

## Feasibility and psychometric properties of the UCLA PTSD reaction index for DSM-5 in Japanese youth: A multi-site study



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### ABSTRACT

The purpose of this study was to determine the reliability and validity of the UCLA PTSD Reaction Index for DSM-5 (PTSD-RI-5) among Japanese youth. This is the first study to explore psychometrics of the DSM-5 version of the PTSD-RI-5, as well as the first multisite study of an Asian population. This article presents psychometric characteristics of the PTSD-RI-5 derived from a sample of Japanese children and adolescents ( $N = 318$ ). The PTSD-RI-5 total scale displayed good internal consistency reliability ( $\alpha = 0.85$ ). Correlations of PTSD-RI scores with the posttraumatic stress scores on the TSCC-A for the entire sample provided evidence of convergent validity. The four-factor structure of the PTSD-RI-5 was supported through confirmatory factor analysis in this sample. In conclusion, a DSM-5 version of the PTSD-RI-5 can be regarded as an adequate instrument for clinical and research purposes in Japan.

### 1. Introduction

Children are at risk of experiencing psychological trauma worldwide (Ameringen et al., 2008). Child abuse and neglect are major social problems not only in developing countries, but also in developed countries. In addition, how to protect children who are suffering from crime, especially sexual crime, is a major issue worldwide.

Japan enjoyed a peaceful existence for more than half a century after the Second World War II. However, in recent years, great numbers of children are known to have experienced trauma, such as child

maltreatment, crimes, natural disasters, and traffic accidents in Japan (Lanius et al., 2010). For example, over the past 25 years, the number of child maltreatment incidents reported to child guidance centers in Japan has increased. Child welfare consultation centers across Japan reported a total of 103,260 cases of child abuse in 2015 (Kyodo, 2016). It is not thought that the rate of abuse itself has increased, but rather because of increased social interest, abuse cases that previously were not recognized have been reported.

Additionally, Japan has been the setting of several catastrophic or novel mass traumatic events. The greatest of these in this decade was

**Abbreviations:** PTSD, posttraumatic stress disorder; PTSD-RI, the UCLA PTSD reaction index; DSM, the diagnostic and statistical manual of mental disorders; PTSD-RI-5, the UCLA PTSD reaction index for DSM-5; TSCC/TSCC-A, trauma symptom checklist for children; CFA, confirmatory factor analysis; CFI, comparative fit index; TLI, Tucker-Lewis index; RMSEA, root mean squared error; ROC, receiver-operating characteristics

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the Great East Japan Earthquake and Tsunami in 2011, which killed more than 15,000 people. A survey of parents of pre-school and school-age children in areas devastated by the 2011 Great East Japan Earthquake found that 20 percent of kindergarten children, 18 percent of elementary school pupils, and 12 percent of junior high school students displayed potential symptoms of PTSD (Ministry of Education, Culture, Sports, Science and Technology, 2012). Moreover, in this disaster, nuclear power plant accidents occurred in Fukushima, and the influence on the physical and psychological health of children exposed to radiation was tracked for a long period (Wada et al., 2013; Yabe et al., 2014; Yasumura et al., 2012).

The UCLA PTSD Reaction Index (PTSD-RI) is currently the only tool for assessing both traumatic experiences and posttraumatic symptoms. The PTSD-RI has been the most widely used assessment tool for PTSD in children in clinical practice and research, has been translated and widely used in various countries, and its psychometric properties have been reported as well (Steinberg et al., 2004; Korb, 2013;). Psychometric studies have demonstrated high internal consistency reliability and higher scores among trauma-exposed youth compared with controls (Goenjian et al., 1995; Koplewicz et al., 2002). Additionally, criterion-referenced validity of the measure was supported by the sensitivity and specificity of the PTSD-RI cutoff score with respect to a PTSD diagnosis based on the Diagnostic and Statistical Manual of Mental Disorders, 3rd Edition-Revised (DSM-III-R) criteria, as well as its reliability coefficients ( $\alpha = 0.90$ ); test-retest reliability ( $\alpha = 0.84$ ) has also been demonstrated for the measure in a Western population (Steinberg et al., 2004; Pynoos et al., 1993). The PTSD-RI has been transformed through the changes in criteria for PTSD in the DSM. Regarding the DSM-IV version of the PTSD-RI, the total scale displayed good to excellent internal consistency reliability across age ranges, sex, and racial groups ( $\alpha = 0.88–.91$ ) (Steinberg et al., 2013). In 2013, the American Psychiatric Association revised the PTSD diagnostic criteria in the DSM-5. Diagnostic criteria for PTSD include past exposure to a traumatic event and related symptoms from each of four symptom clusters: intrusion, avoidance, negative alterations in cognitions and mood, and alterations in arousal and reactivity (American Psychiatric Association, 2013). Consistent with this change, the 5th version of the PTSD-RI changed in structure.

