (reviewed in Davis and Siegel 2000); this being an avenue for future research.

Fourth, based on prior literature the highly correlated nature of the assessment measures (within and between scales) is not surprising; however it does create concerns about divergent validity. The current study results need to be interpreted in the light of this particular limitation. It must be noted that the main purpose of the study was to test any statistically significant differences between correlation pathways (Wald tests); this was accomplished with the statistical approach of the current study. Lastly, several PTSD risk factors in younger samples were not analyzed in this study, examples being a greater impact of mass trauma exposure (affecting a community) versus individual trauma (affecting one person); and comorbid mental health problems such as depression (meta-analyzed in Trickey et al. 2012). Specifically, parenting style after a child's experience of traumatic events (Trickey et al. 2012) and parents' personal traumatic experiences (Daud et al. 2005) significantly impact children's psychological health; this could be further addressed in future studies. Additionally, children and adolescents may react to traumatic stressors with symptoms other than PTSD, examples being irritability, hostility (Perrin et al. 2000), suicidal thoughts and attempts, self-mutilation, and substance abuse and dependence (Giaconia et al. 1995; Schwarz and Perry 1994).

Conclusion

Notable is that PTSD's dysphoria factor related more to depressive and somatic distress only when compared to PTSD's avoidance factor, and did not relate more to anxious distress compared to any other PTSD factor. This indicates the importance of assessing emotional distress as a heterogeneous construct possibly explaining the contradictory findings in the literature. The results also emphasize looking at PTSD specificity and distress variance for PTSD factors on a continuum, rather than assuming dysphoria factor's complete accountability for PTSD's inherent distress. Further, dysphoria's significantly greater relation to depressive distress compared to anxious and somatic distress may explain comorbidity mechanism with depressive disorders.

Acknowledgments We thank Dr. Kshama Shah and concerned students of Mithibai College, Mumbai, India who assisted in data collection, and data entry.

References

- Acharya, A., Mandal, S., & Mehta, A. (2009). Terrorist attacks in Mumbai: Picking up the pieces. In *Singapore: International Centre for Political Violence and Terrorism Research*. S. Rajaratnam School for International Studies. Nanyang Technological University.
- Agustini, E. N., Asniar, I., & Matsuo, H. (2011). The prevalence of long-term post-traumatic stress symptoms among adolescents after the tsunami in Aceh. *Journal of Psychiatric and Mental Health Nursing*, *18*, 543–549. doi:10.1111/j.1365-2850.2011.01702.x.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: American Psychiatric Association.
- Asmundson, G. J., Wright, K. D., & Stein, M. B. (2004). Pain and PTSD symptoms in female veterans. *European Journal of Pain*, *8*, 345–350. doi:10.1016/j.ejpain.2003.10.008.
- Beins, B. C. (2011). Methodological and conceptual issues in cross-cultural research. In K. D. Keith (Ed.), *Cross-cultural psychology: Contemporary themes and perspectives* (pp. 37–55). Malden: Wiley-Blackwell.
- Bhui, K., Bhugra, D., & Goldberg, D. (2002). Causal explanations of distress and general practitioners' assessments of common mental disorder among Punjabi and English attendees. *Social Psychiatry and Psychiatric Epidemiology*, *37*, 38–45. doi:10.1007/s127-002-8212-9.
- Bhushan, B., & Kumar, J. S. (2007). Emotional distress and posttraumatic stress in children surviving the 2004 Tsunami. *Journal of Loss and Trauma*, *12*, 245–257. doi:10.1080/15325020600945996.
- Biehn, T. L., Contractor, A. A., Elhai, J. D., Tamburrino, M., Fine, T. H., & Prescott, M. R. (2013). Relations between the underlying dimensions of PTSD and major depression using an epidemiological survey of deployed Ohio National Guard Soldiers. *Journal of Affective Disorders*, *144*, 106–111. doi:10.1016/j.jad.2012.06.013.
- Brewin, C. R., Dalgleish, T., & Joseph, S. (1996). A dual representation theory of posttraumatic stress disorder. *Psychological Review*, *103*, 670–686. doi:10.1037/0033-295X.103.4.670.
