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Post-Traumatic Stress Disorder in Turkish Child and Adolescent Survivors Three Years after the Marmara Earthquake

Aydın Bal

Arizona State University, College of Education, Division of Curriculum and Instruction, PO Box 871911, Tempe, Arizona USA. E-mail: Aydin.Bal@asu.edu

The study investigated the emergence of post-traumatic stress disorder (PTSD) symptoms in child and adolescent survivors in Turkey three years after the 1999 Marmara Earthquake, with consideration of the severity of exposure and the survivors' gender and age. A representative sample of 293 young earthquake survivors (152 female and 141 male between the ages of 8 and 15) participated in the study. Participants' scores on the Post-Traumatic Stress Disorder Reaction Index for Children indicated that 31.4% reported moderate, 24.2% reported severe, and 3.8% reported very severe traumatic stress reactions. Analysis of the Revised Impact of Events Scale for Children scores revealed that 56% reported severe PTSD symptoms. While severity of exposure and gender were significantly associated with severity of PTSD symptoms, age was not related to PTSD symptoms. The results indicated a high need for addressing the mental health problems of the child and adolescent trauma survivors in Turkey.

Key Practitioner Message:

- Turkish children and adolescents showed severe long-term post-traumatic stress reactions three years after the 1999 Turkish Earthquake.
- Level of exposure and gender were strongly associated with childhood PTSD symptoms.
- Childhood PTSD symptom severity in Turkish children was unaffected by survivors' age.

Keywords: Post-traumatic stress disorder; Turkey; earthquake; children; adolescents

Introduction

Natural disasters are concentrated, inevitable, and most often unpredictable parts of our lives. The large-scale natural disasters such as earthquakes and hurricanes are prototypical community-scale crises; that is, natural disasters have influences over all populations, regardless of social status, gender, age, or economic class. Nonetheless, because of the economical and infrastructural pre-disaster factors and the social and economical oppressive historical trajectories, survivors from developing regions of the world experience the negative psychosocial consequences of natural disasters on an even greater scale (OFDA/CRED International Disasters Data Base [EM-DAT], 2006). Moreover it has been widely reported that compared to adults, younger people are more vulnerable to the negative psychological effects of traumas and develop post-traumatic stress disorder (PTSD) (Barrett et al., 1996; Salmon & Bryant, 2002; van der Kolk, 1985), despite the fact that only a small number of studies compared young and adult survivors traumatic stress reactions after the same disasters. In an extensive literature review, Norris et al. (2002) found that specifically two groups of trauma victims (children and the survivors from developing countries) have more risk of developing mental health problems after natural disasters. In contrast, the majority of traumatic stress literature reports the reactions of adult trauma survivors in economically developed countries (Davis & Siegel, 2000; Friedman & Marsella, 1996). Lack of understanding of post-trauma reactions of young trauma survivors and survivors from developing countries prevents us from addressing their psychological needs.

Most children and adolescents severely affected by a traumatic event suffer from several emotional and behavioural problems (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) (Dyregrov & Yule, 2006; Yule, 2001). PTSD is the most common mental health disorder following natural disasters in children and adolescents (Norris et al., 2002; Yule, 2001). It first appeared in DSM-III (American Psychiatric Association, 1980) but it was only with the publication of DSM-III-R (APA, 1987) that some PTSD symptoms specific to children were added. In addition, the International Classification of Diseases (ICD-10) (World Health Organization [WHO], 2007) lists

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similar symptoms but does not specify specific criteria for children. Moreover, there is still not one widely accepted theory about the 'typical' clinical presentation of PTSD in children (Cohen, 1998; Yule, 2001).

Predictors of childhood PTSD

A traumatic event by itself does not necessarily result in developing childhood PTSD. McNally (1996) suggested the prevalence of PTSD in child trauma victims might vary from 0%–100%. Several predictors such as severity of exposure, types of trauma, age of exposure, gender, time elapsed since trauma, cultural diversity, pre-trauma psychopathology, and access to social support have been documented as important predictors of childhood PTSD (Dyregrov & Yule, 2006; Loughhry & Eyber, 2003). Flouri (2005) stressed the need to conduct more studies on the epidemiology and mediating factors of childhood PTSD, which in turn would help to develop better treatment outcomes for young trauma survivors. In this study, severity of exposure, gender, and age of survivors were studied as predictors or mediating factors of childhood PTSD symptoms.

