

Psychometric Properties of the UCLA PTSD Reaction Index: Part I

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This article presents psychometric characteristics of the UCLA PTSD Reaction Index for *DSM IV* (PTSD-RI) derived from a large sample of children and adolescents ($N = 6,291$) evaluated at National Child Traumatic Stress Network centers. Overall mean total PTSD-RI score for girls was significantly higher as compared with boys. Age-related differences were found in that overall mean total PTSD-RI scores and within sex groups were higher among those aged 7–9 years and 16–18 years. There were no significant differences in mean total PTSD-RI scores across racial/ethnic groups. The PTSD-RI total scale displayed good to excellent internal consistency reliability across age ranges, sex, and racial/ethnic groups ($\alpha = .88-.91$). Correlations of PTSD-RI scores with PTS subscale scores on the TSCC-A for the entire sample and within sex, age, and ethnic/racial groups provided evidence of convergent validity, although not discriminant validity. In contradistinction to previously reported 4-factor models, an exploratory factor analysis revealed 3 factors that mostly reflected the underlying dimensions of PTSD in *DSM IV*. PTSD-RI scores were associated with increased odds ratios for functional/behavior problems (odds ratio [OR] = 1–1.80). These findings are striking in light of the wide range of trauma exposures, age, and race/ethnicity among subjects.

Over the past two decades, the UCLA PTSD Reaction Index (PTSD-RI; Steinberg & Brymer, 2008; Steinberg, Brymer, Decker, & Pynoos, 2004) has been one of the most widely used

instruments for the assessment of posttraumatic stress reactions among children and adolescents across trauma types, sex, age ranges, and cultures (Hawkins & Radcliffe, 2006; Ohan, Myers, & Collett, 2002). As the diagnostic criteria for posttraumatic stress disorder (PTSD) have evolved, successive versions of the PTSD-RI have been extensively translated and broadly used in clinical evaluation and trauma research, especially across the United States and around the world for screening, needs assessment, surveillance, and treatment outcome evaluation after major disasters and catastrophic violence. Translations of the instrument exist in many languages with various psychometric evaluations for these translations previously reported and others ongoing (Lack, Sullivan, & Knight, 2008). Additionally, abbreviated versions of the PTSD-RI have been developed for use in triage and referral after disasters (National Child Traumatic Stress Network [NCTSN], 2005) and for screening in general mental health and pediatric medical settings (Cohen, Kelleher, & Mannarino, 2008).

As the diagnosis of PTSD has evolved, the PTSD-RI has gone through a number of iterations corresponding to earlier versions of the diagnostic criteria. Pre-*DSM IV* versions have been psychometrically studied, with findings of high internal

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consistency reliability, higher PTSD-RI scores among traumatized youth compared with controls, and a clear dose of exposure relationship of PTSD-RI scores across exposure groups (Goenjian et al., 1995; Koplewicz et al., 2002; Lack et al., 2008; Pynoos et al., 1987). Criterion-referenced validity was supported by the sensitivity and specificity of PTSD-RI cutoff scores with a *DSM III-R* diagnosis of PTSD (Pynoos et al., 1993). Cronbach's α reliability coefficients for earlier versions have generally been in the range of .90, with test-retest reliability coefficients in the range of .84 (Steinberg et al., 2004). Additional research, however, is needed using current *DSM IV* diagnostic criteria in a diverse population of traumatized children and adolescents.

In regard to the *DSM IV* version of the PTSD-RI, data from a sample of 73 adolescents (Rodríguez, Steinberg, Saltzman, & Pynoos, 2001) demonstrated excellent internal consistency for the total scale and moderate to high internal consistency for the B, C, and D subscales. Test-retest reliability for the total scale was high ($r = .84$) with an interval range from 6 to 28 days. Construct validity was indicated by significant correlation between the PTSD-RI subscales and the corresponding scales from the PTSD module of the Kiddie Schedule for Affective Disorders and Schizophrenia (Kaufman et al., 1997). Criterion-referenced validity was established by good diagnostic efficiency in predicting PTSD diagnosis against the Clinician Administered PTSD Scale, Children and Adolescent Version (Nader et al., 1996). Given the relatively small sample size of many of the above studies, the Core Data Set (CDS) of the NCTSN provided an opportunity for a more compelling psychometric evaluation of the PTSD-RI for *DSM IV* (Briggs et al., 2012; Pynoos et al., 2008).