- Brewin, C. R., & Holmes, E. A. (2003). Psychological theories of posttraumatic stress disorder. *Clinical Psychology Review*, *23*, 339–376. doi:10.1016/S0272-7358(03)00033-3.

- Brislin, R. (1970). Back-translation for cross-cultural research. *Journal of Cross-Cultural Psychology, 1*, 185–216.
- Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal, 9*, 233–255. doi:10.1207/S15328007SEM0902_5.
- Clark, L. A., & Watson, D. (1991). Tripartite model of anxiety and depression: psychometric evidence and taxonomic implications. *Journal of Abnormal Psychology, 100*, 316–336. doi:10.1037/0021-843X.100.3.316.
- Cole, D. A., Ciesla, J. A., & Steiger, J. H. (2007). The insidious effects of failing to include design-driven correlated residuals in latent-variable covariance structure analysis. *Psychological Methods, 12*, 381–398. doi:10.1037/1082-989X.12.4.381.
- Contractor, A. A., Layne, C. M., Steinberg, A. M., Ostrowski, S. A., Ford, J. D., & Elhai, J. D. (2013). Do gender and age moderate the symptom structure of PTSD? Findings from a national clinical sample of children and adolescents. *Psychiatry Research, 210*, 1056–1064.
- Copeland, W. E., Keeler, G., Angold, A., & Costello, E. J. (2007). Traumatic events and posttraumatic stress in childhood. *Archives of General Psychiatry, 64*, 577–584. doi:10.1001/archpsyc.64.5.577.
- Daud, A., Skoglund, E., & Rydelius, P.-A. (2005). Children in families of torture victims: transgenerational transmission of parents' traumatic experiences to their children. *International Journal of Social Welfare, 14*, 23–32. doi:10.1111/j.1468-2397.2005.00336.x.
- Davis, L., & Siegel, L. J. (2000). Posttraumatic stress disorder in children and adolescents: a review and analysis. *Clinical Child and Family Psychology Review, 3*, 135–154. doi:10.1023/A:1009564724720.
- Derogatis, L. R. (2001). *BSI 18. Brief Symptom Inventory 18. Administration, scoring and procedures manual*. Bloomington: Pearson.
- Durá, E., Andreu, Y., Galdón, M. J., Ferrando, M., Murgui, S., Poveda, R., et al. (2006). Psychological assessment of patients with temporomandibular disorders: Confirmatory analysis of the dimensional structure of the brief Symptoms Inventory 18. *Journal of Psychosomatic Research, 60*, 365–370. doi:10.1016/j.jpsychores.2005.10.013.
- Duraphe, A. T. (2009). *Final report Mumbai terrorist attack cases 26th November 2008*. Mumbai: Retrieved from www.hindu.com/nic/mumbai-terror-attack-final-form.pdf.
- Elhai, J. D., Contractor, A. A., Palmieri, P. A., Forbes, D., & Richardson, J. D. (2011). Exploring the relationship between underlying dimensions of posttraumatic stress disorder and depression in a national, trauma-exposed military sample. *Journal of Affective Disorders, 133*, 477–480. doi:10.1016/j.jad.2011.04.035.
- Elhai, J. D., Grubaugh, A. L., Kashdan, T. B., & Frueh, B. C. (2008). Empirical examination of a proposed refinement to DSM-IV post-traumatic stress disorder symptom criteria using the National Comorbidity Survey Replication data. *Journal of Clinical Psychiatry, 69*(4), 597–602. doi:10.4088/JCP.v69n0411.
- Elhai, J. D., Layne, C. M., Steinberg, A. M., Brymer, M. J., Briggs, E. C., Ostrowski, S. A., et al. (2013). Psychometric properties of the UCLA PTSD reaction index. part 2: investigating factor structure findings in a national clinic-referred youth sample. *Journal of Traumatic Stress, 26*, 10–18. doi:10.1002/jts.21755.
- 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*, 849–854. doi:10.1016/j.jandis.2011.04.007.
