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ORIGINAL CONTRIBUTION

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Post-traumatic stress disorder symptom clusters in Turkish child and adolescent trauma survivors

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Abstract This study identified post-traumatic stress disorder (PTSD) symptom clusters in Turkish children and adolescents who experienced the 1999 Marmara Earthquake, which was classified as one of the world's six deadliest earthquakes in the 20th century. Two hundred ninety three children and adolescents (152 females and 141 males between the ages of 8 and 15) living in Izmit, the epicenter of the earthquake, participated in this study. The Post-Traumatic Stress Disorder Reaction Index for Children (CPTSD-RI) was administered to assess PTSD symptoms. A confirmatory factor analysis (CFA), using data from the CPTSD-RI, was conducted to determine whether the DSM-IV-TR symptom structure of PTSD was valid in Turkish children and adolescents. The CFA model supported the three-symptom cluster model. Limitations and implications for future research studies are included in the discussion.

Key words post-traumatic stress disorder – PTSD symptom structure – children – Turkey – earthquake

Introduction

In 1999, due to the ruptures of the North Anatolian fault, Marmara region, the most populous region of Turkey, was hit by two major earthquakes and at least 1,391 aftershocks. The first one was measured 7.4 magnitudes on the Richter scale and the destructive power was estimated to be 11 on a scale of maximum 12. The second one struck the same area with a 7.2 magnitude and led to further devastation. Even though the numbers varied, the estimated death toll of these earthquakes was around 19,000 and 54,000 people were injured [7, 34]. Over 291,000 buildings including houses, working places, schools, hospitals, and other public places were destroyed by these two massive earthquakes [50]. The financial loss to the Turkish economy was estimated between $7 billion and $40 billion [31]. Turkey has a young population; approximately more than 50% of the survivors affected by the earthquake are children and adolescents.

The psychological, social, and economic well-being of millions of children and adolescents are disrupted every year by natural disorders [26, 37]. Natural disasters are categorized into three types: (a) hydrometeorological disasters (e.g., floods, storms, droughts, avalanches, and extreme temperatures), (b) geophysical disasters (e.g., earthquakes, tsunamis, and volcanic eruptions), and (c) biological disasters (e.g., epidemics and insect infestations) [44]. According to EM-DAT, between 1900 and 2005, the number of natural disasters increased 38.192 times. In 2005 alone, 82,061 people were killed by the 10 worst natural disasters in the world. Natural disasters happen all over the world. Yet, the people of economically developing countries and the citizens of developed countries from historically and economically mar-

ginalized minority groups tend to be most negatively influenced by the devastations of natural disasters [44], such as low-income families (mostly African American) after Hurricane Katrina in the United States. In contrast, the amount of published trauma literature does not reflect this reality; most of the studies have been conducted in developed countries with the trauma survivors from majority groups [42]. Developing countries generally have young populations, and children tend to be the group most vulnerable to physical, social, and psychological effects of such disasters. Like the 1999 Marmara Earthquake, large-scale natural disasters are beyond the realm of everyday experience and pervasively disrupt children and youths' past, present, and future streams of experience [15]. Even though the amount of studies on post-trauma reactions and PTSD has increased over the past 20 years, the majority of the trauma studies continue to focus on adult trauma survivors from economically developed countries [43, 56].

Over the past 2 decades, it has been widely reported that child trauma survivors may experience PTSD symptoms. Indeed, PTSD is the most common mental health disorder among the children, as well as the adults who have experienced traumatic events [12, 43]. Several studies have shown that exposure to high-magnitude natural disasters reliably predict PTSD in children and adolescents at different levels [1, 27, 30). In a study of 111 children and adolescents, ages 8–16, Pynoos et al. [47] found that 70% of the survivors showed PTSD symptoms one and a half years after the 1988 Armenian Earthquake. Kolaitis et al. [36] found that 6 months after the Athens earthquake, based on the different PTSD measures child survivors reported PTSD symptoms from 40% to 78%. In Sri Lanka after the tsunami in the Indian Ocean, Neuner et al. [42] found that 45.3% of the children in Manadkatu fulfilled all Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) [3] criteria for PTSD. About 95% of the child survivors of Hurricane Floyd were identified as having PTSD symptoms and 71% of the young survivors had moderate to very severe levels of PTSD 6 months after of the hurricane. Although DSM-III-R [2] recognized that children might experience PTSD symptoms in different ways than adults and some PTSD symptoms specific to children were added, there are still no specific operational diagnostic criteria for childhood PTSD in DSM-IV-TR [3]. It has been suggested that PTSD symptomatology in children and adolescents closely resembles that of adults but childhood presentation might be influenced by age or developmental phases [48, 51]. For example, in review of PTSD in children, Yule [56] stated that children and adolescents severely affected by a traumatic event mostly suffer repetitive and intrusive thoughts and flashbacks about the trauma, sleep disturbances, nightmares, anger, separation anxiety, memory and concentration problems, survivors guilt, changes in perception of the world as a "safe and predictable" place. Yule categorized these symptoms under three PTSD symptom clusters: (a) re-experiencing, (b) avoidance, and (c) physiological hyper-arousal. Nonetheless, there is still no clear consensus or widely accepted theories about the "typical" clinical presentation of PTSD in children [16, 22, 56].