Severity of Exposure. The level, duration, and proximity of exposure have been reported as important predictors of PTSD (APA, 2000). Neuner et al. (2006) reported that PTSD symptoms among child tsunami survivors in Sri Lanka were directly related to the young survivor's severity of exposure to the disaster, as well as prior experiences of traumas and the loss of family members. In a study of 5,687 children aged 9–19, Lonigan et al. (1991) found the severity of exposure to a natural disaster was associated strongly with children's manifestations of acute PTSD symptoms and comorbid anxiety. If disasters resulted in death or injury of loved ones, the impact might increase and be further heightened when the children lost their pets and the familiar objects in their home and landmarks in the physical environment (Gordon, Farberow, & Maida, 1999). Kolaitis et al. (2003) and Groome and Soureti (2004) reported that children who experienced physical injuries and lived in most damaged places showed higher levels of PTSD symptoms scores following the 1999 Greek earthquake.

Age. The childhood PTSD literature indicates that the relationships between age of children and trauma responses are mixed. Davidson and Smith (1990) found that PTSD symptoms were three times more likely to occur when a traumatic event took place before the age of 11. In a study of 5,664 child and adolescent Hurricane Hugo survivors, Anthony, Lonigan, and Hecht (1999) found that younger children reported significantly more severe PTSD symptoms than did adolescents. Lonigan et al. (1991) found that, after a hurricane younger children exhibited more PTSD and anxiety symptoms compared to older children. On the other hand, in a study of 59 trauma survivors ages 8–18, Silva et al. (2000) found there was no significant relationship between survivors' age and the severity of PTSD symptoms. Similarly, one and a half years after the 1988 Armenian Earthquake, Pynoos et al. (1993) reported no significant age differences in PTSD severity scores. Foy et al. (1996) stated that the relationship between survivors' developmental levels and trauma reactions was likely to be complex rather than a simple linear one.

Gender. Overall, gender has been thought to predict the type or severity of symptomatic trauma responses. After a major trauma, being female put a child survivor five times more at risk for developing PTSD than being male (Breslau et al., 1997; Dyregrov & Yule, 2006). Lonigan et al. (1991) found at each of four-exposure severity levels (none, mild, moderate, and high), girls exhibited more PTSD and anxiety symptoms than boys did. Ostrov, Offer and Howard (1989) pointed out that while boys are likely to show psychological disturbances through externalising behaviour problems such as acting out, girls often exhibit distress through internalising behaviour problems such as depression or anxiety.

Cross-cultural trauma studies. There is a paucity of cross-cultural research on childhood PTSD. While there are universal neurobiological responses to traumatic events, the socio-cultural differences influence the perceptions and expressive dimensions of the traumatic experience and PTSD symptoms (Marsella, Friedman, & Spain, 1996). A number of cross-cultural disaster studies showed that PTSD symptomology was valid in non-Western countries (de la Fuente, 1990; Goenjian et al., 2001; Lima et al., 1991). However, overall, cross-cultural trauma studies are characterised by a comparatively small body of literature (Green, 1996).

Long-term stress reactions and chronic PTSD symptoms. Most of the childhood traumatic stress literature focused on immediate or acute stress reactions of the survivors. Thus, comparatively little is known about the development of chronic symptoms of PTSD. Follow up studies reported that children who experienced a life-threatening trauma suffered from severe psychological symptoms, if they were not treated (Dyregrov & Yule, 2006). For example, Pynoos et al. (1993) found that out of the 111 children, aged between 8 and 16, 78 children met criteria one and half years after a major earthquake in Armenia. Studying the natural course of the traumatic reactions can provide invaluable information to design effective therapies for the survivors suffering from chronic PTSD.

On August 17th, 1999, the Marmara Earthquake, registered 7.4 on the Richter scale, hit the industrial heartland of Turkey. It was the greatest disaster in the history of the Turkish Republic and classified as the sixth deadliest earthquake of the 20th century. According to conservative estimates, this devastating disaster led to a death toll of 19,000. Fifty-four thousand people were injured and almost 1.5 million people were made homeless (Basoglu et al., 2004; Kilic & Ulusoy, 2003). At least 1,391 aftershocks were reported following the original quakes with magnitude on the Richter scale ranging from 2.4 to 5.4. In November 1999, the same region of Turkey was exposed to another massive earthquake rated 7.2 on the Richter scale. The second earthquake resulted in further devastation and casualties. Eight hundred forty-five people were killed and 4,948 people were injured. The Marmara Earthquake affected 30,000 square kilometers where approximately 6 million people live.