- Ellis, B. H., Lhewa, D., Charney, M., & Cabral, H. (2006). Screening for PTSD among Somali adolescent refugees: psychometric properties of the UCLA PTSD index. *Journal of Traumatic Stress, 19*, 547–551. doi:10.1002/jts.20139.
- Forbes, D., Lockwood, E., Elhai, J. D., Creamer, M., O'Donnell, M., Bryant, R., et al. (2011). An examination of the structure of posttraumatic stress disorder in relation to the anxiety and depressive disorders. *Journal of Affective Disorders, 132*, 165–172. doi:10.1016/j.jad.2011.02.011.
- Furnham, A. (1986). Response bias, social desirability and dissimulation. *Personality and Individual Differences, 7*, 385–400. doi:10.1016/0191-8869(86)90014-0.
- Galea, S., & Maxwell, A. R. (2009). Methodological challenges in studying the mental health consequences of disasters. In Y. Neria, S. Galea, & F. H. Norris (Eds.), *Mental health and disasters* (pp. 579–593). New York: Cambridge University Press.
- Garber, J., & Weersing, V. R. (2010). Comorbidity of anxiety and depression in youth: implications for treatment and prevention. *Clinical Psychology: Science and Practice, 17*, 293–306. doi:10.1111/j.1468-2850.2010.01221.x.
- Giaconia, R. M., Reinherz, H. Z., Silverman, A. B., Pakiz, B., Frost, A. K., & Cohen, E. (1995). Traumas and posttraumatic stress disorder in a community population of older adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry, 34*, 1369–1380. doi:10.1097/00004583-199510000-00023.
- Giannopoulou, I., Strouthos, M., Smith, P., Dikaiakou, A., Galanopoulou, V., & Yule, W. (2006). Post-traumatic stress reactions of children and adolescents exposed to the Athens 1999 earthquake. *European Psychiatry, 21*, 160–166. doi:10.1016/j.eurpsy.2005.09.005.
- Gootzeit, J., & Markon, K. (2011). Factors of PTSD: differential specificity and external correlates. *Clinical Psychology Review, 31*, 993–1003. doi:10.1016/j.cpr.2011.06.005.
- Graham, J. W. (2009). Missing data analysis: making it work in the real world. *Annual Review of Psychology, 60*, 549–576. doi:10.1146/annurev.psych.58.110405.085530.
- Gregorich, S. E. (2006). Do self-report instruments allow meaningful comparisons across diverse population groups? Testing measurement invariance using the confirmatory factor analysis framework. *Medical Care, 44*(Suppl. 3), S78–S94. doi:10.1097/01.mlr.0000245454.12228.8f.
- 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. doi:10.1080/10705519909540118.
- Jensen, T. K., Dyb, G., & Nygaard, E. (2009). A longitudinal study of posttraumatic stress reactions in Norwegian children and adolescents exposed to the 2004 Tsunami. *Archives of Pediatrics & Adolescent Medicine, 163*, 856–861. doi:10.1001/archpediatrics.2009.151.
- John, P. B., Russell, S., & Russell, P. S. S. (2007). The prevalence of posttraumatic stress disorder among children and adolescents affected by tsunami disaster in Tamil Nadu. *Disaster Management Response, 5*, 3–7. doi:10.1016/j.dmr.2006.11.001.
- Kar, N., Mohapatra, P. K., Nayak, K. C., Pattanaik, P., Swain, S. P., & Kar, H. C. (2007). Post-traumatic stress disorder in children and adolescents 1 year after a super-cyclone in Orissa, India: exploring cross-cultural validity and vulnerability factors. *BMC Psychiatry, 7*(8). doi: 10.1186/1471-244X-7-8.
- Kass, R. E., & Raftery, A. E. (1995). Bayes factors. *Journal of the American Statistical Association, 90*, 773–785. doi:10.1080/01621459.1995.10476572.
- Kayser, K., Wind, L., & Shankar, R. A. (2008). Disaster relief within a collectivistic context: supporting resilience after the tsunami in south India. *Journal of Social Service Research, 34*, 87–98. doi:10.1080/01488370802086526.