DSM is widely used around the world both for adults and children in the assessment and diagnosis of PTSD symptoms. DSM IV-TR [3] defines PTSD into three symptom clusters (i.e., intrusion, avoidance/numbing, and arousal). In addition, revised version of the 10th edition of International Classification of Diseases (ICD-10) [55] includes PTSD with operational diagnostic criteria for the category and places it between the neurotic, stress-related and somatoform disorders. Like DSM-IV-TR, ICD-10 lists similar symptoms and emphasizes the same symptom clusters (i.e., intrusion, avoidance/numbing and arousal) [55]. In DSM, re-experiencing includes recurrent and intrusive thoughts about the trauma, dreaming or flashbacks of the traumatic event, and intense psychological distress caused by internal or external stimuli, which is symbolized by or associated with the traumatic event [3, 33]. In children and adolescents, repetitive plays and reenactments may be observed. Avoidance/numbing includes avoidance of conversations, places, and feelings associated with the traumatic event (in children, there may/may not be an obvious link to the original trauma), amnesia for aspects of the trauma, detachment from others, withdrawal, or decreased interest in usual activities. In children, this may take the form of loss of previously acquired developmental skills such as toilet training [3, 16, 33]. Increased arousal includes sleep disturbances, irritability, increased startle response, and concentration problems. In children, increased arousal may be observed when a child is exposed to situations associated with the traumatic event [16, 33].

The DSM's three-factor model has been used to develop several therapeutic interventions and prevention programs and services for the trauma survivors around the world [52]. However, although the validity of the PTSD symptoms in DSM-IV-TR [3] in both children and adult populations have been supported by a remarkable amount of clinical and research literature, the applicability of DSM's conceptualization of PTSD symptom clusters for children and teenagers, different cultures, and different types of trauma (e.g., natural disaster, sexual abuse, and traffic accidents) is still the subject of a debate in the psychological trauma literature [5]. To illustrate, in a study of 72 adult female rape victims

and 86 adult female victims of nonsexual assault, Foa et al. [23] confirmed the DSM's three-factor solution, namely arousal/avoidance, numbing, and intrusion. In another study, in which 5,664 child and adolescent victims of Hurricane Hugo participated, Anthony et al. used confirmatory factor analyses to test DSM's model and eight other alternate models of PTSD symptom structures that were reported by previous researchers. They examined the comparative utility of these eight alternative models that addressed the dimensionality of PTSD regardless of population or type of trauma studied in order to describe the post-traumatic stress reactions in the child and adolescent victims of Hurricane Hugo. They found the DSM model was not the best fitting or parsimonious model for describing PTSD in the child and adolescent victims of natural disaster. In their study, a different formulation—i.e., intrusion/active avoidance, numbing/passive avoidance, and arousal—was suggested. Moreover, Sack et al. [49] worked with 194 Khmer adolescent refugees to compare the factor structure to current reports on Caucasian adult samples in order to determine whether refugee subjects from another cultural group would generate a similar PTSD factor structure. They found four factors: arousal, avoidance, intrusion, and numbing. Nevertheless, DSM's formulation was partially supported by Cardova et al.'s [18] study with women who had breast cancer.

