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The Child Stress Disorders Checklist-Short Form: A 4-Item Scale of Traumatic Stress Symptoms in Children

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Abstract

Objective—To develop a user-friendly scale that measures traumatic stress responses in injured children. Though injured youth are at high risk for traumatic stress reactions and negative sequelae, there are limited options available for assessing risk, particularly in acute settings.

Method—Participants were children and adolescents (ages 6–18) hospitalized with burns or acute injuries ($N = 147$). During hospitalization, parents and nurses completed the Child Stress Disorders Checklist (CSDC), a 36-item observer-report measure of traumatic stress symptoms. Other established measures of child traumatic stress were completed by parents and children during hospitalization and 3 months post-injury. A brief version of the CSDC was created using standard psychometric scale development techniques. The psychometric properties of the resultant scale were compared to that of the original CSDC.

Results—A 4-item scale (CSDC-Short Form, CSDC-SF) emerged that demonstrated internal, inter-rater, and test-retest reliability and concurrent, discriminant, and predictive validity comparable to that of the full scale.

Conclusions—The CSDC-SF assesses traumatic stress reactions in injured children. Because the measure is very short and does not require specialized training for administration or interpretation, it may be a useful tool for providers who treat injured youth to identify those at risk for traumatic stress reactions.

Keywords

BRIEF; MEASURE; POSTTRAUMATIC STRESS DISORDER/PTSD; ACUTE STRESS DISORDER/ASD

Each year, millions of youth in the United States experience a medical trauma. In 2008, more than 8 million children and adolescents under the age of 18 were seen in hospital emergency rooms for injuries [1]. Numerous studies have demonstrated that medical trauma results in a range of psychological sequelae, with Acute Stress Disorder (ASD) or Posttraumatic Stress

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Disorder (PTSD) reportedly arising in 6–35% of cases, and subsyndromal ASD/PTSD developing in an additional 10–20% [2,3,4,5,6]. Both full and subsyndromal diagnoses are associated with substantial clinical distress and functional impairment [7].

Evidence suggests that untreated traumatic stress symptoms in childhood may persist for years, even into adulthood [8], often having debilitating consequences on development. For example, PTSD has been associated with decreased total and cerebral brain volume and attenuated frontal lobe asymmetry in children [9,10]. Furthermore, PTSD has been associated with increased risk for a variety of physical and mental disorders, including circulatory, endocrine, musculoskeletal, and digestive diseases, chronic health conditions (e.g. chronic fatigue), and substance abuse, eating disorders, and depression [11]. Though there are a number of empirically-supported interventions that have been shown to significantly reduce PTSD symptoms in traumatized children and adolescents [8,12], their effectiveness may be diminished as time from trauma exposure increases [13].

These data indicate a considerable need for tools that can accurately assess traumatic stress symptoms in at-risk children, particularly in the immediate aftermath of trauma exposure. Furthermore, these tools need to be accessible to providers working in settings where medically injured children are treated (e.g. emergency rooms, medical inpatient units, outpatient clinics). Specifically, measures need to (a) be short enough to be easily incorporated into busy acute clinical settings, (b) rely on sources that are readily available, and (c) require minimal training to administer and interpret. The need for such an instrument was highlighted by two recent surveys of pediatric emergency care providers [14] and primary care pediatricians [15]. The findings indicated that respondents severely underestimated the risk of traumatic stress reactions in injured children, were largely unaware of measures to assess risk for traumatic stress, and infrequently assessed for traumatic stress in their patients, citing time constraints as a major barrier.

Currently there are a number of instruments for assessing PTSD symptoms in children and adolescents. However, the majority are not meant to assess traumatic stress symptoms in the immediate aftermath of a trauma, and most rely on child report of symptoms, which may, by itself, be subject to reporting inaccuracies due to cognitive immaturity, lack of insight, or other factors [16]. One exception is the Child Stress Disorders Checklist (CSDC) [17], a 36-item observer-report measure designed to assess PTSD symptoms as well as ASD symptoms in children and adolescents. The CSDC has demonstrated adequate reliability and validity in assessing traumatic stress symptoms in burned children and children injured in a traffic crash, including high test-retest reliability ($r = .84$), moderate inter-rater reliability between parents and nurses ($r = .44$), and moderate correlations with a variety of established traumatic stress instruments (r s ranged from .26 to .59) [17]. The purpose of the current study was to develop a psychometrically comparable short version of the CSDC that could be utilized in settings where injured children are treated to identify quickly and easily children at risk for traumatic stress reactions. Furthermore, the current study extends prior work on the CSDC by examining the psychometric properties of the instrument in a larger sample of children with a greater variety of traumatic injuries.