Here we report on selected psychometric characteristics of the PTSD-RI for *DSM IV* derived from data collected across 54 centers that, in various settings, serve diverse populations of children and adolescents with a wide range of trauma histories. Specifically, we evaluated the internal consistency reliability and convergent/discriminant validity of the PTSD-RI across age, sex, and racial/ethnic groups, the association of PTSD-RI scores with functional and behavioral measures, and conducted an exploratory factor analysis.

Method

Participants

The present analyses are based on a subsample ($n = 6,291$) of the CDS that include those between 7–18 years of age who experienced at least one trauma and had complete PTSD-RI data. The participants had a mean age of 12.7 years ($SD = 3.08$) and included 2,794 boys and 3,497 girls. The subsample was 32% White; 23% Black/African American; 36% Hispanic/Latino; 1.2% American Indian/Alaska Native; and 7.8% Other (including Asian, Native Hawaiian/Pacific Islander, and multiracial).

The CDS permitted standardized data to be collected as part of routine practice in university- and community-based mental health clinics and in a variety of other settings across

the NCTSN, including schools, child welfare, hospitals, juvenile justice, and residential care. To facilitate data collection from NCTSN centers, a web-based data entry system, *InForm*, provided a common information gathering protocol, a user-friendly, real-time data entry process, and immediate scoring and feedback of clinical assessments. Access to the data were controlled by individual user-level security, with data quality insured using both automated computer checks and manual review in addition to ongoing monitoring by statistical, clinical, and data management staff.

The present data were collected from across the NCTSN over a 6-year period, from the spring of 2004 to the fall of 2010 and included baseline treatment information. The data were housed in a repository at the Duke Clinical Research Institute (DCRI). All regulatory procedures and guidelines for this initiative were in compliance with the Duke Institutional Review Board (IRB). All centers obtained their own IRB approval and completed a data use agreement with DCRI prior to gaining access to the electronic data collection system. Data were collected with limited identifying information as part of data entry and subsequently the data were de-identified for data analysis purposes. Additional consenting and security measures were put in place to ensure compliance with local IRB standards and those of other federal governing agencies. Providers at each center were trained in the administration and scoring of all measures including the THP, PTSD-RI, and TSCC-A. Clinicians used guidelines to rate the presence or absence of a number of functional/behavioral problems at home, school, and in the community.

Measures

The UCLA Trauma History Profile for the CDS (THP; Pynoos & Steinberg, 2002) was derived from the trauma history portion of the PTSD-RI. It was completed by the provider at intake or early in the course of services. Information about trauma, loss, bereavement, and separation experiences was obtained from multiple informants, including the child or adolescent, parent/caregivers, and other relatives. The THP covers the following areas: (a) sexual abuse/maltreatment; (b) sexual assault/rape; (c) physical abuse/maltreatment; (d) physical assault; (e) emotional abuse/psychological maltreatment; (f) neglect; (g) domestic violence; (h) war/terrorism/political violence inside the United States; (i) war/terrorism/political violence outside of the United States; (j) illness/medical trauma; (k) injury/accident; (l) natural disaster; (m) kidnapping; (n) traumatic loss, bereavement, separation; (o) forced displacement; (p) impaired caregiver; (q) extreme personal/interpersonal violence; (r) community violence; (s) school violence; and (t) other trauma. For each trauma type, providers indicated whether the trauma had occurred or if it was suspected to have occurred. Standardized definitions for trauma types were supplied that were modeled on the National Child Abuse and Neglect Data System Glossary (U.S. Department of Health and Human Services Administration for Children and Family, 2000).