Turkey has a young population; more than 50% of the population in Turkey is under 20 years old (Republic of Turkey, Prime Ministry State Institute of Statistics, 2002). Thus, there were hundreds of thousands of children and adolescents affected by this disaster.

This is the first article from a large research study conducted three years after the Marmara earthquake. It aims to identify the emergence of long-term PTSD symptoms of these young survivors with consideration of their age and gender and the severity of exposure.

Method

Setting

A research proposal including the research instruments were submitted to the Division of Primary Education at the Turkish Republic Ministry of Education and Izmit Mayor's Office (IMO) to obtain permission to conduct the study. With the help of the IMO, eight primary schools in Izmit, the epicenter of the earthquake, were selected in the areas where the damage was moderate or severe. Questionnaires were administrated to the participants in groups in their classrooms by the researcher. Before each data collection session, participants were informed that their participation was voluntary and they had the right to withdraw from the study at any time without penalty. It was clarified that there were no right or wrong answers to the questions. The participants were encouraged to respond openly to each item and ask questions to the researcher if they needed any explanations. In order to facilitate comprehension, each item on the measures was read aloud to all of the participants in grades three through five.

Participants

The participants in the study were 293 children and adolescents who experienced the Marmara Earthquake in Izmit. The age range was 8–15, with a mean of 11.15 ($SD = 1.54$). One hundred and fifty-two participants were female (51.9%) and 141 (48.1%) were male. All participants were attending school, from third through to eighth grade.

Instruments

PTSD Symptoms. The Revised Impact of Event Scale for Children (R-IES) is a 13-item self-report measure of childhood PTSD. R-IES was adapted from the Impact of Event Scale (IES) (Horowitz, Wilner, & Alvarez, 1979) for children by Yule and Williams (1990). R-IES has been used with children 8 years of ages and older. The scale was developed based on the assumption that two major symptom clusters (intrusion and avoidance) are commonly experienced by trauma survivors (Dyregrov, Kuterovac, & Barath, 1996). Items are scored 0, 1, 3 or 5. The maximum possible total score is 65. Higher scores indicate more symptoms. A score of 17 or above suggests that the individual is likely to meet diagnostic criteria for PTSD upon interview. It has excellent reliability and good concurrent and predictive validity (see Balaban, 2006; Perrin, Meiser-Stedman, & Smith, 2005; Stallard, Valleman, & Baldwin, 1999).

R-IES was translated to Turkish and used by Sahin et al. (2001) for the Turkish Ministry of Education-UNICEF Psychosocial School Project following the Marmara Earthquake. The reliability and validity coefficients are based on a sample of 664 adolescents exposed to the Marmara Earthquake. Cronbach's alpha reliability coefficient for the total scale was .88. Test-retest reliabilities over two months ranged between .40 ($p < .001$) and .66 ($p = 001$).

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. Frederick, Pynoos and Nader (1992) revised it as a self-report questionnaire. It has a high internal consistency (Cronbach's alpha = .89) (Lonigan et al., 1991). Vernberg et al. (1996) reduced the 5-point Likert-type scale to a 3-point response format (0 = none of the time, 2 = some of the time and 4 = most of the time) in order to simplify the presentation for children. The maximum possible score is 80. Raw scores of 0–11 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 CTPSD-RI is one of the most widely used measures of childhood PTSD after exposure to a broad range of traumatic events such as natural disasters, war, life threatening illness, or sexual abuse. The Turkish version of the scale was used by different studies. Erdur (2002) found the coefficient was as .88. Gokler (2001) reported that the CPTSD-RI showed high internal consistency (Cronbach's alpha = .84).

Level of exposure. Level of Exposure Scale (LoE) is a 4-point Likert-type self-report scale (1 = none; and 4 = a great deal) developed by Erdur (2002) based on Nolen-Hoeksema and Morrow's (1991) four questions to define the stress from the earthquake. It has six questions and the overall level of exposure is the total score of these six ratings (minimum score: 0 and maximum score: 24). The questions are as follows: How much damage did the earthquake cause to the area where you were when the earthquake happened? How much damage did the earthquake cause to your house? How much stress did you experience by losing family members and/or close friends during the earthquake? How much stress did you experience because your family members and/or close friends were injured by the earthquake? How much stress did you experience because you were injured by the earthquake? How much of your daily life has been inconvenienced as a result of earthquake? LoE was translated from English to Turkish and from Turkish to English by three graduate students in counseling and clinical psychology. Then, ten Turkish people checked the questionnaire for the clarity of the items (Erdur). In her study of 440 survivors of Marmara earthquake, Erdur reported the inter-item reliability coefficient was .71.

