

Comparing the earthquake exposed and non-exposed Turkish children's Post Traumatic Stress Reactions

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Título: Comparación de las reacciones de estrés post-traumático en niños turcos expuestos y no expuestos a terremoto.

Resumen: Desafortunadamente, Turquía se encuentra en una zona propensa a terremotos; por consiguiente, los niños turcos tienen riesgo de desarrollar trastornos de estrés post-traumático (TEPT) causado por la exposición a terremotos, tanto en la amenaza anticipada de terremoto como en sus réplicas. Este estudio tiene el objetivo de identificar las reacciones de TEPT al desastre en niños turcos expuestos y no expuestos al gran terremoto de Marmara de 1999 en las dos ciudades turcas de Sakarya y Edirne. Los datos de ambos grupos, control y trauma, fueron recogidos en Mayo de 2000. Se utilizó el *OSU-Child PTSD Inventory* para evaluar los síntomas TEPT. Se aplicaron estadísticos descriptivos y pruebas *t* para muestras independientes para comparar a los grupos expuestos y no expuestos en términos de frecuencias de diagnóstico TEPT en categorías débil, moderado, severo y muy severo. Estos resultados indican que las tasas de prevalencia estimada de PETP alcanzaron una proporción muy alta de 73% en el grupo expuesto a terremoto y un 9% en el grupo control no expuesto. El número de niños para un diagnóstico posible de TEPT en los grupos expuestos a trauma fue seis veces mayor que en el grupo control no expuesto, 144 *versus* 24, respectivamente. Los psicólogos y profesionales de salud mental deberían considerar estas altas tasas de severidad y prevalencia de TEPT cuando desarrollen programas de tratamiento, intervención y prevención para niños después de catástrofes naturales y tecnológicas. Los resultados indican que la exploración temprana para la identificación de TEPT es muy importante para predecir ulteriores efectos de TEPT.

Palabras clave: Severidad de TEPT; prevalencia de TEPT; niños supervivientes de terremotos.

Abstract: Unfortunately, Turkey is stretched out on the earthquake fault line; therefore, Turkish children are at risk of developing posttraumatic stress disorder (PTSD) caused by earthquake exposures and the threats of the anticipated earthquakes as well as aftershocks. This current study aimed at identifying PTSD reactions of disaster exposed and non-exposed Turkish children after the big 1999 Marmara earthquakes in the two cities as Sakarya and Edirne, Turkey. The data for both of the trauma and control groups were collected in May of 2000. OSU-Child PTSD Inventory was used for assessing the PTSD symptoms. The descriptive statistics and independent samples *t* tests were utilized to compare the exposed and non-exposed groups in terms of frequencies of PTSD diagnosis in mild, moderate, severe and very severe category. The results indicated that the estimated prevalence rates of PTSD reached on a very high proportion of 73% in the earthquake exposed group whereas 9% in the non-exposed-control group. The numbers of children for possible the PTSD diagnosis in the exposed-trauma groups were 6 times more than in non-exposed-control group, 144 *versus* 24, respectively. Psychologists and mental health providers should consider these high severity and prevalence rates of PTSD when developing treatment, intervention and prevention programs for children after natural and technological disasters. Results indicates that early screening for identification of PTSD is very important in predicting the lasting effects of PTSD.

Key words: Severity of PTSD; prevalence of PTSD; earthquake survivors children.

Traumatic experiences have the potential for creating long term and short-term symptomology. People experiencing a major disaster or life threatening events are likely to develop some sort of psychological aftereffects regardless of their age and coping mechanisms. Post traumatic Stress Disorder (PTSD) is one of the new disorders which has been recently introduced to the DSM nomenclature. It seemed that stressful events affect people at various degrees for some time. At other times the symptoms will have a delayed onset and worsen over time (McFarlane, Policansky, and Irwin, 1987). There are reported cases of PTSD that last an individual's life span and the worst one above all is that it may transform from one generation to the next generation. In the literature this phenomena is called "transgenerational trauma" (Segal, 1983) and "intergenerational trauma" (Yehuda *et al.* 1998).