The first version (DSM-III version) of the PTSD-RI was introduced in Japan after the Hanshin-Awaji earthquake in 1995. However, since it has not been standardized and usage was restricted, it has not been used widely. The DSM-IV version of the PTSD-RI was translated into Japanese with the developer's permission and good reliability has been reported (Fujimori et al., 2014). Thus, the DSM-IV version of the PTSD-RI is an adequate tool for measuring posttraumatic symptoms within small samples in Japan. Based on this result, we were working on a standardization of the DSM-IV version of the PTSD-RI; however, the DSM-5 version was released. Therefore, we attempted to translate the latest version of the PTSD-RI with the developer's permission.

Although the PTSD-RI is recommended for use in screening children and youth's traumatic experiences and PTSD symptoms, the reliability and validity of the former version of the PTSD-RI were only tested in a Western population. Thus, we aimed to determine the psychometric properties of the PTSD-RI-5 in Japan using mixed-trauma type samples in a multisite study.

## 2. Materials and methods

### 2.1. Participants

This multi-site study collected data from 2 child guidance centers, 1 child psychiatric hospital, 3 prefectures in a tsunami-devastated area, and 1 prefecture of Japan not affected by the tsunami (general population). Participants consisted of 318 youth (M:F = 151:162, aged 6–18); 143 (44.96%) of the responses came from the tsunami-devastated area, 90 (28.30%) from the child guidance centers, 30 (9.43%)

from the psychiatric hospital, and the remaining 55 (17.30%) from the general population.

The present analyses are based on a sample that experienced at least one trauma and had complete PTSD-RI-5 data. The anonymized data sets were provided as part of routine practice in the child guidance center and community-based child psychiatric hospital, and the data from the tsunami-devastated area and the general population were collected as part of research by the National Center for Child Health and Development (Fujiwara et al., 2014). The present data were collected from August 2015 to January 2016. All centers and institutions obtained their own IRB approval and completed a data use agreement prior to data collection. Data were collected with limited identifying information.

### 2.2. Instruments

#### 2.2.1. UCLA PTSD reaction index for DSM-5 (PTSD-RI-5)

The PTSD-RI-5, published by Pynoos, Steinberg and Beyerlein, (2014) is a self-report instrument to screen for trauma exposure and assess DSM-5 PTSD symptoms in school-aged children and adolescents.

The PTSD-RI-5 includes lists of traumatic events that children and youth may suffer in their lives. The PTSD-RI-5 consists of the following sections: "Trauma/Loss History Screening Questions," "Posttraumatic/Loss History Screening Questions," and "Posttraumatic Stress Symptoms." "Posttraumatic Stress Symptoms" consists of 27 items to assess PTSD symptoms and 4 additional items to assess the dissociative subtype based on the DSM-5. Children rate the frequency of symptoms based on the month prior to the day of the assessment (from 0 = none of the time to 4 = most of the time). Items assessing PTSD symptoms are classified into 5 questions for Criterion B (intrusion), 2 questions for C (avoidance), 7 questions for D (negative alterations in cognitions and mood), and 6 questions for E (alterations in arousal and reactivity) (Steinberg et al., 2013).

The PTSD-RI-5 was translated into Japanese using a two-step approach: 1) translation-back translation, 2) in-group translation with our research team at the Hyogo Institute for Traumatic Stress in Japan (Takada et al., 2015); for items with potential cultural differences, we changed the wording with the developers' permission. Each word was checked for conceptual understanding as well as understandability by a child/adolescent.

#### 2.2.2. Trauma symptom checklist for children (TSCC)

The TSCC was developed by Briere for evaluating posttraumatic symptoms in children and adolescents (Briere, 1996). The TSCC comprises 54 items, two validity scales, that is Underresponse (Und) and Hyperresponse (Hyp), and six clinical scales with 9–10 questions each (Anxiety, Depression, Anger, Posttraumatic Stress, Dissociation, and Sexual Concerns). The TSCC-A is an alternate version of the TSCC that does not include questions about Sexual Concerns. Many studies have shown that the TSCC and TSCC-A have adequate internal consistency with alphas ranging from 0.72–.91 (Lanktree and Briere, 1995; Matulis et al., 2015).