The UCLA PTSD Reaction Index for *DSM IV* (PTSD-RI, Steinberg et al., 2004) is a self-report questionnaire to screen for exposure to traumatic events and assess PTSD symptoms in school-age children and adolescents. The symptom scale assesses the frequency of occurrence of PTSD symptoms during the past month (rated from 0 = *none of the time* to 4 = *most of the time*). All participants completed the *DSM IV* version, whose items map directly onto Criterion B (Intrusion), Criterion C (Avoidance), and Criterion D (Arousal); two additional items assess associated features (fear of recurrence and trauma-related guilt). Scoring algorithms permit tabulation of PTSD-RI total score, and B, C, and D category subscale scores.

The Trauma Symptom Checklist for Children-Alternative (TSCC-A; Briere, 1996) is a 44-item measure used to assess posttraumatic symptoms in children ages 6–18 years. The TSCC-A has two rater validity scales that assess underresponding and hyperresponding, and five clinical scales that assess anxiety, depression, anger, posttraumatic stress (PTS), and dissociation (with two subscales, Fantasy and Overt Dissociation). This measure has strong psychometric properties with respect to reliability and validity, and is standardized on a large sample of racially and economically diverse children (Briere, 1996; Sadowski & Friedrich, 2000).

The Indicators of Severity of Functional Problems, a project developed measure, was used to assess the severity of a wide range of functional impairments and behavioral problems. Functional and behavioral problems rated by providers included academic problems, behavior problems in school or day care, problems with skipping school, behavior problems at home or in the community, suicidality, other self-injurious behaviors, inappropriate sexualized behaviors, alcohol use, substance use, attachment problems, criminal activity, running away from home, prostitution, and other medical problems or disabilities. Providers rated the presence or absence of each of these problems as *not a problem*, *sometimes a problem*, or *very much a problem*.

Data Analysis

Demographic variables for the present analyses included age, sex, and race/ethnicity. Age was categorized into four developmental periods spanning 3 years each (7–9, 10–12, 13–15, and 16–18). Race/ethnicity was categorized as follows: White, Black/African American, Hispanic/Latino, and American Indian/Alaska Native. Other racial/ethnic groups were not included in the analyses due to small numbers in each of these subgroups. Multiple trauma was defined as experiencing two or more trauma types. Pearson correlations were used to determine the average correlation of each PTSD-RI item with the other PTSD-RI items and the correlation coefficients of the PTSD-RI total scale with B, C, and D subscales and across subscales. Cohen's *d* was used to calculate effect size.

The analyses were designed to investigate the internal consistency (Cronbach's α) of items comprising the PTSD-RI and the extent to which this varied by sex, age, and racial/ethnic

Table 1
Mean, Standard Deviation, and Range of PTSD-RI Total Score by Sex, Age, Type of Trauma, and Race/Ethnicity

Variable	PTSD-RI Total			
	<i>N</i>	<i>M</i>	<i>SD</i>	Range
Total sample	6,291	26.6	14.9	0–68
Sex				
Boys	2,794	23.9	14.2	0–68
Girls	3,497	28.7	15.1	0–68
Age group				
7–9	1,474	28.0	14.6	0–68
10–12	1,797	24.9	14.8	0–68
13–15	1,880	25.9	14.9	0–68
16–18	1,140	28.8	14.9	0–68
Trauma type				
Single	1,346	24.0	14.8	0–68
Multiple	4,945	27.3	14.9	0–68
Race/ethnicity				
Hispanic/Latino	2,288	25.9	14.8	0–68
White	2,012	27.1	14.8	0–68
Black/African American	1,452	26.8	15.2	0–68
American Indian/Alaska Native	75	30.2	14.5	4–62

Note. Hispanic/Latino may include Black/African American, White, or American Indian/Alaska Native. Black/African American, White, American Indian/Alaska Native categories do not include multiracial children. PTSD-RI = PTSD Reaction Index.

group. Exploratory factor analysis using varimax rotation was used to investigate the dimensionality of the PTSD-RI in relation to the construct of PTSD in *DSM IV*. Pearson correlations were used to explore convergent and discriminant validity of PTSD-RI in relation to the TSCC-A. We investigated the contribution of a 10-point increase in PTSD-RI score to the odds ratio for each functional/behavioral problem. Group comparisons of PTSD-RI scores, including demographic characteristics, single/multiple types of trauma exposure, and determination of odds ratios for functional/behavioral problems, utilized a random effects model to take into account the possible intraclass correlations among participants seen within the various NCTSN centers.