Earthquakes and PTSD

Earthquakes pose one of the most dangerous types of natural disasters due to the power of life-threatening, unpredictable and uncontrollable nature of the phenomena (Başoğlu

& Mineka, 1992). Earthquakes cause such a widespread devastation that leaves survivors at risk for injury, loss of property, homelessness and dislocation (McCaughy, Hoffman & Llewellyn, 1994). In addition, the lack of advance warning systems causes confusion and shock. People find themselves completely unprepared for earthquake physically and psychologically as well.

In the psychology literature, there is a growing awareness addressed to the psychological sequelae among children and adolescents. The effects of disasters on children's mental health are well established. Natural catastrophes may cause physical, psychological and physiological stress for the survivors. Due to their frequent occurrences, earthquakes and hurricanes are the most commonly researched natural phenomenon (Roussos *et al.*, 2005). Powerful earthquakes can cause thousands of casualties and can have long term consequences (Goenjian *et al.* 2000). The findings of previous studies involving earthquake survivors suggest that PTSD symptoms are common among the trauma victims (Başoğlu, Şalıcıoğlu & Livanou, 2002; McMillen, North & Smith, 2000). McFarlane, Policansky & Irwin (1987) emphasized post disaster adversarial and natural disasters' possible aftereffects. With regard to post-disaster adversities, La Greca, Silverman, Vernberg & Prinstein (1996) reported that the

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traumatic life events may have an additive affect on children's post disaster reactions. Similarly, Garrison, Weinrich, Hardin & Wang (1993) mentioned that some disasters have powerful effect on causing more traumatic symptoms than the others. Additionally, some authors have argued that some types of natural disasters are more likely to evoke symptoms typical of the PTSD syndrome than that of other types (Garrison *et al.* 1993). The prevalence rates of PTSD in earthquake affected communities have only recently started to attract the attention of the researchers. There is also new research trends geared towards cross-cultural comparison of traumatic experiences. Thus, it will be interesting to see what kinds of specific results emerge as a result of the earthquake experiences.

Post-traumatic stress disorder (PTSD) is one of the most frequently used diagnostic categories arising from traumatic experiences (Magritte, 2000). In order to be diagnosed with this disorder, a person has to experience a traumatic event that threatens death or injury for that person or somebody whom the person knows. In addition, there are major symptom clusters; a) intrusions, such as flashbacks and nightmares where the traumatic event is re-experienced; b) avoidance, where the person tries to avoid places and objects that remind him/her of the original experience; and c) hyperarousal, physiological arousal such as hypervigilance or increased startle response. If these symptoms persist for more than a month, and cause significant impairment in the person's life, then the person meets the qualifications for a diagnosis of PTSD (American Psychological Association, 2000).

Originally, it was assumed that children would follow the same course of response as adults who had been traumatized. Terr (1979; 1981) conducted an extensive longitudinal study of kidnapped children in California and identified child specific symptoms such as fear of death, separation anxiety, identification with perpetrators or hallucination of perpetrators, traumatic amnesia, reenactments, wishful thinking, a sense of foreshortened future. Terr (1979) was the first to distinguish trauma responses and long term effects in children from the effects on adolescents and adults. Yule and Udwin (1991) argued that children as young as 8 years old can suffer from PTSD in ways that are identical to those suffered by adults. Garbarino and Kostenly (1996) explained that younger children were more susceptible to the negative consequences of multiple risks than older ones. Moreover, Hoffman, Levy-Shiff, Soholberg, and Zarizki (1992) reported that adolescents possess a greater variety of coping skills than pre-adolescents and use them more efficiently. Similarly, Pynoos and Eth (1985) agreed that adolescents have greater cognitive skills and can formulate a greater variety of cognitive reappraisals and inner plans of action. Therefore, these skills allow them to stay normal and function well. Research shows that pre-adolescent children are more at risk for PTSD than older children. In the same way, Shannon, Lonigan, Finch & Taylor (1994) found that children younger than 13 were more likely to be affected by trau-

matic events than the older children. Similarly, in a recent study in Taiwan elementary school students experienced more severe PTSD symptoms compared to junior high schools (Chen, Lin, Tseng & Wu, 2002).