In Turkish trauma survivors, Sahin et al. [50] and Erdur [21] tested the applicability of DSM's symptom clusters using factor analyses a short time after the Marmara Earthquake. Sahin et al. [50] was able to confirm DSM's three factor model for the Turkish adolescent earthquake survivors in a study of 650 students, ages 12–17. On the other hand, in a study of 440 trauma survivors, ages 11–59, Erdur [21] utilized exploratory and confirmatory factor analyses to examine DSM's PTSD symptom structure in relation to Turkish earthquake survivors and to examine the strength of associations of several risk/resilience variables with PTSD. According to the CFA output, DSM's model was not confirmed in that sample. Exploratory factor analysis suggested a different PTSD factor structure for Turkish trauma victims: re-experiencing/arousal, cognitive impairment, and numbness.

Even though the DSM model has been challenged by several studies and alternative models have been suggested, neither DSM's model nor any of the alternative PTSD symptom cluster models have been supported consistently by empirical evidence or enjoyed a clear consensus among scholars in the traumatic stress literature [45]. Conflicting findings on PTSD symptom structure might be a result of different trauma types studied, different measures and varying administration formats (e.g., interview, self report) used in these research studies. Alternative models of PTSD symptom structures and, as we discuss in this article, different theoretical approaches to factor analytic methods might also account for contradictory results. To date, unfortunately, little is known about the relationship between cultural factors and etiology, epidemiology, assessment, diagnosis and treatment of PTSD [41]. While it has been suggested that there is a universal neurobiological response to traumatic events, several researchers have suggested that culture may influence the perceptions and expressive dimensions of the traumatic experience and, thus, the PTSD symptom structures [see 19, 41]. Several reviews and analyses proposed that there is an immense need for studies on the manifestations of traumatic stress reactions specifically for the children and adolescents from different countries and cultural groups who have been exposed to different types of traumas [22, 51, 56]. Furthermore, testing the validity of DSM's three-factor model and establishing a valid PTSD structure model may help mental health researchers and practitioners develop better assessment tools and interventions for the child and adolescent trauma survivors [45]. Thus, the goal of the present article was to test the applicability of the DSM-IV-TR [3] three-factor symptom clusters model that underlies the long-term PTSD symptoms for the child and adolescent survivors in Turkey.

Method

Participants

Participants were 293 children and adolescents exposed to the 1999 Marmara Earthquake. One hundred fifty two participants were female (51.9%) and 141(48.1%) were male. At the time of the data collection, in 2002, all participants were living in Izmit, the epicenter of the 1999 Marmara Earthquake. Participants were enrolled in primary schools in Izmit, in grades three through eight, and their ages ranged from 8 to 15 years, with a mean of 11.15 (SD = 1.54) years.

Setting

Permissions to conduct this study were obtained from the Division of Primary Education at Turkish Republic Ministry of Education and Izmit Mayor's Office. Eight primary schools in Izmit were selected in the areas where the damage was moderate or severe. Questionnaires were administrated to the participants in their classrooms by the first author. Students were informed that their participation was completely voluntary and that they had the right to withdraw

from the study at any time without a penalty. Participant queries about the purpose and procedure of the study were answered openly. In order to facilitate comprehension, each item on the measures was read aloud to the participants in grades three through five.

Measure

The Post-Traumatic Stress Disorder Reaction Index for children (CPTSD-RI) is a 20-item self-report measure originally designed as a semi-structured interview [24, 39] to assess the presence or absence of PTSD symptoms. Frederic [24] found that the correlation between CTPSD-RI and confirmed cases of PTSD was 0.91 in children and 0.95 in adults. The measure was revised and a child friendly version was developed [46]. The CTPSD-RI is the most widely used measure of childhood PTSD after an exposure to a broad range of traumatic events such as natural disasters, war, life threatening illness, or sexual abuse. The instrument has been used internationally in such places as Armenia, Australia, the Dominican Republic, Egypt, Italy, Norway, Mexico, Palestine, Thailand, and Uganda [21, 53]. Raw scores between 0 and 11 indicate doubtful/no level of PTSD, 12–24 a mild level of PTSD, 25–39 a moderate level of PTSD, 40–59 a severe level of PTSD, and 60–80 very severe PTSD. The Turkish version of the scale has been adapted and used in several studies. Erdur [21] found a reliability coefficient of 0.88. Gokler [28] used the CPTSD-RI to assess the predictor variables of the PTSD symptoms of 519 children exposed to the 1999 Marmara Earthquake and reported that the CPTSD-RI showed high internal consistency (Cronbach's alpha = 0.84).