Method

Participants

Data obtained from two samples of children admitted to two Boston hospitals were used to develop and test the short version of the CSDC. One sample consisted of children admitted for burn-related injuries, and the second of children admitted for a variety of injuries, including motor vehicle accidents, falls, and interpersonal violence. Prior to study enrollment, written informed consent was obtained from all adult participants and, when appropriate, written assent

was obtained from child and adolescent participants. All procedures were reviewed and approved by the institutions' respective Institutional Review Boards.

Children with Burns—Participants ($n = 32$) consisted of children ages 6 to 17 years ($M = 11.44$, $SD = 3.55$) admitted to Shriners Burn Hospital in Boston for an acute burn and enrolled in a study of risk factors for the development of PTSD following a burn injury. All children admitted to the hospital were eligible for the study unless they or their parents did not speak sufficient English to complete the study protocol. Families were approached to participate in the study by a trained researcher once the child was deemed medically stable. Approximately 80% of the families approached agreed to participate. Forty-one children were enrolled, with 32 providing data necessary for the current analyses. Table 1 presents participant demographic information.

Children with Injuries—Participants ($n = 115$) consisted of children ages 7 to 18 years ($M = 13.57$, $SD = 3.39$) admitted to Boston Medical Center for an injury and enrolled in a study of risk factors for the development of PTSD following an acute injury. All families with a child admitted for an injury were eligible unless they met one or more of the following exclusion criteria: (a) the child had a Glasgow Coma Scale at 7 or below upon admission, indicative of a severe head trauma, which may have interfered with completion of study assessments and/or validity of responses; (b) the child and/or parent(s) did not speak sufficient English to complete the study measures; and/or (c) the family lived more than two hours from the hospital, which would have interfered with completion of follow-up measures. Once the attending surgeon determined that the child was medically stable, a trained researcher approached the family and asked if they would like to participate in the study. Of the 338 children referred to the study, 10% were deemed ineligible, 22% were discharged before the study assessment could be administered, 20% declined, and 48% consented. One hundred fifteen families provided data necessary for the current analyses. Cause of injury varied, with 25% the result of motor vehicle accident, 25% pedestrian struck by car, 23% assault (stabbed, shot), 15% fall, and 12% other (e.g. sports injury, near suffocation). Table 1 presents participant demographic information.

Measures

The Child Stress Disorders Checklist (CSDC)—The Child Stress Disorders Checklist (CSDC) [17] is a 36-item observer-rated measure of traumatic stress symptoms. The measure consists of 1 traumatic event item, 5 immediate response items, and 30 symptom items. Each of the symptom items is rated on a 3-point scale (0 = “not true,” 1 = “somewhat true,” 2 = “very true”). The 30 symptom items were used in the current analyses to develop the short version of the scale. These items assess symptoms corresponding to the various DSM-IV domains for PTSD: reexperiencing (7 items), avoidance (5 items), numbing and dissociation (8 items), increased arousal (6 items), and impairment in functioning (4 items). A prior examination of the CSDC, which included the burn participants, demonstrated reliability and validity of the symptomatology total score [17].

The Child PTSD Reaction Index (CPTSD-RI)—The Child PTSD Reaction Index (CPTSD-RI) [18,19] is a 20-item semi-structured interview that assesses posttraumatic stress symptoms in children. The measure has demonstrated high test-retest reliability and construct validity, discriminating between children with and without PTSD.