Prevalence rates of PTSD

Early trauma studies had methodological limitations because of their small sample size, use of different instrument, different time lags, lack of probability samples and control groups. Furthermore, they were conducted either within the acute phase of PTSD (Bergiannaki, Psarros, Varsou, Pappariopoulos & Soldatos 2003) or within the first 3 months after the earthquakes (Bergiannaki, Soldatos, Markides, Kontaxakis, Sofia & Voskidou *et al.* 1990). Most early studies of PTSD focused on adults and until recently there was little evidence for PTSD symptoms in children (Vogel & Verberg, 1993). One possible explanation for the lack of evidence of PTSD in children in the earliest studies is that they mostly relied on parents or teachers' ratings which tend to underestimate the level of distress experienced by children (Earls, Smith, Reich & Yung, 1988). However, recent studies in which children completed PTSD symptom rating scales have confirmed the existence of PTSD phenomenon in children (Smith, Perrin, Dyregov & Yule, 2003). Recent studies seem to be more sensitive in terms of methodology, sample and assessment of content through PTSD.

Epidemiological studies of PTSD revealed different rates depending on the nature and duration of trauma. Magritte (2000) reported that the incidence and lifetime prevalence rates of PTSD in the general population were around 1% to 9%, respectively. Frequencies of PTSD have varied considerably from a low of 0% (Earls, Smith, Reich, & Jung 1988) to 37% (Green *et al.* 1991) two years after The Buffalo Creek Dam collapse. Other studies reported PTSD symptoms and impairments as high as 80% (Titchener, Kapp, & Frederick, 1991) and McFarlane *et al.* (1987) 33% in an Australian bush fires two years after the disaster. A community study reported 50 % of lifetime PTSD in Armenian survivors after the 1988 Spitak earthquake (Armenian, Morikawa, Melkonian, Hovanesian, Haroutunian & Saigh *et al.* 2000). Studies have indicated that children and adolescents who are exposed to the 1988 Armenian earthquake were suffering from chronic and severe PTSD symptoms even years after the calamity (Goenjian, *et al.* 1995).

The literature includes only a few studies of psychological status of Turkish earthquake survivors, in spite of the fact that Turkey is located on the first degree earthquake fault line. Turkish researchers Alyanak, Ekşi, Toparlak, Pekerli, & Saydam (2000) argued that trauma studies in Turkey focused on adults and samples chosen for the studies are very low and needs more variations. Trauma studies in Turkey are mostly concentrated on the theme of depression and anxiety disorders rather than PTSD. However, there are a few new studies regarding children PTSD reactions. Gökler (2001) investigated the severity of the PTSD in children 6

months after the Marmara earthquakes in Turkey. In this study, %34 of the children were moderate, %38 high and %9 were in a very high category.

A commonly researched risk factors for earthquake related psychopathology include the level of exposure, (Rousos *et al.* 2005), actual or hypothetical threat (Carr, Lewin, Webster, Kenardy, Hazell & Carter, 1997), proximity to the earthquake's center (Armenian, Morikawa, Melkonian, Hovanesian, Haroutunian & Saigh *et al.* 2000), and damage to the properties (Bland, O'Leary, Farinero, Jossa & Trevisan, 1996). Furthermore, the degree of experienced stress may be related to the female gender (Başoğlu, Şalcıoğlu & Livanou, 2002), low level of educational attainment (De la Fuente, 1990), and past emotional problems (Başoğlu, Şalcıoğlu & Livanou, 2002).

