Psychometric Properties of the Child's Reaction to Traumatic Events Scale-Revised in English and Lugandan

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Abstract Brief and age-appropriate measures of trauma-related symptoms are useful for identifying children in need of clinical services. The current study examines the psychometric properties of the 23-item Child's Reaction to Traumatic Events Scale-Revised (CRTES-R). The CRTES-R includes subscales assessing hyperarousal, avoidance and intrusion. To date, no studies have examined the psychometric properties of this revised measure or cross-cultural differences in its factor structure. Two samples of (a) children (ages 6–21) who had experienced a hurricane in the USA or Grenada ($N = 135$), and (b) Ugandan children (ages 8–17) who had experienced a variety of traumatic events ($N = 339$) completed the CRTES-R in English or Lugandan. Confirmatory factor analysis supported an empirically adjusted model with three modified latent factors in both the English ($\chi^2/df = 1.34$, CFI = .90, RMSEA = .05) and Lugandan samples ($\chi^2/df = 1.45$, CFI = .93, RMSEA = .04). Although the analysis supported separate hyperarousal,

avoidance and intrusion subscales, the items that loaded on each factor differed from the original CRTES-R subscales. The English version of the CRTES-R showed good concurrent validity with the Kauai Recovery Index measure of trauma symptoms. Those using the CRTES-R to assess children's experiences of the different symptom types should consider using the empirically-derived subscales described in this paper; however, those who wish to capture a broad spectrum of PTSD symptoms should consider using all the original CRTES-R items and calculating a total score.

Keywords Traumatic stress · Children · Psychometrics · CRTES-R · Cross-cultural

Introduction

Only in recent years have researchers begun to examine experiences of trauma in children (Foa et al. 2001). Several scales have been developed to assess trauma-related symptoms in children, including the Child Post-Traumatic Stress Disorder Reaction Index (CPTSD-RI; Federick et al. 1992), the Child Report of Post-Traumatic Symptoms (CROPS; Greenwald and Rubin 1999), the Children's PTSD Inventory (CPTSDI; Saigh et al. 2000) and the Child PTSD Symptom Scale (CPSS; Foa et al. 2001). Foa et al. (2001) suggest that brief self-report instruments that assess PTSD symptoms in children may be useful; particularly in situations when clinicians are not available to assess children one-on-one, these instruments can be used to identify the children most in need of clinical resources.

The Child's Reaction to Traumatic Events Scale (CRTES; Jones 1996) is a self-report measure of children's response to trauma. Designed as a child appropriate version of the Horowitz Impact of Events Scale (IES; Horowitz

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et al. 1979), the CRTES assessed two of the three core symptoms of PTSD: avoidance and intrusion. Both the IES and CRTES were subsequently revised to include hyperarousal symptoms of PTSD (IES-R, Weiss and Marmar 1997; CRTES-R, Jones et al. 2002). The IES-R uses a five-point response scale to assess the amount of distress caused by symptoms. In contrast, the revised 23-item CRTES-R, examines children's reports of the frequency of symptoms on a four-point scale (0 = *not at all*, 1 = *rarely*, 3 = *sometimes*, 5 = *often*). The use of the four-point response scale in the CRTES-R is consistent with the original IES.

As a child version of the IES-R, the content of the CRTES-R is largely the same. Of the 23 CRTES-R items, six items are taken directly from the IES-R and 12 items include minor wording changes that were intended to make the questions more appropriate for children. The CRTES-R contains a single item that examines problems falling and staying asleep, unlike the IES-R which splits the sleep item into two separate questions examining trouble staying asleep (symptom of intrusion) and trouble falling asleep (symptom of hyperarousal). The CRTES-R contains three separate items examining physical reactions to reminders of the traumatic event, while the IES-R contains a single item that lists several different physical reminders (e.g. sweating, trouble breathing, nausea or pounding heart).

The CRTES-R is similar to the Children's Revised Impact of Event Scale (CRIES; Smith et al. 2003) which was also designed to be a child version of the IES-R. Unlike the CRTES-R, the CRIES contains only 13 items examining symptoms of avoidance, intrusion and arousal. Items that might be misinterpreted by children or ambiguous were dropped from the CRIES during its development. For example, a factor analysis of the IES in a sample of children who had experienced war, identified two items that did not load on either the avoidance or intrusion factors (Dyregrov et al. 1996). In addition, two items that were intended to measure avoidance were found to load on the intrusion factor. These items are not included in the CRIES.