The Child Behavior Checklist (CBCL)—The Child Behavior Checklist (CBCL) [20] is a 118-item observer-completed measure of children's behavioral and emotional problems. It provides standardized ratings and descriptive information of children's symptoms grouped into a variety of internalizing and externalizing scales. For this study, two scales from the CBCL

were used. Wolfe and Brit [21] created a 23-item PTSD scale from items on the CBCL to overlap with DSM-III PTSD symptoms. This PTSD scale has demonstrated high internal consistency and significant correlations with several scales from the Children's Impact of Traumatic Events Scale-Revised and a self-report measure of PTSD in children [22]. The measure has been shown to discriminate between children who have and have not been sexually abused [21], and to decline between pre- and post-treatment among children treated for PTSD diagnosed using DSM-IV criteria [23]. In addition, the CBCL Delinquency scale, which was not expected to be associated with PTSD symptomatology, was used for the purpose of assessing discriminant validity.

The Diagnostic Interview for Children and Adolescents (DICA)—The Diagnostic Interview for Children and Adolescents (DICA) [24] is a semi-structured interview that assesses parent- and child-report of children's diagnostic status for a variety of DSM-IV diagnoses. For this study, the PTSD module was used. The PTSD module has demonstrated high reliability and validity across a variety of settings. Responses were scored for number of PTSD symptoms endorsed and whether criteria were met for a diagnosis of PTSD.

Procedures

Participants in the burn sample ($n = 32$) and injury sample ($n = 115$) followed similar protocols. In both samples, participants were administered a number of measures during their hospital stay. Parents completed the CSDC and CBCL and children completed the CPTSD-RI. When possible, the child's nurse was administered the CSDC to examine inter-rater reliability ($n = 98$), and parents were re-administered the CSDC two days following the initial assessment to examine test-retest reliability ($n = 33$). Approximately 3 months following the acute assessment, families were invited to complete a follow-up assessment, which included re-administration of the CSDC and CBCL to parents and the CPTSD-RI to children, and administration of the DICA to both parents and children. Approximately 71% of the participants completed the 3-month assessment. Participants who did and did not complete the follow-up assessment did not differ on type of injury (burn or other injury), $\chi^2(1, 204) = 2.21$, $p = .14$; gender, $\chi^2(1, 202) = 1.42$, $p = .23$; race/ethnicity, $\chi^2(6, 202) = 7.53$, $p = .27$; age, $t(200) = .43$, $p = .67$; or PTSD symptoms at the acute assessment as measured by child-report on the PTSD-RI, $t(198) = -.62$, $p = .54$ or parent-report on the CSDC, $t(144) = .93$, $p = .35$. All assessments were conducted by a psychiatrist or researcher with a Master's degree in psychology, trained to reliability on the DICA. Participants from Boston Medical Center were paid \$50 for participation in each of the assessments.

Data Analytic Approach

Participants in the burn sample and in the injury sample were combined for data analysis purposes, as previous theoretical work and empirical studies examining responses to medical traumas have combined such groups [25,26]. Moreover, an examination of the psychometric properties of the original CSDC with the sample of burn injured children and a sample of children injured in motor vehicle accidents showed that the CSDC was internally consistent across these test populations [17]. Furthermore, within the current study, there were no differences between the burn sample and the injury sample on mean scores on any of the traumatic stress measures administered at the acute assessment.

Using standardized methods for scale development [27], a short form of the CSDC was developed from the CSDC parent-report data gathered at the acute assessment. Specifically items were identified that performed well on selection criteria, as described by DeVellis [27], including item mean, scale mean if item deleted, item standard deviation, scale variance if item deleted, corrected item-total scale correlation, and scale coefficient alpha if item deleted. The shortest scale with an alpha coefficient $\geq .80$ ("very good" criteria for acceptable bounds for

alpha) was then subjected to reliability and validity analyses. The reliability and validity of the short scale were compared to that of the 30-item scale. Due to the non-normality of the data, non-parametric tests were employed.

Results

Step 1: Develop Short Form of CSDC

Due to the nature of the scale development procedures, only participants whose parents provided responses to all 30 items on the CSDC were included in Step 1 ($n = 120$). Among the parents who were administered the CSDC but who did not provide complete CSDC data, 70% skipped 1 item, 11% skipped 2–3 items, and 19% skipped 4 or more items. Children whose parents did and did not provide complete CSDC data did not differ on any of the study variables.