### 2.3. Statistical analysis

Data were derived from a sample of Japanese youth aged 6–18 years ( $n = 318$ ). Statistical analysis was performed using SPSS 22.0 and R 3.2.3.

First, internal consistency of the PTSD-RI-5 was evaluated using Cronbach's coefficient alpha, both for the total score and for the subscales. Next, we explored a single-factor structure of the PTSD-RI-5 using confirmatory factor analysis (CFA). A model is shown to have good fit based on the following goodness-of-fit indices: comparative fit index (CFI) and Tucker-Lewis Index (TLI)  $> 0.9$  and root mean squared error (RMSEA)  $< 0.08$  [32–33]. Lastly, to examine the relationship between the TSCC-A and PTSD-RI-5, Pearson correlation and polychoric

**Table 1**  
Mean, Standard Deviation, and Range of PTSD-RI-5 Total Scores by Sex, Age, Type of Trauma, and Race.

Variable	PTSD-RI Total Score			
	n	Mean	SD	Range
Total sample	318	17	16	0–72
Sex				
Boys	153	16	16	0–61
Girls	165	18	18	0–72
Age group				
6 to 11	231	13	13	0–62
12 to 18	87	28	19	0–72
Trauma type				
Single	239	14.2	15	0–63
Multiple	79	25.2***	18	0–72
Race				
Asian	318	17	16	0–72

\*\*\* Correlation is significant at the 0.001 level (2-tailed).

correlation coefficients were employed.

### 3. Results

Table 1 shows the mean PTSD-RI-5 total score by sex, age, trauma type (single or multiple), and race. Girls had slightly higher mean PTSD-RI-5 total scores compared with boys. There were significant differences across age groups, with those in the 12–18 age group scoring significantly higher than other age groups ( $p < 0.001$ ). Those with repetitive trauma such as child abuse scored significantly higher compared to those with a single type of trauma such as a natural disaster ( $p < 0.001$ ).

Table 2 shows the mean PTSD-RI-5 total scores by the respondents' location. Computed independently, respondents from the child guidance center had significantly higher mean PTSD-RI total scores compared to the other locations ( $M = 25.7$ ,  $SD = 17.7$ ). This was followed by respondents in the psychiatric hospital ( $M = 23.3$ ,  $SD = 18.1$ ), the tsunami-devastated area ( $M = 10.9$ ,  $SD = 10.6$ ), and from the general population ( $M = 10$ ,  $SD = 9.0$ ), respectively. For the total sample, the mean PTSD-RI score was 17.0 ( $SD = 16.2$ ); scores ranged from 0 to 72.

Table 3 shows the mean, standard deviation, skewness, and median score for each of the 20 PTSD-RI items arranged in the B, C, D, and E subcategories. The final column gives the average inter-item correlation for each item with all other items. Each of the items was similarly intercorrelated with other items.

Cronbach's  $\alpha$  for the PTSD-RI-5 total scale and the B, C, D, and E category scales by sex and age are displayed in Table 4. The PTSD-RI-5 total scale Cronbach's  $\alpha$  for the entire sample was 0.85, for boys was 0.82, and for girls was 0.84. For boys and girls, Cronbach's  $\alpha$  ranged from 0.75 to 0.90 for the intrusion subscale, 0.42 to 0.85 for the avoidance subscale, 0.77 to 0.88 for the negative alterations in cognitions and mood subscale, and 0.70 to 0.82 for the alterations in arousal and reactivity subscale.

**Table 2**  
Mean, Standard Deviation, and Range of PTSD-RI-5 Total Scores by Respondents' Location.

Variable	PTSD-RI-5 Total Score		
	n	Mean	SD
Total sample	318	17.0	16.2
Respondents' location			
Child guidance center	90	25.7	17.7
Child psychiatric hospital	30	23.3	18.1
Tsunami-devastated area	143	10.9	10.6
General population	55	10.0	9