Currently there are limited and inconsistent data available on the factor structure of these three revised versions of the IES (i.e., the IES-R, CRTES-R and CRIES). Data from the CRIES has indicated a three-factor solution (i.e., avoidance, intrusion and arousal; Giannopoulou et al. 2006; Lau et al. 2013; Zhang et al. 2011) or a two-factor solution (i.e., avoidance, and intrusion + arousal; Chen et al. 2012). Studies using the IES-R in adults have identified two (Creamer et al. 2003; Smith et al. 2003), three (Asukai et al. 2002), and four factor solutions (Baumert et al. 2004; Gargurevich et al. 2009; King et al. 2009). For example, in addition to intrusion, arousal and avoidance, some studies have suggested dysphoria, described as

"general distress" (Palmieri et al. 2007), may be an additional factor of PTSD symptoms (Elklit et al. 2010; Hassija et al. 2012; Palmieri et al. 2007). Others have found emotional numbing may be an important component of PTSD (Asukai et al. 2002; King et al. 2009). Currently, it is not clear whether a numbing model or dysphoria model may better capture PTSD symptomology (Marshall et al. 2013).

There is currently limited data available about the psychometric properties of the CRTES-R. The internal consistency and the factor structure of the original CRTES have been examined (Jones 1996; Jones et al. 2003a), supporting a two-factor solution (intrusion, 35.5 % of the variance, avoidance, 11.0 % of the variance). Both the intrusion ($\alpha = .84$) and avoidance subscales ($\alpha = .72$) have been found to demonstrate respectable-to-very good internal consistency (Jones 1996). The psychometric properties of the CRTES-R have yet to be established. Given the lack of data on the CRTES-R, the aim of the current study is to examine the dimensionality and internal consistency of the revised measure. Data were provided by two recent studies that employed the CRTES-R as a measure of PTSD symptoms (Joseph 2006; Lamphear et al. 2008).

In the past, the CRTES has been used among English-speaking children from the United States in studies examining PTSD symptoms following residential and wild fires (Jones and Ollendick 2002; Jones et al. 1994). The aim of the current study was to examine the psychometric properties of the CRTES-R in two diverse samples. In study 1, a Lugandan language version of the CRTES-R was administered to a group of children in Uganda (Lamphear et al. 2008). In study 2, an English version of the CRTES-R was administered to a sample of children from the USA and Grenada (Joseph 2006). Items translated into different languages and used across cultures sometimes take on different meanings (Manrique Millones et al. 2013), and there is evidence to suggest that culture affects an individual's experience of trauma symptoms (Hinton and Lewis-Fernández 2010). For instance, some have suggested that flashbacks as a result of PTSD are unique to Western cultures (Jones et al. 2003b). Further, the factor structure of PTSD symptoms in African adults differs from the factors suggested by the DSM-IV developed using European and American samples (Rasmussen et al. 2007). Given these potential language and cultural differences, the current study explored the factor structures of the Lugandan and English versions of the measure separately. Differences in experiences of trauma symptoms between the two samples were also investigated. In addition, the validity of the CRTES-R was examined by comparing CRTES-R responses to another measure of PTSD symptoms, the Kauai Recovery Inventory (KRI; Hamada et al. 2003).

Method

Study 1: Lugandan CRTES-R Data

Participants

In total, 348 children and adolescents between 8 and 18 years of age were recruited from rural orphanage-based schools in the Rakai and Masaka districts of Uganda. The sample included children who lived at the school either because they had been orphaned or abandoned, as well as children who attended the school as day students and lived in the community with their family. The CRTES-R was administered to children at high risk of PTSD symptoms, including children reporting death of family members, disease, abandonment and neglect. Children were excluded from the study if their parent(s) had died within the past 6 months ($n = 9$). A total of 339 students aged between 8 and 17 completed the CRTES-R ($M = 10.9$ years, $SD = 2.67$). The majority of the sample was female (58.8 %). Consent from the primary caregiver and assent from the child were obtained before a child participated in the study.