Analytical procedure

We chose a confirmatory factor analysis (CFA) model rather than an exploratory factor analysis (EFA) model to assess the present research question for theoretical reasons. Because the driving purpose of this study was to "confirm" (or "disconfirm") the three-factor PTSD symptom structure found in the DSM-IV-TR (2000) as the most widely used and accepted diagnostic approach for PTSD evaluation in the Turkish child population, we chose the CFA approach. Thus, our analysis is theoretically driven. Rather than empirically-driven studies, which seek to "explore" a factor structure that best fits the data, we decided to take a more theoretical route. While EFA results are subject to capitalization on chance variation, CFA models are not—they simply confirm (or disconfirm) an a priori model [35]. EFA results produce statistically sound models, but the theoretical rationale to support such results may often be weak. The CFA model was, thus, conducted to determine whether the DSM-IV-TR three-factor structure for PTSD corresponded with data collected on Turkish children using data from the CPTSD-RI. Questionnaire items (i.e., measured variables) were assigned to one of the three factors—intrusion (or re-experiencing), avoidance/numbing, and arousal—based on the authors' conceptual criteria and clinical judgment (Table 1).

A total of seven items were excluded from the CFA model because the authors concluded that they did not pertain conceptually to one of the three factors (see Table 2). Following guidelines from Kline [35], the model was specified, identified (mathematically and empirically), and fit was estimated using EQS software. Estimation was conducted using maximum likelihood procedures [14, 35, 38]. In this analysis, global fit indices were of primary interest, indicating whether the prescribed three-factor model significantly explained the observed correlations. Fit indices reported include χ^2 (i.e., chi-square), Comparative Fit Index (CFI) and the Root Mean Square Error of Approximation (RMSEA). To determine goodness of fit, we adhered to the commonly accepted cut-offs of 0.900 or higher for the CFI and 0.050 or lower for the RMSEA [29].

Results

Prior to statistical analyses, all dependent and independent variables were tested for assumptions of normality, linearity, and outliers. Histograms and normality statistics revealed that all variables were found to be reasonably "normal." Preliminary data inspection showed outliers for total scores on the CPTSD-RI.

Based on the total PTSD score on the CPTSD-RI, 10.9% of the participants reported few or no symptoms, 29.7% reported symptoms as mild, 31.4% as moderate, 24.2% as severe, and 3.8% reported very severe levels of PTSD (for more information, see Bal [6]). The total score on the CPTSD-RI produced a Cronbach's alpha of 0.86 as a reliability test. The Pearson product-moment correlation revealed a strong positive correlation between level of exposure (LoE) and PTSD scores [$r = 0.56$, $P < 0.0001$]. There was a significant difference in the total scores for females ($M = 35.09$, SD = 14.66) and males ($M = 24.61$, SD = 13.58). Moreover, there was no significant correlation between survivors' age and their scores on CPTSD-RI [$r = -0.004$, $P > 0.05$]. Univariate analysis of variance indicted that level of exposure, age, and gender did not interact to determine the PTSD symptoms (Table 3).

Table 1 CPTSD-RI items assigned a priori to PTSD symptom clusters

PTSD symptoms (according to DSM-IV-TR)	Item number	Item
Intrusion (or re-experiencing)	1	Do you get scared, afraid or upset when you think about the disaster?
	2	Do you go over in your mind what happened—that is, do you see pictures in your mind or hear sounds in your mind about the disaster?
	3	Do thoughts about the disaster come back to you even when you don't want them to?
	4	Do you have good (?) or bad dreams about the disaster or other bad dreams?
	16	When something reminds you, or makes you think about the disaster, do you get tense or upset?
Avoidance/numbing	6	Do you feel as good about things you liked to do before the disaster like playing with friends, sports, and school activities?
	7	Do you feel more alone inside, or more alone with your feelings—like other people really don't understand how you feel about what you went through?
	8	Do you feel so scared, upset, or sad that you don't really want to know how you feel?
	9	Have you felt so scared, upset, or sad that you couldn't even talk or cry?
	15	Do you want to stay away from things that make you remember what happened to you during the disaster?
Arousal	10	Do you startle more easily or feel more jumpy or nervous than before the disaster?
	11	Do you sleep well?
	13	Do thoughts or feelings about what happened get in the way of remembering things, like what you learned at school or at home?
	14	Is it as easy to pay attention (concentrate) as before the disaster?