**Table 3**  
PTSD-RI-5 Item Characteristics and Correlations with PTSD-RI-5 Total Scores.

Item	Mean	SD	Skewness	Median	r
B1	1.3	1.39	0.64	1	0.41
B2	0	0	0	0	0.43
B3	1.08	1.45	0.91	0	0.42
B4	1.53	1.48	0.47	1	0.41
B5	1.22	1.43	0.73	1	0.42
C1	1.14	1.29	0.91	1	0.43
C2	1.31	1.54	0.68	0	0.43
D1	1.11	1.33	0.92	1	0.42
D2	2.2	1.33	-0.06	2	0.42
D3	1.86	1.57	0.12	2	0.41
D4	1.93	1.5	0.09	2	0.42
D5	0.88	1.23	1.33	0	0.42
D6	1.12	1.38	0.84	0	0.42
D7	0.68	1.06	1.6	0	0.43
E1	1.36	1.41	0.62	1	0.44
E2	1.06	1.3	1.02	1	0.42
E3	1.58	1.46	0.41	1	0.43
E4	1.48	1.44	0.54	1	0.42
E5	1.44	1.49	0.57	1	0.43
E6	1.66	1.42	0.28	1	0.47

**Table 4**  
Reliability Analysis of the PTSD-RI-5.

Group	UCLA PTSD-RI-5 Scales				
	Total	B	C	D	E
Total sample (n = 318)	0.85	0.77	0.85	0.77	0.77
Boys (n = 153)	0.82	0.82	0.64	0.85	0.77
6–11 (n = 114)	0.90	0.75	0.67	0.78	0.73
12–18 (n = 39)	0.95	0.86	0.43	0.88	0.78
Girls (n = 165)	0.84	0.88	0.58	0.87	0.78
6–11 (n = 121)	0.91	0.84	0.42	0.82	0.70
12–18 (n = 44)	0.95	0.90	0.67	0.87	0.82

**Table 5**  
Correlation Coefficients of PTSD-RI-5 Total Scores with B, C, D, and E Subscale Scores.

	Total	B	C	D	E
Total					
B	.91**				
C	.68**	.61**			
D	.94**	.82**	.60**		
E	.85**	.70**	.52**	.79**	

\*\*Correlation is significant at the 0.01 level (2-tailed).

Table 5 presents the correlation coefficients of the PTSD-RI total scale with the B, C, D, and E subscales. The PTSD-RI Total scale score was significantly correlated with subscales B ( $r = 0.907$ ), C ( $r = 0.676$ ), D ( $r = 0.944$ ), and E ( $r = 0.852$ ). The subscales were also significantly correlated with each other.

Confirmatory factor analysis of the structure of the DSM-5 PTSD symptoms using self-report data has shown the four-factor model implied by the DSM-5 diagnostic criteria provided adequate fit to the data in prior research (Elhai et al., 2013). The four-factor structure of the PTSD-RI-5 was confirmed in this study through confirmatory factor analysis ( $\chi^2(164) = 364.78$ ,  $p < 0.01$ ,  $RMSEA = 0.06$ ,  $CFI = 0.93$ ,  $TLI = 0.92$ ), as shown in Fig. 1.

To determine the concurrent validity of the PTSD-RI-5, we examined its relationship with the TSCC-A in Table 6. The results showed that the subcategories of the PTSD-RI-5, namely B (intrusion), D (negative alterations in cognitions and mood), and E (alterations in arousal and reactivity) were moderately correlated with the five TSCC-A clinical scales, Anx (Anxiety), Dep (Depression), Ang (Anger), PTS (Post-traumatic), and DIS (Dissociation), and two subscales, namely DisF (Fantasy) and DisO (Overt Dissociation).