Procedure

All of the questions were translated from English into Lugandan by translators who spoke Lugandan as their primary language. The translated questionnaire was back-translated into English, and compared with the original version. Any discrepancies were resolved by at least two translators.

Before completing the CRTES-R, the children participated in a semi-structured interview that assessed experiences of current and past traumatic events and life challenges. The sample reported high levels of multiple stressful events, including the death of one or both parents (74.3 %), having to care for sick relatives (67.8 %), experiencing conflict and violence (50.9 %), and/or being abandoned by relatives (45.1 %). Participants were asked to select the one event that bothered them the most or was most disturbing or upsetting when completing the CRTES-R.

The most commonly reported distressing event was the loss of one or both parents (45.9 %). In total, 17.1 % children reported lacking basic needs (e.g. food, shelter, clothes, shoes), 14.4 % reported not being able to afford school fees or school-related supplies, 4.6 % separation from their parent(s), 4.9 % experienced illness (i.e., malaria), 3.1 % experienced the death of a family member, 3.7 % reported abuse or neglect, and 2.2 % reported coping with the illness of a parent or family member. Children

who reported ambiguous problems or those who did not state a specific problem were excluded from the analysis ($n = 21$).

Study 2: English CRTES-R Data

Participants

Data were collected from 135 children and young adults, 107 female and 28 male, between the ages of 6 and 21 ($M = 12.29$, $SD = 3.02$). The participants in the sample were affected by one of two hurricanes: Hurricane Ivan or Hurricane Katrina. The Hurricane Katrina participants included 32 females and 28 males between the ages of 6 and 21 years old. The majority of participants in this subsample were African American (75 %), 11.7 % were of Caucasian/European decent, 5 % were Hispanic or Latino, 3.3 % were Asian/Pacific Islander, and 5 % reported their ethnicity as “other”. The Hurricane Ivan subjects included 75 females, ranging in age from 11 to 19 years old, ($M = 13.71$ years, $SD = 1.59$). Ninety-six percent of the sample was Afro-Caribbean, and 4 % was multiracial.

Procedure

Participants were recruited through schools in Houston, Texas, and Grenada. Parents were contacted through the schools and provided with information about the study. Both parental consent and child assent were required for a child to participate in the study; participants 18 years and older completed consents. All participants completed the CRTES-R as a measure of their reaction to the hurricane they experienced. Along with the CRTES-R, participants also completed the Kauai Recovery Inventory (KRI; Hamada et al. 2003). The KRI provides a measure of trauma symptoms in the past seven days, specifically in response to a hurricane, and is based on criteria B, C, and D of the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (American Psychiatric Association 2000). The KRI has been shown to be reliable and valid (Hamada et al. 2003) and has been used in past studies examining traumatic responses to hurricanes (Chemtob et al. 2002a, b). The KRI has three subscales intended to measure intrusion, hyperarousal, and avoidance symptoms.

Analysis Plan

Data was analyzed using the structural equation modeling software EQS (Version 6.1, Multivariate Software, Inc.; Bentler 2003). An initial theoretical model using the three proposed factors of intrusion, avoidance, and hyperarousal with all three-factors correlated was estimated on the larger

of two samples (i.e., the Lugandan data) to assess model fit. No missing data were present within either of the two samples and Maximum Likelihood (ML) covariance estimation methods were used throughout. As recommended by Hu and Bentler (1999) and Browne and Cudeck (1993), multiple fit indices were used to determine how well the proposed factor structures fit the observed data. The following fit indices were evaluated using suggested value guidelines: (a) Chi square (values should not be significant, but in larger samples this is often not feasible); (b) Chi square/degree of freedom (χ^2/df) ratio (values should be <3.0 ; Kline 1998); (c) comparative fit index (CFI; values should be $\geq .90$); and (d) root-mean-square error of approximation (RMSEA; values should be $\leq .05$). The initial model was subsequently adjusted using Lagrange Multiplier test results as provided by EQS to yield the final empirically adjusted (EA) model. As a final validation step we estimated the final model on the smaller sample (i.e., English sample) to assess its generalizability.