Results

The percentage of participants who had been exposed to at least one of the 20 trauma types included in the THP was as follows (children may have endorsed more than one trauma type): traumatic loss/separation/bereavement (52%); domestic violence (49.1%); impaired caregiver (38.5%); emotional abuse (37.2%); physical abuse/maltreatment (30.4%); neglect (23.7%); sexual abuse/maltreatment (23.2%); community violence (19.6%); sexual assault (17%); school violence (15.6%); serious accident or injury (13.7%); physical assault (12.1%);

Table 2
PTSD-RI Item Characteristics and Correlations With PTSD-RI Total Score

Item	<i>M</i>	<i>SD</i>	<i>Skewness</i>	<i>Mdn</i>	<i>r</i>
B1: Intrusive distressing recollections	1.54	1.43	0.43	1	.24
B2: Recurrent distressing dreams	1.41	1.44	0.59	1	.37
B3: Acting like the trauma is recurring	1.03	1.31	1.03	0	.39
B4: Psychological reactivity to reminders	2.01	1.39	0.04	2	.37
B5: Physical reactivity to reminders	1.56	1.49	0.41	1	.36
C1: Avoid thoughts, feelings, or conversations	1.98	1.55	0.05	2	.31
C2: Avoid activities, places, or people	1.53	1.53	0.46	1	.37
C3: Inability to recall aspects of the trauma	1.09	1.30	0.96	1	.33
C4: Diminished interest in activities	1.06	1.30	1.01	1	.30
C5: Detachment or estrangement	1.20	1.36	0.82	1	.34
C6: Restricted affect	1.52	1.44	0.46	1	.26
C7: Foreshortened future	1.29	1.43	0.73	1	.31
D1: Sleep difficulty	1.82	1.54	0.19	2	.36
D2: Irritability or anger	2.17	1.33	-0.07	2	.40
D3: Difficulty concentrating	1.83	1.45	0.17	2	.32
D4: Hypervigilance	1.92	1.46	0.15	2	.36
D5: Exaggerated startle	1.63	1.45	0.39	1	.35

Note. *N* = 6,291. PTSD-RI = PTSD Reaction Index.

illness/medical trauma (10.6%); natural disaster (6.7%); extreme interpersonal violence (6.4%); kidnapping (2.5%); forced displacement (2.1%); war, terrorism, political violence inside the United States (1.4%); war, terrorism, political violence outside the United States (1.3%); and other trauma (10.6%).

Table 1 shows the mean PTSD-RI total score by sex, age, single/multiple trauma, and race/ethnicity. Girls had significantly higher mean PTSD-RI total scores compared with boys ($p < .001$; $d = 0.33$). There were significant differences across age groups, with those 7–9 and 16–18 scoring significantly higher than those in the 10–12 or 13–15 age range ($p < .001$; d range from 0.05 to 0.21). A supplemental analysis indicated that these differences across age groups were preserved within sex groups. As expected, the mean number of experienced traumas increased by age group: 7–9 ($M = 3.0$, $SD = 1.9$), 10–12 ($M = 3.3$, $SD = 2.0$), 13–15 ($M = 3.8$, $SD = 2.4$), and 16–18 ($M = 4.4$, $SD = 2.8$). Those with multiple types of trauma scored significantly higher compared with those with a single type of trauma ($p < .001$; $d = 0.22$). In regard to the association of number of traumas with increased PTSD-RI scores controlling for sex and age, a random effects model indicated a significant association ($B = 0.97$, $SE B = 0.09$, $p < .001$). The sex difference was retained and age difference was also replicated except for the 16–18 age group. There were no significant differences across ethnic/racial groups in mean PTSD-RI total score (d ranges from 0.06 to 0.29).