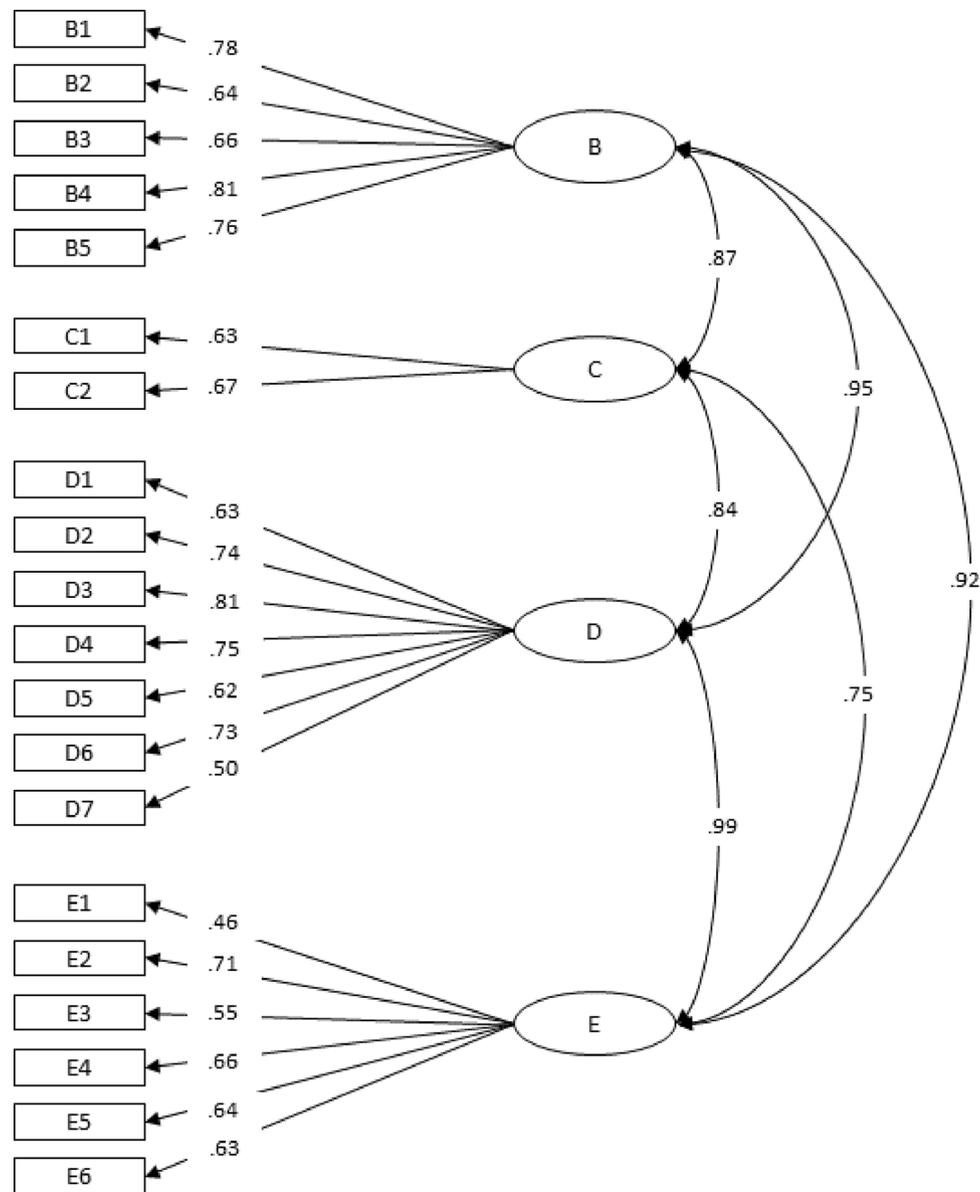


Fig. 1. Factor Structure of the PTSD-RI-5.

Table 6  
Correlation Coefficients of the PTSD-RI-5 with TSCC-A.

PTSD-RI-5	TSCC-A				
	Anxiety	Depression	Anger	PTS	Dissociation
Total	.64**	.65**	.61**	.65**	.62**
B	.61**	.61**	.55**	.67**	.57**
C	.39**	.35**	.27**	.43**	.37**
D	.60**	.64**	.58**	.63**	.61**
E	.58**	.57**	.59**	.56**	.53**

\*\*Correlation is significant at the 0.01 level (2-tailed).

#### 4. Discussion

The results of this study confirm the strong psychometric properties of the PTSD-RI-5 and its utility for assessing PTSD severity. This is the first study to explore psychometrics of the DSM-5 version of the PTSD-RI-5, as well as the first multisite study in an Asian population.

Based on the Cronbach’s alpha of 0.85, the PTSD-RI 5 is a reliable instrument for use in Japan. This is also supported by the significant inter-item correlations of the PTSD-RI-5 at the 0.05 level of

significance. This finding is similar to those of studies conducted in other countries using the former version of the PTSD-RI (Steinberg et al., 2004; Korb, 2013; Valerie et al., 2012; Murray et al., 2011, Steinberg et al., 2013). Coefficients of the PTSD-RI-5 were correlated with each other and were directly correlated with the TSCC-A.