Using parents' response data to the 30-item CSDC, 6 items were identified that performed well on the item selection criteria. After pilot testing an earlier version of the scale, two of the items ("child avoids talking about the injury" and "child tries to avoid thinking about the injury") were eliminated due to concerns reported from scale administrators about the difficulty observers had in assessing these symptoms. The remaining 4-item combination resulted in an alpha coefficient of .82. All 3-item scales had alphas below .80. Therefore, the 4-item scale was submitted to the next step of reliability and validity testing. Table 2 displays the items in the 4-item scale along with a mnemonic for remembering the items.

Step 2: Compare Reliability and Validity of 4-item CSDC Scale to 30-item CSDC Scale

Reliability

Reliability of the 4-item scale was examined by calculating Cronbach's alpha coefficients and test-retest and inter-rater reliability coefficients. As shown in Table 3, the 4-item scale performed comparably to the 30-item scale on internal consistency, test-retest reliability, and inter-rater (parent-nurse) reliability. The 4-item scale was highly correlated with the 30-item scale ($r_s = .85, p < .001$).

Validity

Concurrent and discriminant validity: To assess concurrent validity, the 4-item and 30-item scale scores from the acute assessment were correlated with other measures of traumatic stress symptoms assessed concurrently. As shown in Table 4, the 4-item scale performed similarly to the 30-item scale. Follow-up analyses examining confidence intervals for the correlation coefficients revealed no significant differences in the magnitude of correlation coefficients between the 4-item and 30-item scales and any of the concurrent traumatic stress measures. Only the 4-item scale did not correlate significantly with the discriminant validity measure of delinquency symptoms.

Predictive validity: To assess predictive validity, the 4-item and 30-item scale scores from the acute assessment were correlated with other measures of traumatic stress symptoms assessed at the 3-month follow-up assessment. As shown in Table 4, the acutely administered 4-item scale performed similarly to the 30-item scale in predicting 3-month follow-up scores. Follow-up analyses examining confidence intervals for the correlation coefficients revealed no significant differences in the magnitude of correlation coefficients between the acute 4-item and 30-item scales and any of the follow-up traumatic stress measures. Furthermore, children who met criteria for PTSD at 3 months¹ ($n = 17$) had significantly higher scores on the parent-report 4-item scale at the acute assessment and at the 3-month assessment compared to children who did not meet criteria ($n = 83$) by Mann-Whitney U analyses: with PTSD $M = 3.00, SD = 2.67$, without PTSD $M = 1.55, SD = 2.25, Z = -2.41, p = .02$ at acute assessment; with PTSD

$M = 3.00$, $SD = 2.71$, without PTSD $M = 1.05$, $SD = 1.55$, $Z = -2.58$, $p = .01$ at 3-month assessment.

Discussion

The objective of the current study was to develop a very short, reliable, and valid measure that assesses risk for traumatic stress symptoms in youth following a medical trauma. The resultant 4-item Child Stress Disorders Checklist-Short Form (CSDC-SF) was derived from the 36-item Child Stress Disorders Checklist (CSDC). The CSDC-SF evidenced psychometric properties equivalent to those of the previously validated CSDC, including comparable reliability and concurrent, discriminant, and predictive validity.

Acute Stress Disorder (ASD) and Posttraumatic Stress Disorder (PTSD) can have long-term negative consequences on child mental and physical health and development if left untreated [11]. Experiencing a medical trauma has been identified as a significant risk factor for the development of ASD and PTSD, leading some to conclude that routine psychological assessment and treatment should become standard practice in pediatric trauma care [28]. The first step to obtaining appropriate treatment is identification of symptomatic and at-risk youth. However, recent data suggest that pediatric emergency care providers [29] and primary care pediatricians [30] infrequently assess for traumatic stress in their patients, citing time constraints as a major barrier. The short length of the CSDC-SF may help to address this barrier and increase the likelihood that physicians will incorporate measurement of traumatic stress into their clinical assessments, though this remains to be tested empirically. Importantly, screening for traumatic stress should only be implemented in settings where suitable referral procedures are established to provide appropriate follow-up care for identified youth.