Table 2 Questionnaire items omitted from CFA models

Item number	Item
5	Do things sometimes make you think it might happen again
12a	Do you feel bad or guilty because you didn't do something you wish you had done?
12b	Do you feel bad or guilty because you did do something you wish you had not done?
17	Since the disaster are you doing things again that you had once stopped doing (such as sleeping with someone, biting your nails or sucking your thumb)?
18	Do you have more stomach aches, headaches, or other sick feelings since the disaster than you did before?
19	Do you do things now that you wouldn't have done before (such as getting into fights, disobeying more, doing dangerous things when you play)?
20	How much would the things that happened to you during the disaster upset or bother most children your age?

Descriptions of overall fit for the CFA model tested are presented in Table 4. Based on these statistics, the model provided good fit to the data, as indicated by measures of overall fit, CFI, and RMSEA. That is, the CFI was well above 0.900 and the RMSEA was below 0.050. However, the chi-square statistic was statistically significant—χ^2 (51, $N = 293$) = 80.916, $P < 0.001$. This implies that the model did not fit the population perfectly. However, results of the χ^2 test should always be interpreted cautiously, regardless of its outcome, because it is a function of sample size [29, 40]. We expect the test statistic to be significant, even when the lack of fit is trivial, because of an insufficiently large sample size. Indeed, MacCallum et al. [40] suggest very large sample sizes (e.g., $N > 1{,}000$) in order to reject incorrect hypothesis based on the χ^2 significance test. Furthermore, the χ^2 statistic is often inflated because this test assumes measure variables are normally distributed, which is not the case with Likert item data [10, 11].

Discussion

There has been a growing interest in human responses to personal and collective traumas and PTSD. As the most common psychopathological response to the personal and collective traumas, the criteria for PTSD in DSM-IV-TR [3] were mainly developed for the adults in mainstream North American society on the basis of descriptions of war veterans. Hence, it is not clear whether these criteria accurately reflect developmental and cultural variations across societies and socio-cultural groups. Developmental stages and culture may well affect perceptions of trauma and manifestation of PTSD symptoms [16, 19, 25, 46]. Moreover, despite the fact that a substantial body of clinical and research literature supports the presence and validity of PTSD in children and adolescents across cultural and ethnic groups [8, 19, 47, 50], some important and specific issues concerning the precise

Table 3 Age, gender, level of exposure factor and interaction effects

Source	Dependent variable	Type I sum of squares	df	Mean square	*F*	Sig.	Eta squared
Corrected model	CPTSD-RI	50814.3	188	270.289	1.818	0.000	0.767
Intercept	CPTSD-RI	2624540.7	1	2624540.7	1779.5	0.000	0.945
Age	CPTSD-RI	1551.5	7	221.6	1.5	0.179	0.091
Gender	CPTSD-RI	8613.2	1	8613.2	57.9	0.000	0.358
LoE	CPTSD-RI	21035.3	28	751.3	5	0.000	0.576
Age × gender	CPTSD-RI	426	6	71	0.478	0.824	0.027
Age × LoE	CPTSD-RI	14091.6	104	135.5	0.991	0.681	0.477
Gender × LoE	CPTSD-RI	3415.6	23	148.5	0.999	0.474	0.181
Age × Gender × LoE	CPTSD-RI	1,681	19	88.5	0.595	0.902	0.098
Error	CPTSD-RI	15,461	104	148.7			
Total	CPTSD-RI	330816	293				
Corrected total	CPTSD-RI	66275.3	292				

$R^2 = 0.767$ (Adjusted $R^2 = 0.345$)

Table 4 Overall fit statistics for PTSD confirmatory factor analysis

	χ^2 (df)	CFI	RMSEA (90% CI)
CPTSD-RI	111.042 (74)	0.964	0.041 (0.024, 0.056)

conceptualization and diagnosis of childhood PTSD in different societies for the different type of traumas have not been resolved [5].

The 1999 Marmara Earthquake was a large-scale catastrophe, with two quakes above 7.2 on the Richter scale and tens of aftershocks with horrible negative consequences on the physiological, psychological, and social well-being of individuals, families, and the economic infrastructures. Several studies have been conducted on the survivors' responses to the Marmara Earthquake since 1999 and found a high prevalence of PTSD symptoms and comorbid disorders such as depression [7–9, 13, 21, 28, 34, 50, 54]. However, among these studies, most of the published works are prevalence studies on the adult survivors of the Marmara earthquake. The extent of the Turkish traumatic stress literature is still sparse compared to the devastating economic, social, and psychological consequences of the Marmara earthquake. Moreover, the studies focusing on the young survivors of the Marmara earthquake were conducted in a short period of time after the earthquake. Therefore, there were not any findings on the long-term trauma reactions of Turkish children and adolescents.