Table 2 shows the mean, standard deviation, skewness, and median score for each of the 17 PTSD-RI items arranged in B, C, and D subcategories. The final column gives the average interitem correlation for each item with all other items. Each of the items is similarly intercorrelated with the other items.

Table 3 presents the correlation coefficients of the PTSD-RI total scale with the B, C, and D subscales. The PTSD-RI total scale score is highly correlated with the B, C, and D subscale scores and the B, C, and D subscale scores are, respectively, highly to moderately correlated with the other subscales scores. The Cronbach's α for the PTSD-RI total scale and B, C, and D category scales by sex and age is displayed in Table 4. The PTSD-RI total scale Cronbach's α for the entire sample was .90, for boys was .89, and for girls was .90. For boys and girls, Cronbach's α ranged from .72 to .86 for the Intrusion subscale, .73 to .80 for the Avoidance subscale, and .61 to .71 for the Arousal subscale. The Cronbach's α for the PTSD-RI total scale and B, C, and D subscale scores by race/ethnicity are shown in Table 5. Cronbach's α across race/ethnicity range from .88 to .90 for the total scale, from .80 to .84 for the Intrusion subscale, .73 to .80 for the Avoidance subscale, and from .60 to .67 for the Arousal subscale.

Table 3
Correlation Coefficients of PTSD-RI Total Score With B, C, and D Subscale Scores

Variable	Total	B	C
Total			
B	.89		
C	.91	.71	
D	.85	.65	.66

Note. *N* = 6,291. All $ps < .001$. PTSD-RI = PTSD Reaction Index.

Table 4
Internal Consistency of the PTSD-RI Total and Subscales by Sex and Age

Group	UCLA PTSD-RI Scales			
	Total	B	C	D
Total sample (<i>n</i> = 6,291)	.90	.82	.79	.67
Boys (<i>n</i> = 2,794)	.89	.79	.77	.65
7–9 (<i>n</i> = 786)	.86	.72	.73	.61
10–12 (<i>n</i> = 929)	.89	.80	.77	.68
13–15 (<i>n</i> = 703)	.90	.83	.80	.66
16–18 (<i>n</i> = 376)	.88	.83	.79	.62
Girls (<i>n</i> = 3,497)	.90	.84	.80	.68
7–9 (<i>n</i> = 688)	.89	.77	.78	.66
10–12 (<i>n</i> = 868)	.91	.84	.80	.71
13–15 (<i>n</i> = 1,177)	.90	.85	.80	.69
16–18 (<i>n</i> = 764)	.90	.86	.80	.67

Note. Internal consistency = alpha coefficient; PTSD-RI = PTSD Reaction Index.

Table 6 presents an exploratory factor analysis of the 17 PTSD-RI items. This 3-factor solution indicates that all of the B category items cluster in the first factor with the addition of avoidance of thoughts, feelings, or conversations (C1); avoidance of activities, places, or people (C2); and hypervigilance (D4). The second factor includes four of the C category items. The third factor includes four of the D category items, along with inability to recall aspects of the trauma (C3). An oblique rotation showed the same 3-factor pattern.

See Table 7 for the correlations between the PTSD-RI total and subscale scores with the TSCC-A subscale scores. The strong positive correlation of the PTSD-RI total and subscale scores with the PTS scale of the TSCC-A provides evidence of convergent validity. The relatively high correlations of the PTSD-RI total scale and the remaining TSCC-A subscales does not adequately demonstrate discriminant validity. A similar pattern of convergent validity was reflected in correlational analyses by sex, age, and ethnic/racial groups.