- Kilpatrick, D. G., Ruggiero, K. J., Acierno, R., Saunders, B. E., Resnick, H. S., & Best, C. L. (2003). Violence and risk of PTSD, major depression, substance abuse/dependence, and comorbidity: results from the national survey of adolescents. *Journal of Consulting and Clinical Psychology, 71*, 492–700.
- Kirmayer, L. J. (1996). Confusion of the sense: Implications of ethnocultural variations in somatoform and dissociative disorders

- for PTSD. In A. J. Marsella, M. J. Friedman, E. T. Gerrity, & R. M. Scurfield (Eds.), *Ethnocultural aspects of posttraumatic stress disorder: Issues, research, and clinical applications* (pp. 131–165). Washington: American Psychological Association.
- Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). New York: The Guilford Press.
- Marshall, G. N., Schell, T. L., & Miles, J. N. V. (2010). All PTSD symptoms are highly associated with general distress: Ramifications for the dysphoria symptom cluster. *Journal of Abnormal Psychology, 119*(1), 126–135. doi:10.1037/a0018477.
- Meredith, W., & Teresi, J. A. (2006). An essay on measurement and factorial invariance. *Medical Care, 44*(11, Suppl 3), S69–S77. doi:10.1097/01.mlr.0000245438.73837.89.
- Norris, F. H., Friedman, M. J., Watson, P. J., Byrne, C. M., Diaz, E., & Kaniasty, K. (2002). 60,000 disaster victims speak: Part I. An empirical review of the empirical literature, 1981–2001. *Psychiatry, 65*, 207–239. doi:10.1521/psyc.65.3.207.20173.
- Pacella, M. L., Hruska, B., & Delahanty, D. (2013). The physical health consequences of PTSD and PTSD symptoms: a meta-analytic review. *Journal of Anxiety Disorders, 27*, 33–46. doi:10.1016/j.janxdis.2012.08.004.
- Pathak, K. (2007). Terrorism: some mental health issues in Indian perspectives. *Eastern Journal of Psychiatry, 10*, 6–9.
- Pearson Education Inc. (2012). Brief symptom inventory 18 (BSI®18) Retrieved June 1, 2012, from <http://psychcorp.pearsonassessments.com/HAIWEB/Cultures/en-us/Productdetail.htm?Pid=PAg110>.
- Perrin, S., Smith, P., & Yule, W. (2000). Practitioner review: the assessment and treatment of post-traumatic stress disorder in children and adolescents. *The Journal of Child Psychology and Psychiatry, 3*, 277–289.
- Petkus, A. J., Gum, A. M., Small, B., Malcarne, V. L., Stein, M. B., & Wetherell, J. L. (2010). Evaluation of the factor structure and psychometric properties of the brief symptom inventory—18 with homebound older adults. *International Journal of Geriatric Psychiatry, 25*, 578–587. doi:10.1002/gps.2377.
- Pole, N., Gone, J. P., & Kulkarni, M. (2008). Posttraumatic stress disorder among ethnoracial minorities in the United States. *Clinical Psychology: Science and Practice, 15*, 35–61. doi:10.1111/j.1468-2850.2008.00109.x.
- Pynoos, R. S., Steinberg, A. M., Layne, C. M., Briggs, E. C., Ostrowski, S. A., & Fairbank, J. A. (2009). DSM-V PTSD diagnostic criteria for children and adolescents: A developmental perspective and recommendations. *Journal of Traumatic Stress, 22*, 391–398. doi:10.1002/jts.20450.
- Rajkumar, A. P., Premkumar, T. S., & Tharyan, P. (2008). Coping with the Asian tsunami: perspectives from Tamil Nadu, India on the determinants of resilience in the face of adversity. *Social Science and Medicine, 67*, 844–853. doi:10.1016/j.socscimed.2008.05.014.
- Rhemtulla, M., Brosseau-Liard, P. E., & Savalei, V. (2012). When can categorical variables be treated as continuous? A comparison of robust continuous and categorical SEM estimation methods under suboptimal conditions. *Psychological Methods, 17*, 354–373. doi:10.1037/a0029315.