Results

Data Screening

Variables were examined for normality using EQS-generated mean, standard deviation, skewness, and kurtosis values as well as using Mardia's coefficient for examining multivariate kurtosis. In the larger Ugandan sample univariate skewness $\leq |1.23|$ and univariate kurtosis $\leq |1.52|$ suggesting possible univariate nonnormality (Bulmer 1979). Mardia's coefficient = 34.63, again suggesting possible non-normality (Bentler and Wu 1993). In the smaller English sample univariate skewness $\leq |3.60|$ and univariate kurtosis $\leq |13.73|$ giving strong indication of non-normality that was supported by Mardia's coefficient = 149.69. For these reasons, we utilized robust statistics throughout the reported analyses to account for any non-normal features of the data.

Initial Theoretical Three-Factor Model

Based on the original CRTES and the IES-R (Jones 1996; Weiss and Marmar 1997), the initial model was specified to have three latent factors that were correlated, but loaded almost exclusively on unique CRTES-R items (Fig. 1). Using ML estimation and robust methods, this model failed to meet three of the four suggested fit guidelines with Satorra-Bentler scaled χ^2 ($227, N = 453$) = 452, $p < .001$ (i.e., unmet guideline); $\chi^2/df = 1.99$ (i.e., met guideline); CFI = .85 (i.e., unmet guideline); RMSEA = .06 (i.e., unmet guideline). Nevertheless, this model did show significant improvement over the independence model (i.e.,

fully restricted model with no variables correlated), for which χ^2 ($253, N = 453$) = 1708.01, $p < .001$, and $\chi^2/df = 6.75$. Furthermore, all items in the model were found to significantly load onto the proposed latent factors.

Empirically Adjusted Three-Factor Model

Following the evaluation of the initial model, we utilized empirical methods (i.e., Lagrange Multiplier Test) to evaluate possible alterations to the model. The empirically adjusted (EA) model (Fig. 2) revealed improved fit and met three of the four suggested fit guidelines with Satorra-Bentler scaled χ^2 ($217, N = 453$) = 314.93, $p < .001$ (i.e., unmet guideline); $\chi^2/df = 1.45$ (i.e., met guideline); CFI = .93 (i.e., met guideline); RMSEA = .04 (i.e., met guideline). However, one item (CRTES-R item 2) did not significantly load onto any of the three latent factors in this model with marginal loading onto its hypothesized latent factor. Furthermore, five items cross-loaded on more than one latent factor (i.e., CRTES-R items 14, 18, 19, 20 and 23).

As a final validation step, we evaluated the EA model on a separate, smaller, sample of CRTES responders (i.e., the English sample). On the alternate sample, the model still revealed good fit, meeting the same three of the four fit guidelines with Satorra-Bentler scaled χ^2 ($217, N = 156$) = 289.86, $p < .001$ (i.e., unmet guideline); $\chi^2/df = 1.34$ (i.e., met guideline); CFI = .90 (i.e., met guideline); RMSEA = .05 (i.e., met guideline).

Concurrent Validity

Pearson correlation coefficients between scores on the CRTES-R and KRI were used to examine the concurrent validity of the CRTES-R using the English sample (Table 1). CRTES-R subscales were calculated by summing the items from each of the three theoretical subscales, as well as from summing items from the three modified subscales indicated by the EA model. The six CRTES-R items that cross loaded, or did not load on a latent factor were not included in a subscale. There was a strong positive correlation between total scores on the two measures ($r(134) = .63, p < .001$). The theoretical avoidance subscale on the CRTES-R was most strongly correlated with the avoidance subscale on the KRI ($r(134) = .51, p < .001$). The theoretical CRTES-R intrusion subscale was most strongly correlated with the intrusion subscale on the KRI ($r(134) = .63, p < .001$). The theoretical hyperarousal subscale on the CRTES-R was more strongly correlated with the intrusion and avoidance subscales on the KRI rather than the hyperarousal KRI subscale. The subscales derived from the EA model demonstrated the same pattern.

Fig. 1 Original CRTES-R
3-factor model

CRTES-R Subscale Correlations

Pearson correlation coefficients were calculated to examine the relation between the CRTES-R subscales, based on the theoretical subscales and EA model (Table 1). For the Lugandan data, the theoretical avoidance subscale was weakly positively correlated with intrusion ($r = .25$, $p < .001$), while intrusion and hyperarousal were strongly positively correlated, ($r = .64$, $p < .001$). Hyperarousal was not significantly associated with avoidance ($r = .08$, $p = .19$). A similar pattern was found for the subscales derived from the EA model. In comparison to the Lugandan data, the relationship between subscales was stronger

for the English version. For example, the theoretical subscales were all positively correlated ($.60 < r < .67$), as were the EA model subscales ($.45 < r < .68$, $p < .001$).