The CSDC-SF complements a growing body of instruments available for frontline healthcare clinicians to assess PTSD symptoms in children (e.g. CTSQ [31], CTSQ-HR [32], STEPP [33]) and adults [34,35,36] (see Brewin [37] for general review of PTSD screens). Whereas currently available child measures utilize self-report (CTSQ) or a mixture of self- and parent-report and medical record information (CTSQ-HR; STEPP), the CSDC-SF relies solely on observer report. Therefore, the CSDC-SF may be particularly useful when self-report and/or medical record data are not available and/or when the accuracy of the child's report of symptoms is in question (e.g. due to lack of understanding, insight, or ability or willingness to report symptoms accurately). The CSDC-SF may be most useful when utilized in conjunction with a self-report measure. A number of studies indicate that parent-child agreement regarding child ASD/PTSD symptoms following an acute medical injury is relatively poor in the immediate aftermath of the trauma, with increasing agreement over time [28,38,39]. These patterns have led many to conclude that children and parents offer different clinical information and to recommend the use of data from multiple reporters to assess child ASD/PTSD [28,38,39].

Of note, there is some evidence that assessing a few key traumatic stress symptoms in the immediate aftermath of a medical trauma may be as effective in predicting the development of PTSD as conducting a full diagnostic interview [40]. Therefore, a measure such as the CSDC-SF may prove as accurate as a clinical interview without the time or expertise demands. Also, while the CTSQ, CTSQ-HR, and STEPP were designed to predict the development of PTSD symptomatology, the CSDC-SF was demonstrated to be useful in assessing current ASD

¹Diagnostic status was based on child self-report. All children who met criteria for PTSD based on parent-report also met criteria based on self-report. There were an additional 6 children who met criteria for PTSD based on self-report but not parent-report. Also, there were 10 children who completed the DICA whose parents did not complete the DICA. Therefore, using child self-report for diagnostic status maximized the available data, classified all children who met criteria by parent and/or child report as having a positive diagnosis, and allowed for an examination of the predictive value of the 4-item CSDC to diagnostic status without reporter bias (that is, there were different reporters for the CSDC [i.e. the parent] and for the DICA [i.e. the child]).

or PTSD symptoms as well as predicting the development of PTSD symptoms. The CSDC-SF offers some benefits over the original CSDC, most notably its considerably shorter length. Moreover, the items included in the CSDC-SF are all fairly easily observable, whereas the CSDC contains a number of items that are highly relevant to a diagnosis of PTSD but also more challenging to observe (e.g. “child seems numb or distant from his/her emotions”) or difficult to assess in the acute setting (e.g. “child avoids places that remind him or her of the injury”) and therefore more vulnerable to reporting inaccuracies.

Limitations

Though this study examined the psychometric properties of the CSDC-SF in a larger and more varied sample than the study examining the psychometric properties of the original CSDC, the current sample size was relatively small. Larger sample sizes would allow for a detailed examination of any age, gender, race, or ethnicity effects on the psychometric properties of the measure. Such work is necessary to determine if the items perform differently across various demographic groups. The current sample included youth from 6 to 17 years of age but was skewed toward older children and adolescents. Younger children may express their traumatic stress symptoms differently than older children [16]. Therefore, the performance of the CSDC-SF should specifically be tested in different age groups. Of note, data from the National Center for Injury Prevention and Control indicate that the ratio of male to female participants in the current samples reflects the gender distribution among youth hospitalized for injuries [1]. Studies that recruit a more balanced ratio of male to female participants may be better positioned to examine potential gender differences in the psychometric properties of the CSDC-SF. Also, while the current study assessed a wider variety of traumatic injuries than the original CSDC study, the current study sample was restricted to youth who had experienced a burn or injury. The current results do not indicate whether the CSDC-SF would be valid among children who have experienced other types of traumatic events.