The subcategories of the PTSD-RI-5, namely B (intrusion), D (negative alterations in cognitions and mood), and E (alterations in arousal and reactivity) were moderately correlated with the five TSCC-A clinical scales. Weaker correlations were found in subcategory C (avoidance). It could be that children with severe avoidance symptoms could not answer the questions correctly because they avoided thinking about them. In addition, the correlation between the PTSD-RI-5 total score and the PTS scale of the TSCC-A was as high as 0.65, which is sufficient for securing the adequacy of this scale. This tendency can also be said from the fact that among the subordinate scales of the PTSD-RI-5, B (intrusion) and C (avoidance) had the highest correlation with the PTS scale of the TSCC-A. On the other hand, among the subscales, the correlation between Depression in D and Anger in E was the highest. Although B (intrusion) and C (avoidance) are specific symptoms of PTSD, D (negative alterations in cognitions and mood) and E (alterations in arousal and reactivity) are related to general psychiatric

symptoms also found in other mental disorders such as depression or anxiety disorders. In the DSM-5, subcategory C in DSM-4 included (avoidance and psychic numbing) and was divided into two subcategories C and D in DSM-5, so that specificity in PTSD symptoms of C is emphasized. Subcategory D is occupied by items common to depression, such as negative cognition and negative change of emotion, except for one item, dissociative amnesia (D1). In addition, regarding subcategory E, “episode or self-destructive behavior (E2)” has been added, and consists of aggression and hyperarousal symptoms, which are symptom groups also found in other psychiatric disorders. Therefore, it is understandable that there is a high correlation between D (negative alterations in cognitions and mood) and E (alterations in arousal and reactivity). In this study, we found that a high correlation between subcategories B and C and the PTS scale of the TSCC-A indicated that both were characteristic symptoms of PTSD. Overall, this result indicated that there were high correlations of the total score of the PTSD-RI-5 and B and C with the PTS scale of the TSCC-A.

As four-factor models fitted the data well, there were very high correlations between ‘intrusions’ and “negative alterations in cognitions and mood,” “negative alterations in cognitions and mood,” and “alterations in arousal and reactivity,” and “intrusions” and “alterations in arousal and reactivity” in the model. This result suggested that the Japanese version of the PTSD-RI-5 adequately represented the PTSD criteria of the DSM-5, and that the PTSD-RI-5 can be used to detect PTSD symptoms among Japanese youth.

Interpersonal violence has a higher conditional risk of PTSD; not a few studies reported PTSD due to natural disasters in Japan although some studies failed to find it. (Substance Abuse and Mental Health Services Administration, 2014; Suzuki et al., 2011). Interestingly, this pattern is consistent with our reports; the mean score of the PTSD-RI-5 was low in a sample from a tsunami-devastated area. This is because compared to multiple trauma, such as child abuse and maltreatment, the psychological impact of natural disaster is less severe, even though its impact is substantial (Kessler, 2000). In addition, it is known that Japanese show lower levels of comorbidity of PTSD and depression (Sugisawa et al., 2015); however, this does not mean Japanese do not suffer depression as much as western countries, but rather that they value enduring distress (Goto and Wilson, 2003; Kirmayer, 2006). From a cultural point of view, many Japanese dislike showing their emotions compared to those from the West and this tendency could be a cause of avoidance.

Clinicians may use this instrument not only for assessing traumatic symptoms but also as a communication tool for use with children and their caregivers. Without screening, childhood trauma often goes undetected and increases the risk for severe traumatic symptoms and other trauma-related disorders (Collishaw et al., 2007). Therefore, there is an urgent need to establish an effective assessment tool to screen for childhood trauma and provide optimal treatment; the results of this study indicate that the PTSD-RI-5 could fill this gap.

Although the results of our study are promising, consistent with previous research, and were obtained from a heterogeneous and well-defined sample, some limitations must be discussed. First, the sample size was small compared to the initial development sample (Steinberg et al., 2004). More research needs to be conducted with a larger sample of youth with multiple or repetitive traumas. Second, the PTSD-RI-5 is a self-report instrument; therefore, youth might have over- or, more likely, under-reported their symptoms. Furthermore, we were not able to investigate the test-retest reliability and cut-off score of the PTSD-RI-5 in our study. To confirm the predictive value of this scale, it is necessary to assess receiver-operating characteristics (ROC) by conducting structured interviews and compare these with the PTSD-RI-5 and a gold-standard diagnostic interview for PTSD (Nader et al., 1996).

As the first study to examine the feasibility and psychometric properties of the PTSD-RI-5 in Asia, our results demonstrated that the PTSD-RI-5 was a reliable and useful tool for assessing youth’s PTSD symptoms in clinical and epidemiological settings, especially after

catastrophic disaster. In conclusion, use of the PTSD-RI-5 with potentially traumatized samples to screen for PTSD symptoms will aid Japanese clinicians in their clinical decision-making regarding youth at risk for the development of PTSD symptoms and further treatment planning.

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## Conflict of interests

None.

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