Internal Consistency

Coefficient alphas were calculated to examine the internal consistency of the subscales (Table 2). For the Lugandan data, the theoretical CRTES-R subscales demonstrated undesirable to respectable internal consistency ($.61 < \alpha < .81$) (DeVellis 2003). The CRTES-R subscales derived from the EA model also demonstrated unacceptable to respectable internal consistency ($.42 < \alpha < .76$) (DeVellis 2003).

Fig. 2 Empirically adjusted CRTES-R model. *Solid arrows* indicate positive factor loadings. *Dotted lines* indicate negative loadings

For the English data, the theoretical intrusion ($\alpha = .84$) and avoidance ($\alpha = .74$) subscales demonstrated higher internal consistency than did the Lugandan version. The CRTES-R hyperarousal subscale derived from the Lugandan EA model ($\alpha = .70$) also demonstrated higher internal consistency than the English version.

Comparison of English and Lugandan Samples

Independent t tests (also Table 2) were used to examine whether the USA/Grenada sample and Ugandan sample differed on their total scores and subscale scores on the CRTES-R. The Ugandan children received higher total scores ($M = 54.7$, $SD = 18.6$) on the CRTES-R compared to the USA/Grenada

participants ($M = 28.4$, $SD = 21.3$), $t(430) = 12.96$, $p < .001$. The Ugandan children scored higher on all of the theoretical subscales (intrusion, $t(445) = 15.53$, $p < .001$; hyperarousal, $t(333.36) = 10.25$, $p < .001$; avoidance, $t(226.1) = 4.95$, $p < .001$) and the subscales derived from the EA model (intrusion, $t(443) = 15.24$, $p < .001$; avoidance, $t(442) = 5.97$, $p < .001$; hyperarousal, $t(411.43) = 10.97$, $p < .001$).

Discussion

The current study examined the psychometric properties of the CRTES-R in two samples: Ugandan children who had

Table 1 Correlation between CRTES-R and KRI subscales

	1	2	3	4	5	KRI Total	KRI Avo	KRI Int	KRI Hyp
English data									
CRTES-R Total						.63***	.59***	.62***	.40***
1. CRTES-R Avo ^a	1.0					.45***	.51***	.43***	.24**
2. CRTES-R Int ^a	.64***	1.0				.61***	.51***	.63***	.39***
3. CRTES-R Hyp ^a	.60***	.67***	1.0			.60***	.54***	.57***	.45***
4. CRTES-R Avo2 ^b	.98***	.66***	.61***	1.0		.47***	.54***	.45***	.25**
5. CRTES-R Int2 ^b	.66***	.97***	.70***	.68***	1.0	.62***	.52***	.64***	.40***
6. CRTES-R Hyp2 ^b	.45***	.50***	.86***	.45***	.49***	.46***	.39***	.45***	.35***
Lugandan data									
1. CRTES-R Avo ^a	1.0								
2. CRTES-R Int ^a	.25***	1.0							
3. CRTES-R Hyp ^a	.08	.64***	1.0						
4. CRTES-R Avo2 ^b	.98***	.26***	.06	1.0					
5. CRTES-R Int2 ^b	.20***	.95***	.66***	.20***	1.0				
6. CRTES-R Hyp2 ^b	−.04	.49***	.89***	−.08	.51***				

Avo avoidance, Hyp hyperarousal, Int intrusion

* $p < .05$; ** $p < .01$; *** $p < .001$

^a Theoretically derived subscales

^b Subscales based on EA model

Table 2 Summary of coefficient alphas, means and standard deviations for scores on the CRTES-R