Demographic factors. Information regarding age and the gender of the participants was obtained through a demographic information sheet. Age was re-coded into two categories (age group-1: 6 to 10 years old, age group-2: 11 years and older) (Dyregrov & Yule, 2006).

Data analysis

Prior to the statistical analyses, all dependent and independent variables were tested for assumptions of normality, linearity, and outliers. For the normality assumption, descriptive analyses were conducted and

skewness and kurtosis values were examined. An independent samples *t* test, and Analyses of Variance (ANOVA) were used. The independent variables of this study were defined as: the severity of exposure as assessed by the LoE; gender; and age. As dependant variables, total PTSD scores on R-IES and on CPTSD-RI were analysed separately. The 13 items of the R-IES and the 20 items of the CPTSD-RI were subjected to the Principal Component Analyses (PCA) individually by using SPSS.

Results

Histograms and normality statistics revealed that all variables were found to be within normal parameters. Pre-analysis data inspection showed that two outliers were participants who reported the most severe symptomology on R-IES; there were no outliers for CPTSD-RI scores. Outliers on R-IES were included in analyses to evaluate the adequacy of models to describe the full range of posttraumatic stress responses.

Level of exposure

Age, gender, and PTSD symptoms. The maximum score for the LoE was 24 and the minimum was 0, with a mean of 13.9 ($SD = 7.2$). On the total scores of LoE, according to independent samples *t* test, no significant difference was found between female ($M = 14.95$, $SD = 6.86$) and male ($M = 12.67$, $SD = 7.46$) survivors (Table 1). The relationship among level of exposure, age, and the total scores on R-IES and CPTSD-RI was investigated using a Pearson product-moment correlation. Preliminary analyses were performed to ensure no violation of the assumption of normality, linearity, and homoscedasticity. The Pearson product-moment correlation revealed no significant relationship between age and LoE ($p > .005$).

R-IES, gender and age. Fifty-six per-cent of the participants reported a total score higher than 17, which suggests based on R-IES an individual is likely to meet the criteria for childhood PTSD upon interview. Overall, the mean level of PTSD symptoms assessed by R-IES was moderate with a mean of 20.87 ($SD = 13.2$). The R-IES showed significant differences between female and male with 99% confidence. The mean score for females ($M = 23.98$, $SD = 13.66$) was higher than that for males ($M = 17.52$, $SD = 12.14$). The majority of the female population (66.4%) might meet diagnostic criteria for PTSD whereas only 44.7% of the boys were most likely to meet diagnostic the criteria for PTSD upon interview.

Table 1. Total PTSD and level of exposure scores by gender.

Measures	Gender	*n*	*M*	*SD*	*SEM*
R-IES	Female	152	23.98	13.66	1.11
	Male	141	17.52	12.14	1.02
CPTSD-RI	Female	152	35.09	14.66	1.19
	Male	141	24.61	13.58	1.14
LoE	Female	152	14.95	6.86	.56
	Male	141	12.67	7.46	.63

R-IES = Revised Impact of Event Scale for Children; CPTSD-RI = Post-Traumatic Stress Disorder Reaction Index for Children; LoE = Level of Exposure.

Lastly, a Pearson product-moment correlation was performed. No significant correlation was found among survivor's age and their total scores on R-IES ($p > .005$)

CPTSD-RI, gender and age. Of the 293 participants, 32 (10.9%) reported few or no symptoms of PTSD; 87 (29.7%) reported mild; 92 (31.4%) reported moderate; 71 (24.2%) reported severe; and 11 (3.8%) reported very severe levels of PTSD. An independent samples *t*-test was employed to compare the total scores on the CPTSD-RI for females and males. There was a significant difference in the total scores for females ($M = 35.09$, $SD = 14.66$) and males ($M = 24.61$, $SD = 13.58$). Of the 152 females, only 4.9% reported few or no symptoms of PTSD. Approximately 19.1% of the females described mild, 32.2% moderate, 37.5% severe, and 6.6% very severe PTSD symptoms. Compared to females, males reported less severe PTSD symptoms;15.6% reported few or no symptoms; 36.9% mild; 25.5% moderate; 19.9% severe; and 2.1% very severe PTSD symptoms. Lastly, a Pearson product-moment correlation was performed. There was no significant correlation among survivors' age and their scores on CPTSD-RI ($p > .005$).