The analysis on PTSD prevalence in this sample revealed that almost 60% of Turkish child trauma survivors suffered from moderate to very severe levels of PTSD symptoms even 3 years after the 1999 earthquake. In a similar sample, Gokler [28] found that more than 72% of 519 children, ages 10–15, reported moderate to severe levels of these symptoms 6 months after the Marmara Earthquake. Another study conducted 11 months after the 1999 earthquake reported 74% of Turkish children in 4th and 5th grades showed PTSD symptoms [13]. Though these results from different samples indicate a slow decrease in the number of children with PTSD symptoms, the majority of the young Turkish survivors were still suffering long-term PTSD symptoms.

As noted above, traumatic stress studies on various types of traumas with the survivors from non-Western or developing countries have produced mixed results on the validity of the DSM's three-factor model. The research question we posed in this article involves the nature of evidence to support the three-factor symptom cluster model found in the DSM-IV-TR [3] with a population of Turkish children and adolescents who survived the 1999 Marmara Earthquake. Because we had a specific factor structure to test, with sound theoretical qualities, we employed a CFA analysis. This revealed that the DSM-IV-TR three-factor symptom cluster—intrusion (or re-experiencing), avoidance/numbing, and arousal—was supported within the sample, using data from the CPTSD-RI. Fit indices were within acceptable ranges and in-line with traumatic stress studies investigating symptom clusters of PTSD in different types of trauma, different ages, genders, and cultural groups [20, 23, 43]. As for the Turkish trauma survivors, our results coincide with Sahin et al.'s [50] study, which showed the DSM model to be applicable to their sample of young Turkish survivors. On the other hand, in a study of the survivors of the 1999 Marmara Earthquake, Erdur [21] suggested another three-factor solution for the Turkish earthquake survivors (i.e., re-experiencing/arousal, cognitive impairment, and numbness). These conflicting results again highlight the need for additional studies.

Several limitations to our study should be mentioned. First, though substantial, the size of the sample needed to be larger. As mentioned previously, running the CFA model on less than 300 participants could have affected the χ^2 significance test, which was found to be significant, suggesting that the model was statistically

different from the data. With samples smaller than 1,000 participants, however, it is not uncommon to have a significant chi-square statistic coupled with acceptable fit indices [40]. Second, we may have introduced a degree of bias in the items we decided, based on our clinical and conceptual judgments, to include or omit from the CPTSD-RI questions in the analysis. Clearly, the CPTSD-RI contains items not directly relevant to the DSM factor structure for PTSD. It may not be entirely clear, however, which items conceptually fit each factor and which do not pertain. Further studies analyzing these data may be able to evaluate alternative conceptualizations of item allocation.

Another limitation to the present study is the issue of testing alternative factor structures and models, using EFA models. The fundamental belief influencing this discussion is whether a factor analytic model should be induced by theory or empiricism. We have opted on the side of theory, choosing to test a widely-used, theoretically sound model, rather than sorting through numerous EFA models to find an empirically strong model, which may be, not be theoretically grounded. Jöreskog [32] and others recommend assessing and comparing a series of a priori models rather than only a single model. In essence, this would mean running a series of CFAs on different factor structures, and comparing fit of the models using a χ^2 difference test. Although this does not directly relate to the research question posed in the present study, it should be an aim of future research studies.

The final limitation relates to the PTSD identification procedures used. Assessment procedures combining interviews, observation, physiological tests, and self-report have been suggested to be the most effective, rather than using a self-report questionnaire in isolation [51]. We did not use a multidimensional assessment approach in this study because of funding and data collection measures necessary to obtain the high number of participants needed to run a CFA model.

In conclusion, our study and existing literature reviewed indicate the need for systematic studies on manifestation of trauma-related behaviors and psychopathological symptoms in young trauma victims from the developing countries and the minority groups in Western societies. As mentioned previously, these children and youth are the most likely to be exposed to the dangerous corollaries of natural disasters and their terrible aftermath (EM-DAT [44]). Lastly culture mediates human behaviors and affects mental health perceptions, practices and outcomes [3, 17], studies of traumatic stress should use a dynamic view of culture by incorporating elementary physiological effects of traumas with socio-historical factors in the cultural groups of trauma survivors and the survivors' individual life histories and characteristics, which enables and constrains survivors' trauma reactions.

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