Table 8 shows the odds ratios and confidence intervals for behavioral problems associated with a 10-point unit increase in PTSD-RI total score. A 10-unit increase in PTSD-RI score was

significantly associated with increased odds ratios for almost all behavior problems with the exception of criminal activity, and medical problems and disabilities. For example, a 42% increase in self-injurious behaviors is associated with a 10-unit increase on PTSD-RI. Academic problems, behavior problems at home or in the community, behavior problems in school or daycare, and attachment problems were among the most highly endorsed functional/behavioral problems. Strikingly, 19.1% endorsed suicidality.

Discussion

This study includes the largest pool of traumatized children and adolescents examining the psychometric properties of the UCLA PTSD Reaction Index for *DSM IV* to date. It included children and adolescents with a wide range of trauma exposures whose data were analyzed by sex, age, race/ethnicity, and single/multiple types of trauma. The overall finding of higher PTSD-RI total scores among girls compared with boys is consonant with the majority of findings in the child and adult literature across a variety of trauma types (Cohen et al., 2010; Kimerling, Ouimette, & Wolfe, 2002; Tolin & Foa, 2006; Vernberg, Silverman, La Greca, & Prinstein, 1996). Currently, the literature is unclear about whether these differences may be related to gender differences in type and frequency of trauma exposure, acute stress reactions, perceptions of threat, or differences in psychological and biological stress responses (for review, see Kirsch, Wilhelm, & Goldbeck, 2011; Olff, Langeland, Draijer, & Gersons, 2007). Questions also remain about whether such findings may be due to greater willingness on the part of girls to endorse distress symptoms. More research is needed among children and adolescents in regard to factors that may help explain gender differences in posttraumatic stress reactions.

There have been conflicting findings in the literature in regard to age-related differences in PTSD, with some studies showing younger children to be at increased risk, others finding older children and adolescents to be at increased risk, whereas other studies have found no differences across age groups (for example, see McDermott, Lee, Judd, & Gibbon, 2005; Pynoos et al., 1993; Roussos et al., 2005; Shannon, Lonigan, Finch, & Taylor, 1994). These discrepancies may be related to studies having been conducted across different traumatized populations

Table 5
Internal Consistency of the PTSD-RI Total and Subscales by Race/Ethnicity

Variable	AI/AN (<i>n</i> = 75)	Black/African American (<i>n</i> = 1,452)	White (<i>n</i> = 2,012)	Hispanic/Latino (<i>n</i> = 2,288)
Total scale	.88	.89	.90	.90
Intrusion	.80	.81	.84	.82
Avoidance	.73	.78	.79	.80
Arousal	.60	.67	.67	.67

Note. Hispanic/Latino may include Black/African American, White or American Indian/Alaska Native. Black/African American, White, American Indian/Alaska Native categories do not include multiracial children. Internal consistency = alpha coefficient; PTSD-RI = PTSD Reaction Index; AI/AN = American Indian/Alaska Native.

Table 6
Exploratory Factor Analysis: 3-Factor Solution

Item	Item label	Factor 1	Factor 2	Factor 3
D ₄	Hypervigilance	.40	.08	.20
B ₄	Psychological reactivity to reminders	.65	.27	.14
B ₁	Intrusive distressing recollections	.61	.26	.25
B ₂	Recurrent distressing dreams	.49	.21	.41
B ₃	Acting like the trauma is recurring	.51	.29	.27
C ₄	Diminished interest in activities	.22	.56	.17
C ₅	Detachment or estrangement	.27	.68	.20
C ₁	Avoid thoughts, feelings, or conversations	.49	.31	.12
D ₅	Exaggerated startle	.37	.13	.38
D ₁	Sleep difficulty	.32	.22	.52
C ₃	Inability to recall aspects of the trauma	.20	.24	.35
D ₃	Difficulty concentrating	.17	.32	.47
C ₂	Avoid Activities, Places, or People	.55	.23	.24
B ₅	Physical reactivity to reminders	.62	.28	.28
D ₂	Irritability or anger	.22	.37	.37
C ₆	Restricted affect	.27	.54	.31
C ₇	Foreshortened future	.24	.50	.35

Note. $N = 6,291$. Coefficients in bold indicate factor loading.

of children and adolescents using different instruments at various posttrauma intervals. Using a diverse sample, the present study did find specific age-related significant differences for the entire sample, which was mirrored within sex groups. Future studies are needed to further investigate the relationship between trauma history (including multiplicity and configuration of trauma exposures, age of onset, duration, number of episodes, time since trauma, specific details of traumatic experiences) as well as to demographic, child intrinsic, and ecological factors related to the recovery environment and PTSD.