	# Items	Range	English data		Lugandan data		<i>t</i> (df)
			<i>M</i> (SD)	α	<i>M</i> (SD)	α	
CRTES-R Total	23	0–115	28.42 (21.32)	.90	54.65 (18.61)	.81	12.96 (430)***
CRTES-R Int ^a	8	0–40	9.38 (9.05)	.84	32.31 (8.55)	.74	15.53 (445)***
CRTES-R Hyp ^a	7	0–35	7.22 (6.78)	.73	15.17 (9.00)	.79	10.25 (33.36)***
CRTES-R Avo ^a	8	0–40	11.82 (8.60)	.74	16.05 (7.45)	.61	4.95 (226.1)***
CRTES-R Int2 ^b	7	0–35	8.51 (8.02)	.81	21.31 (8.21)	.76	15.24 (443)***
CRTES-R Hyp2 ^b	3	0–15	2.13 (2.66)	.42	5.93 (4.63)	.70	10.97 (411.43)***
CRTES-R Avo2 ^b	7	0–35	10.36 (7.65)	.71	14.77 (6.94)	.61	5.97 (442)***

Avo avoidance, Hyp hyperarousal, Int intrusion

*** $p < .001$

^a Theoretically derived subscales

^b Subscales based on EA model

experienced a variety of traumatic events, and children who had experienced a hurricane in the USA or Grenada. In the Lugandan data, an initial three-factor model showed moderate, though not good, model fit. An EA model, with three modified latent factors, demonstrated improved model fit. Furthermore, this modified three-factor model yielded good model fit in a second smaller sample of English-speaking children. This validation step supports the generalization of the EA model.

A three-factor model is consistent with previous research that has examined the factor structure of the

CRIES and IES-R (Asukai et al. 2002; Giannopoulou et al. 2006; Lau et al. 2013; Zhang et al. 2011); however, the items that loaded on each of the factors in the current study were not consistent with previous research. For example, several of the items similar to those that Giannopoulou et al. found to assess hyperarousal, loaded on the intrusion factor in our analyses. Although we did not find a strong positive correlation between intrusion and hyperarousal in either the Lugandan or English samples, the inconsistent item loadings across studies employing similar measures support arguments that intrusion and hyperarousal items

should be combined into a single subscale (Chen et al. 2012; Creamer et al. 2003; Smith et al. 2003).

The current study did not find any evidence for a numbing or dysphoria model. This may reflect the fact that the content of the CRTES-R does not directly assess all of the PTSD symptoms outlined by the DSM-IV-TR (American Psychiatric Association 2000). For example, emotional numbing involves feeling distant from others, a PTSD symptom not included in the CRTES-R. Indeed, a recent analysis of the IES-R (King et al. 2009), on which the CRTES-R was based, did not support separating avoidance and numbing symptoms. There may be room to revise the CRTES-R further to include items that more directly assess numbing symptoms.

Correlational analysis of the KRI and CRTES-R provided support for the concurrent validity of the CRTES-R. Total scores of the two scales were strongly positively correlated. Correlations between avoidance and intrusion subscales on the two measures were moderate to strong, while correlations between hyperarousal subscales were weaker. The hyperarousal symptoms on the CRTES-R included items examining physiological responses to reminders of the trauma. Subscales on the KRI reflect the DSM-IV-TR (American Psychiatric Association 2000) criteria where physiological reactions to reminders of the trauma are scored as symptoms of intrusion, not arousal. These differences in item content are likely responsible for the lower correlations between the hyperarousal subscales.

The current results indicate that researchers should be cautious when using the original subscales of the CRTES-R. Although these subscales had reasonable internal consistency, the current analyses indicated that the data did not fit the original three-factor model. In the EA model, in addition to the single CRTES-R item that did not load on any latent factor (item 2, “I stopped letting myself get upset when reminded of it”), a substantial number of items cross-loaded on more than one latent factor. This resulted in six items being excluded from the revised CRTES-R subscales. Those interested in assessing children’s experiences of different symptom types might consider using the empirically-derived subscales indicated by the current analyses, rather than the original subscales. However, those wishing to capture a broader spectrum of PTSD symptoms could consider assessing all of the original CRTES-R items and calculating a total score rather than subscale scores.