One of the common feature of the disaster studies is the notion of proximity. The severity of the PTSD is closely related to the degree of exposure to injury or danger which is known as "dose of exposure". For example, Pynoss *et al.* (1993) reported that following an earthquake in Armenia children residing closest to the epicenter manifested more severe PTSD symptoms than those living further away. This finding was also observed in Taiwan, children near the epicenter were experiencing PTSD symptoms 1 year after the disaster (Chen, Lin, Tseng & Wu (2002). Researchers have began to investigate more firmly the relationships between the PTSD severity and proximity phenomenon.

The Purpose of the Study

On the 17th of August 1999, a major earthquake as 7.4 on the Richter scale hit the northwestern part of the Turkey. The tremor lasted approximately 45 seconds and was followed by several aftershocks and earthquakes over the next few months. The epicenter was the portal town of Gölcük, in İzmit. The most severely area lied through the diameter of 100 km from the epicenter. The disaster affected a huge metropolitan area which covered approximately 500 km. The earthquake caused to the deaths of 20.000 people and left half of million people homeless. Many of the citizens living close to the epicenter were subjected to severe traumatic experiences.

The present study was based on the experience of the 1999 Marmara earthquakes children experiences. The study aimed at contributing to the existing knowledge in the field of trauma by comparing children from heavily effected and non effected cities of Turkey. Thus, the purpose of the study is to look at the psychological effects of the earthquake disasters on children. Particularly, earthquake-exposed and non-exposed group of the children were compared in terms of severity and prevalence rates of the PTSD reactions in two differentially effected cities in Turkey.

Method

Participants

The study sample was a convenience sample of 400 participants of 4th and 5th grade from four elementary schools located in two differentially affected cities in northwestern part of Turkey.

On May 2000, 11 months after the earthquake, a total of 200 students from 2 schools in the city of Sakarya, which is located at the epicenter, were evaluated for possible PTSD reactions. Another convenience sample of 200 students were recruited for the comparison purposes. For the control group data was collected again approximately at the same time, 11 months after the earthquake, and served as a comparison group, which is also composed of 200 students from the city of Edirne, where there was no damage and no loss of life was found.

First, the Sakarya Board of Education was contacted and information is gathered regarding the loss of life and the degree of damage the schools received by the earthquakes. The Sakarya Board of Education provided a list of all the schools in the district and their location and phone numbers. Since this study is aimed to measure traumatic effects of the earthquakes, the most severely affected schools were chosen as representative samples in Sakarya. In order to increase the generalizability, two cluster of samples were chosen from two different schools from the hardest hit areas and moderately hit areas in the downtown of Sakarya.

The city of Sakarya was one of the most heavily hit cities in the earthquake zone. Sakarya was mainly an industrial and urban settlement and part of a large metropolitan area. The city's community centers, schools, hospitals, and business buildings were destroyed to a great extent. Many factories were shut down for more than two months. As a result, there was significant lay-off resulting in large unemployment and migration into other cities. Many families lost either their houses or businesses which this post disaster adversarial created as secondary stressors. In short, the catastrophe was very heavy in magnitude and destructive in nature. In this city, post-disaster adversarial conditions lasted more than one year or even longer than that.

Trauma group (the city of Sakarya): The participants of trauma group are composed of children who have experienced the earthquake at first hand and directly affected by the disaster. The trauma group children were from the most heavily devastated neighborhoods of Sakarya. This part of town, which is the center of the city, was also known for the center of commerce activities and residential areas. Thus, 200 students were specifically selected as a representative sample, a number almost equal to 1/5th of the total 4th and 5th grade students in trauma group. There were 97 boys and 103 girls and 85 of them were 4th and 115 were 5th graders. The trauma group of students were also consisted of two groups of children; one group were the high impacted groups which were from the downtown area and the low impact groups of children from 8 kilometers north of the major disaster area. In previous research, the comparison of the two groups revealed no difference in severity and frequency of PTSD; therefore, these two groups combine together and are refereed as "trauma group" throughout the text.