Conflicting findings have been reported regarding ethnic/racial differences in PTSD (Brown & Kolko 1999; Pole, Best, Metzler, & Marmar, 2005; Roberts, Gilman, Breslau, Breslau, & Koenen, 2011). Consistent with the present findings,

Table 7
Correlations Between the PTSD-RI Total and Subscale Scores and TSCC-A Subscale Scores

TSCC-A Scale	PTSD-RI Scale			
	Total	B	C	D
PTS	.75	.73	.65	.60
Anger	.54	.42	.49	.53
Anxiety	.68	.63	.60	.60
Depression	.67	.57	.65	.54
Dissociation	.65	.56	.61	.57

Note. $n = 4,964$. All $ps < .001$. PTSD-RI = PTSD Reaction Index, TSCC-A = Trauma Symptom Checklist, alternate version.

Ruchkin and colleagues (2005), using the PTSD-RI, found that posttraumatic stress symptoms and their association with other adolescent mental health problems were not culture-bound and followed a similar dynamic cross-culturally. Kassam-Adams and Winston (2004) also found no significant difference in PTSD based on race. Again, more research is needed among children and adolescents, especially within different trauma exposure categories, to examine ethnic, racial, and cultural differences in PTSD symptom response.

The finding that mean total PTSD-RI score among those exposed to multiple trauma was significantly higher than for those with a single type of trauma, along with findings from the random effects model indicating that increasing PTSD-RI scores were significantly associated with increasing number of experienced traumas, is consistent with a dose of exposure pattern (Brymer, Steinberg, Watson, & Pynoos, 2012; Fairbank, 2008) and lends further support to the validity of the PTSD-RI.

The Cronbach's α s were in the excellent range for total PTSD-RI score for the total sample, for boys and girls, and across ethnic/racial groups is striking, suggesting that these items measure a coherent underlying construct of posttraumatic distress. The fact that internal consistency is uniformly high across these groups also points to the applicability of the use of the PTSD-RI across diverse populations. With the exception of the PTSD-RI Arousal subscale, which showed weaker internal consistency, the Intrusion and Avoidance subscales showed acceptable to good internal consistency. More research is needed to further investigate whether the Arousal subscale items reflect a unidimensional construct and to identify factors that may moderate its manifestations.

Table 8
Percent, ORs, and CIs for Functional/Behavioral Problems Associated With a 10-Unit Change in PTSD-RI Total Score

Functional/behavioral problem	n_1	n_2	%	OR	95% CI
Academic	3,632	5,834	62.3	1.15***	[1.11, 1.19]
Behavior in school or daycare	2,821	5,832	48.4	1.12***	[1.08, 1.16]
Skipping school/daycare	976	5,794	16.8	1.14***	[1.08, 1.19]
Behavior at home/community	3,509	5,908	59.4	1.10***	[1.06, 1.14]
Suicidality	1,113	5,827	19.1	1.56***	[1.48, 1.63]
Other self-injurious behaviors	787	5,859	13.4	1.42***	[1.35, 1.50]
Inappropriate sexualized behaviors	827	5,785	14.3	1.20***	[1.14, 1.26]
Alcohol use	523	5,784	9.0	1.18***	[1.11, 1.26]
Substance use	628	5,734	11.0	1.14***	[1.07, 1.21]
Attachment	2,556	5,762	44.4	1.13***	[1.09, 1.18]
Criminal activity	596	5,883	10.1	1	[0.94, 1.06]
Running away from home	525	5,900	8.9	1.12***	[1.05, 1.19]
Prostitution	42	5,886	0.7	1.80***	[1.45, 2.24]
Other medical or disabilities	750	5,813	12.9	1.05	[0.99, 1.10]

Note. OR = odds ratio; CI = confidence interval; PTSD-RI = PTSD Reaction Index. n_1 = Number endorsing problem (*somewhat/sometimes* or *very much/often a problem*); n_2 = number included in analysis.