Future Directions

This study is the first step in the development and validation of a 4-item observer measure to assess presence of or risk for ASD/PTSD in children. Due to the ease of use, the CSDC-SF has potential for more widespread utility, and future work should continue to explore the psychometric properties of the measure so that its validity in various settings among different populations may be established. Specifically, as noted above, the measure should be tested in larger, demographically diverse samples that will allow for an examination of possible developmental, race/ethnicity, and gender effects in the functioning of the instrument. Future work should also include one or more control samples of children who have not experienced a traumatic event to further examine the measure's validity. The CSDC-SF should also be tested in other traumatized populations (e.g. due to maltreatment, witnessing violence), in different settings (e.g. pediatric clinics, schools, outpatient clinics), and with reporters other than parents who may be able to report on child symptoms (e.g. teachers, therapists) to determine if the measure may have broader utility. These steps may be accomplished through a multi-site trial that assesses the psychometric properties of the CSDC-SF, independent from the original CSDC, among a diverse sample of traumatized youth. A large, randomized control trial may evaluate whether the CSDC-SF can be used to effectively screen for present or emergent traumatic stress and whether referrals and treatment for youth identified at risk decrease later psychological morbidity. Such a study may also examine whether the predictive value of the CSDC-SF is increased when used in conjunction with other relevant clinical material (e.g. child self-report of symptoms, medical data, child's prior psychological functioning, degree of family support). As with the original CSDC, there is no clinical cutoff score with the CSDC-SF; rather, higher scores suggest greater risk. Larger studies may examine whether the efficiency of identifying at-risk children is aided by use of a cutoff score by examining the measure's sensitivity and specificity with different cutoff scores. By increasing the availability of valid,

user-friendly assessment tools for ASD and PTSD symptoms in children and adolescents, the likelihood that at-risk youth will be evaluated early and referred for treatment to prevent the long-term negative sequelae of trauma exposure may be increased.

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1. .

Table 1

Participant Demographics

	Burn Participants (n = 32)	Injury Participants (n = 115)	Total (N= 147)
Gender (% Male)	75.0%	73.0%	73.5%
Race/Ethnicity			
White	75.0%	41.7%	49.0%
Black	12.5%	40.0%	34.0%
Hispanic	6.3%	15.7%	13.6%
Asian	0%	0.9%	0.7%
Native American	3.1%	0%	0.7%
Multi-racial	3.1%	0.9%	1.4%
Other	0%	0.9%	0.7%
Age	11.44 (3.55) years	13.57 (3.39) years	13.11 (3.52) years
Length of Hospital Stay	24.97 (21.51) days	6.03 (5.93) days	10.18 (13.72) days

Table 2

Child Stress Disorders Checklist-Short Form (CSDC-SF) Items

Scale Items	CSDC-SF Mnemonic
0 = not true 1 = somewhat true 2 = very true	
1. Child reports more physical complaints when reminded of the trauma (headache, stomachache, nausea, difficulty breathing, etc.).	P hysical complaints when reminded of trauma.
2. Child avoids doing things that remind him or her of the trauma.	T ries to avoid doing things that are reminders of trauma.
3. Child startles easily. For example, he or she jumps when hears sudden or loud noises.	S tartles easily.
4. Child gets very upset if reminded of the trauma.	D istressed if reminded of trauma.

Table 3

Reliability Analyses for the 4-Item and 30-Item CSDC Scales

	4-Item Scale	30-Item Scale
Cronbach's α	.82	.93
Test-retest reliability	.89 ^{***}	.86 ^{***}
Inter-rater reliability	.43 ^{***}	.27 [*]

*
 $p < .05$.

 $p < .001$.

Table 4

Concurrent, Discriminant, and Predictive Validity of the Parent-Report 4-Item CSDC Scale Compared to the 30-Item CSDC Scale

Measure	4-Item Scale, Acute	30-Item Scale, Acute
<i>Concurrent Validity</i>		
CPTSD-RI	.29**	.26**
CBCL-PTSD	.34***	.47***
<i>Discriminant Validity</i>		
CBCL-Delinquency	.15	.28**
<i>Predictive Validity (3 Months)</i>		
CPTSD-RI	.17	.18 ⁺
CBCL-PTSD	.29*	.31**
DICA PTSD Symptoms		
Child-rated	.31**	.35**
Parent-rated	.53***	.58***

⁺ $p < .10$.

* $p < .05$.

** $p < .01$.

*** $p < .001$.