- Satorra, A., & Bentler, P. M. (2001). A scaled difference chi-square test statistic for moment structure analysis. *Psychometrika, 66*, 507–514. doi:10.1007/BF02296192.
- Schafer, J. L., & Graham, J. W. (2002). Missing data: our view of the state of the art. *Psychological Methods, 7*, 147–177. doi:10.1037//1082-989X.7.2.147.
- Scheeringa, M. S., Wright, M. J., Hunt, J. P., & Zeanah, C. H. (2006). Factors affecting the diagnosis and prediction of PTSD symptomatology in children and adolescents. *American Journal of Psychiatry, 163*, 644–651. doi:10.1176/appi.ajp.163.4.644.
- Schwarz, E. D., & Perry, B. D. (1994). The post-traumatic response in children and adolescents. *Psychiatric Clinics of North America, 17*, 311–326.
- Simms, L. J., Watson, D., & Doebbeling, 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.
- Spitzer, R. L., First, M. B., & Wakefield, J. C. (2007). Saving PTSD from itself in DSM-V. *Journal of Anxiety Disorders, 21*, 233–241. doi:10.1016/j.janxdis.2006.09.006.
- Steinberg, A. M., Brymer, M., Decker, K., & Pynoos, R. S. (2004). The UCLA PTSD reaction index. *Current Psychiatry Reports, 6*, 96–100. doi:10.1007/s11920-004-0048-2.
- Steinberg, A. M., Brymer, M. J., Kim, S., Briggs, E. C., Ippen, C. G., Ostrowski, S. A., et al. (2013). Psychometric properties of the UCLA PTSD reaction index: part I. *Journal of Traumatic Stress, 26*, 1–9. doi:10.1002/jts.21780.
- Suar, D., Das, N., & Hota, L. B. (2010). Social indicators affecting post-tsunami trauma of survivors. *Journal of Health Management, 12*, 483–500. doi:10.1177/097206341001200405.
- The Associated Press. (2012). New Asian immigrants to US now surpass hispanics. Retrieved from <http://www.npr.org/templates/story/story.php?storyId=155332915>.
- Trickey, D., Siddaway, A. P., Meiser-Stedman, R., Serpell, L., & Field, A. P. (2012). A meta-analysis of risk factors for post-traumatic stress disorder in children and adolescents. *Clinical Psychology Review, 32*, 122–138. doi:10.1016/j.cpr.2011.12.001.
- Ursano, R. J., Fullerton, C. S., & Benedek, D. M. (2009). What is psychopathology after disasters? Considerations about the nature of the psychological and behavioral consequences of disasters. In Y. Neria, S. Galea, & F. H. Norris (Eds.), *Mental health and disasters* (pp. 131–142). New York: Cambridge University Press.
- Varma, D., Chandra, P. S., Thomas, T., & Carey, M. P. (2007). Intimate partner violence and sexual coercion among pregnant women in India: relationship with depression and post-traumatic stress disorder. *Journal of Affective Disorders, 102*, 227–235. doi:10.1016/j.jad.2006.09.026.
- Watson, D. (2005). Rethinking the mood and anxiety disorders: A quantitative hierarchical model for DSM-V. *Journal of Abnormal Psychology, 114*, 522–536. doi:10.1037/0021-843X.114.4.522.
- Watson, D. (2009). Differentiating the mood and anxiety disorders: a quadripartite model. *The Annual Review of Clinical Psychology, 5*, 221–247. doi:10.1146/annurev.climpsy.032408.153510.
- Watson, D., Gamez, W., & Simms, L. J. (2005). Basic dimensions of temperament and their relation to anxiety and depression: a symptom-based perspective. *Journal of Research in Personality, 39*, 46–66. doi:10.1016/j.jrp.2004.09.006.
- Wiesner, M., Chen, V., Windle, M., Elliott, M. N., Grunbaum, J. A., Kanouse, D. E., et al. (2010). Factor structure and psychometric properties of the Brief Symptom Inventory–18 in women: a MACS approach to testing for invariance across racial/ethnic groups. *Psychological Assessment, 22*, 912–922. doi:10.1037/a0020704.
- 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*, 764–776. doi:10.1037/a0020981.