*** $p < .001$.

Although prior confirmatory factor analytic studies suggest a 4-dimensional construct of PTSD (Elhai & Palmieri, 2011), findings from the exploratory factor analysis in this study to an extent reflect the underlying three dimensions of PTSD in *DSM-IV*. All of the B category items fell on the same factor. The avoidance items that cluster with the B category items (C1 and C2) may be due to avoidance resulting from persistent intrusive symptoms. In addition, the second factor includes only C category items, excluding the two avoidance items that factored with B category items. The other C category item (C3) clustered with the remaining D category items, all of which comprised the third factor. Based on models used in prior studies of the PTSD-RI (Armour et al., 2011), a companion article in this issue (Elhai et al., in press) provides additional information about the dimensionality of the PTSD-RI using confirmatory factor analyses to test a 3-factor model, two 4-factor models, and a recently conceptualized 5-factor model, along with investigating the convergent validity of factors against subscales of the TSCC-A.

The correlation between the total scale PTSD-RI score and the PTS subscale of the TSCC-A, which is in the excellent range (Cicchetti & Sparrow, 1981) provides strong evidence of convergent validity. The high correlation of the total PTSD-RI and subscale scores for the total sample (and within sex, age, and ethnic groups) with the PTS subscale of the TSCC-A suggests that both scales are measuring a similar underlying theoretical construct. The weaker correlations with the other TSCC-A subscales that fall in the fair to good range, did not demonstrate adequate discriminant validity. This may be due to a moderate degree of theoretical relatedness of these constructs, which may underlie their frequent co-occurrence (Kessler,

Sonnega, Bromet, Hughes, & Nelson, 1995; Kilpatrick et al., 2003).

There are several limitations to this study. Due to the lack of administration of a structured diagnostic instrument for PTSD as part of the CDS, we could not replicate earlier findings regarding criterion referenced validity, nor determine cut-off scores based on sensitivity and specificity of the continuous scale against a diagnosis of PTSD. Given flexibility in mode of administration (paper and pencil self-report, computer-administered self-report, and clinician-read self-report) there was variability in the method of administration of the PTSD-RI. Mode of administration is not recorded in the CDS, thus we could not examine issues related to interrater reliability or possible differences across modes of administration. As items related to PTSD Criterion A2 were not included in the PTSD-RI version of the CDS, we could not examine the relation between subjective aspects of exposure and PTSD-RI scores. Interrater reliability in the use of the functional/behavioral problems measures across providers was not assessed. It should be noted the effect sizes reported for the comparisons of PTSD-RI scores across age, sex, racial/ethnic groups, and single versus multiple trauma are small and may have achieved significance due to the large sample size.

There has been a steadily growing discussion in the literature on treatment outcome research in regard to the clinical significance of statistically significant change in scores on distress measures (Ferguson, Robinson, & Splaine, 2002; Jacobson, Follette, & Revenstorf, 1984; Jacobson & Truax, 1991; Nietzel & Trull, 1988; Schmitt & Fabio, 2004). This has spawned the increasing use of metrics (such as effect size, the Reliable Change Index, reduction of distress from a nonnormative to a

normative range, number needed to treat [NNT], and preventive fraction) in the evaluation of the effectiveness of intervention or treatment. The findings from this study regarding the association between PTSD-RI scores and increased odds ratios for functional/behavioral problems is an important step in linking PTSD-RI scores with other clinically significant indicators (Taylor & Weems, 2011). These associations also suggest a potential causal role of posttraumatic stress symptoms in regard to the development or maintenance of disturbances in behavior and functioning. Future studies from the CDS are planned to more specifically examine the independent contribution of PTSD-RI scores in addition to the type and details of traumatic experiences to a variety of outcomes.

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