Previous factor analyses have identified items on the IES that were potentially problematic (Dyregrov et al. 1996; Yule et al. 1994). For example, Dyregrov et al. (1996) identified four IES items that are ambiguous and have been found to inconsistently load on factors in past research: item 2, item 8 (“I felt that it did not happen”), item 12 (“I had lots of feelings about it, but didn’t pay attention to them”), and item 15 (“I don’t have feelings about it anymore”). Similarly in the

current study, item 2 did not load on any of the factors, possibly indicating that children had trouble understanding this item. Dyregrov et al. noted that children appeared to have difficulty understanding item 15 of the IES, and suggested rewording the item. The CRTES-R uses slightly different wording for this item, asking children whether they still had feelings about the stressful event. Using this wording, item 15 loaded on the avoidance factor as expected; however, for both the Lugandan and English versions, this item had the lowest item-total correlation of all the CRTES-R questions. These findings again highlight potential problems children may have responding to these items.

The EA model developed in the Lugandan sample was validated in the English sample, indicating the overall relationship between items was roughly the same in both samples. The Ugandan children did, however, score significantly higher on the CRTES-R total and subscale scores. The higher rates of PTSD symptoms among the Ugandan children may reflect cultural differences in how the children responded to the items. In addition, the Ugandan children may have reported greater symptomology because they had less family support available to deal with traumatic events than their American/Grenadian counterparts. Alternatively, the Ugandan children may experience more frequent symptoms of PTSD due to more chronic or severe trauma exposure. For instance, the Ugandan children reported experiencing multiple and prolonged stressful events. The CRTES-R assesses symptomatology with regard to one specific event, and although this is a common feature of many trauma questionnaires, this may have been problematic for children who have experienced multiple traumas. The children in USA/Grenada were asked to respond to the CRTES-R while thinking about the hurricane they had experienced. In contrast, before completing the CRTES-R, the Ugandan children completed an interview about a range of stressful events they had experienced, and the majority of the Ugandan children reported experiencing multiple events. It may have been more difficult for the Ugandan children to only consider one of these events when completing the CRTES-R. This may also have contributed to the differences in scores observed between the two samples. Revising the CRTES-R to incorporate reactions to multiple traumas may be beneficial for future research using this instrument.

The current study has several limitations and implications for future research. For example, the samples in the present analyses included participants ranging in age from 6 to 21 years. Future research is needed to explore whether the psychometrics properties of the CRTES-R vary by age. In addition, the Ugandan and USA/Grenada samples differ in several significant ways, including culture, language of instrument administration, instrument administration procedures, and the types and number of

stressful events the children had experienced. These differences limit our ability to draw conclusions about the differences observed between the sample scores on the CRTES-R. The Ugandan sample included children who had experienced stressful events that do not meet the DSM-IV criteria for a traumatic event. For example, most of the children had experienced the death of close family or abandonment, poverty and hunger. However, a large number reported that their most stressful event was not having school fees. For these children being able to go to school is often perceived as their only real hope for a financial future and not attending school can lead to social ostracization. Given that trauma is defined and interpreted differently across cultures (Hinton and Lewis-Fernández 2010), in the current study data were included in the CFA from Ugandan children that had experienced these non-traditional stressful events. Future studies are needed to explore how trauma among children is conceptualized in non-western cultures. This approach may also inform the translation of the CRTES-R into other languages. In Study 1, the Lugandan version of the CRTES-R was developed using back-translation. While this approach ensures that the translation was appropriate, other researchers might consider using a more comprehensive approach to culturally adapting the measure. For example, a group of culturally informed bilingual individuals could be recruited to review the item content for both optimal wording and cultural appropriateness (Geisinger 1994). This approach may lead to a translation of the CRTES-R that incorporates more relevant cultural experiences. Further research is needed to examine the reliability and validity of the CRTES-R, including studies examining different languages. Research specifically examining the criterion-related validity of the CRTES-R is also needed, for example, evaluating whether scores on the CRTES-R are predictive of PTSD diagnosis and developing possible cut-off scores for the CRTES-R.

In conclusion, the current study provided support for a three-factor model of the CRTES-R using two diverse samples of children exposed to stressful events. However, not all of the CRTES-R items were found to load on the hypothesized latent factors. The current study offers an alternative approach to scoring the three CRTES-R subscales of hyperarousal, avoidance and intrusion. The total score of the CRTES-R had good-to-excellent internal consistency in both samples and showed good concurrent validity. The CRTES-R total score may provide a useful measure for those interested in assessing a broad range of symptoms to identify children experiencing posttraumatic distress. Further research developing culturally and linguistically appropriate measures of childhood trauma, including revised versions of the CRTES-R, would be beneficial.

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