R-IES and CPTSD. The relationship between two measures of this study were examined using a Pearson product–moment correlation coefficient. The R-IES and the CPTSD-RI scores were significantly and positively associated with each other ($r = .76$, $p < .0001$).

Interaction effects. A univariate analysis of variance was performed to examine two- factor and three-factor interactions. Between subjects effects showed that the two-factor and three-factor interactions were not significant on either questionnaire.[1] In other words, level of exposure, age, and gender do not interact to determine PTSD symptoms assessed by the R-IES and the CPTSD-RI. On the other hand, level of exposure and the R-IES scores were positively correlated ($r^2 = .62$, $p < .001$). The CPTSD-RI had a strong positive relationship with level of exposure ($r^2 = .58$, $p < .001$).

Discussion

The majority of traumatic stress literature consists of research studies involving adult trauma survivors from developed countries. Studies focusing on child survivors of natural and man-made disasters in developing countries make up a small part of the PTSD literature (Green, 1996). This study aimed to identify the long-term PTSD symptoms in an economically developing country after a natural disaster.

The findings based on two of the most widely used childhood PTSD scales demonstrate that Turkish children and adolescents have been suffering from pervasive, severe and chronic post-traumatic stress reactions. In terms of personal predictors of PTSD symptoms, the severity of exposure and gender were strongly associated with child and adolescent survivors' manifestations of chronic traumatic stress reactions. On the other hand, the PTSD symptom severity was

[1]A detailed summary of the analysis is available from the author on request.

unaffected by age. Our findings are congruent with the trauma studies of adults (Brewin, Andrews, & Valentine, 2000; March, 1993; van der Kolk, 1985), children and adolescents exposed to disasters (Lonigan et al., 1991; Pynoos et al., 1993), and the child survivors of community violence (Pynoos et al., 1987). However overall, this study indicates comparatively higher prevalence of PTSD than the other studies in the trauma literature (Pynoos et al., 1993; Yule, 2001). The majority of the population in the earthquake zone had to reside in tents or prefabricated houses for several years after the earthquake. This and the lack of continuous psychological and social services provided for these youth may explain the high level of long-term PTSD symptoms.

In addition, gender played a significant role in the manifestation of PTSD symptomatology. Females reported more PTSD symptoms on both self-report instruments than did males, whereas there was no significant difference between females and males in reported severity of exposure. This result is consistent with the majority of childhood traumatic stress studies on adolescent and child victims of trauma that suggested females appeared to be at higher risk of developing PTSD (Breslau et al., 1991, 1997; Davis & Siegel, 2000).

In the childhood PTSD literature, findings on the relationship between age and severity of PTSD symptoms are varied. The findings in this study revealed that age was not significantly associated with PTSD symptoms. This result is consistent with earlier studies on both adult and child Turkish earthquake survivors (Erdur, 2002; Gokler, 2001) and other international trauma studies (Pynoos et al., 1987; Pynoos et al., 1993; Silva et al., 2000).

Limitations and implications for future studies

There were some factors, which might have affected or limited this study. First, a systematic randomisation and a non-exposed control group were not used. Secondly, the study relied upon self-report measures. It has been suggested that a comprehensive assessment of PTSD in children and adolescents should be multidimensional and include interviews with child and primary caregivers, preferably in a semi-structured format with direct questioning regarding PTSD symptoms and other psychological problems such as depression (Davis & Siegel, 2000; McNally, 1996; Perrin, Smith, & Yule, 2000). However, in this study a multidimensional assessment was not economical and practical to reach a large sample of participants. For future studies, combinations of the multi-source assessment tools may be more helpful to measure trauma reactions across different areas of functioning across time and contexts. Lastly, it is worth noting that some items of the LoE may cause confusion between subjective reports of traumatic stress and degree of exposure.

In this study, age gender and level of exposure were taken as predictors of severity of PTSD symptoms. Taking other personal and social predictors, prior experiences of trauma, family dynamics, pre-trauma psychopathologies, and self-confidence with regard to vulnerability and resilience, the available psychosocial resources in future studies could be helpful to develop a better understanding of childhood PTSD.

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