Control group (the city of Edirne): The city of Edirne, which is situated approximately 500 kilometers northwest of the main disaster areas. Children form this town chosen to asses the difference of PTSD reactions in the trauma exposed and non-exposed group of students. The earthquake was not felt in this city and there were no

sign of distress among the residents of Edirne. The children in this city did not also experience any physical damage or personal injuries. Another 200 students from Edirne were recruited for this group as a control group. There were 105 girls and 95 boys, and there were 102 students in 4th grade and 98 were in 5th grade. This group served as the control group and is referred to as the "control group" throughout the manuscript. For both of the groups data was gathered 11 months following the earthquakes, which is at the end of May 2000 just before the schools started summer vacations. The control group students were also chosen from two public schools which had very similar socio-economic and demographic characteristics of the trauma group. The researcher tried to match the trauma and control groups in terms of the number and other important features of the cities and participant students.

Table 1: Demographic Information for the Trauma Group and Control Group.

Variables	Trauma Group		Control Group	
	Frequency	Percent	Frequency	Percent
Gender				
Female	88	44	105	52.5
Male	112	56	95	47.5
Age				
9	2	1	3	1.5
10	65	32.5	64	32
11	90	45.5	75	37.5
12	23	11.5	58	29
Grade				
4th	85	42.5	102	51
5th	115	57.5	98	49
Total	200	100	200	100

Instruments

The OSU Child - Post Traumatic Stress Disorder Inventory (OSU-PTSDI) was constructed by modifying previous PTSD scales (Evans, 2001). The DSM (Diagnostic and Statistical Manual) IV PTSD criteria were also included in the instrument items. The OSU Child-PTSDI has 31 items and it was originally designed as a 5-point Likert-like scale ranging from 0 to 4. In a study with Tornado survivors the reliability analysis of the OSU-PTSDI Inventory for Children was reported as .93 (Evans, 2001). In another study, norms and psychometric properties of this instrument was established with earthquake survivors of Turkish children (Bulut, 2003). For the present study the reliability analysis was found .92 for the trauma group and .94 for control group.

Procedure

Prior to the study, the investigator contacted to the Governor Office and Board of Education in Edirne and Sakarya by written communication and provided all the necessary information about the research by submitting all the survey and consent forms. After reviewing the research outlines and the other documents, both of the Governor Office and Board of Education granted permission for the study in both of the locations.

Two elementary school superintendents in cities of Sakarya and two in Edirne, Turkey, were requested to participate in this study. A master student, who are majoring in community counseling, explained the purpose and rationale for the study, assessment strategies, and time requirements, and gave copies of all research instruments and survey protocol forms for the superintendents' review and ap-

proval. Then, parents were informed and invited to participate in the study in order to screen the children in their schools for adverse psychological effects resulting from earthquakes. Both school administrations and parents agreed on screening of the children for any possible distress or upsetting conditions that might have come about as a result of a real disaster exposure and indirect exposure via media and news coverage on TV or in media. A Turkish researcher, a master student in counseling program, was in charge of data collection. The researcher visited the classes, read the script to the students and explained the aim of the research study with the participating students. The students were informed that the results would be used to help other students who have experienced similar traumatic incidents. Those students who were willing to sign voluntary assent forms were recruited for the investigation. Students were informed about the confidentiality of their responses by assuring that their names were not required and the only person was the researcher to see their answers.

The OSU Child-PTSD Inventory was administered to the children in their classrooms within a less than one class period. It took approximately 30 minutes to answer the survey packages in classrooms as a group. The researcher read the survey directions, answered any questions that raised by the participants regarding the purpose of the study, procedure and how they are going to fill out the forms and who is going to see the results etc. The data set was stored in a safety box for a 5 years. Finally, the data was entered into a computer and analyzed using SPSS program version 10 (SPSS INC, 2000) in the summer of 2005 summer. Therefore, the collected data was evaluated and considered as an archival data set.

Results

The first requirement in the DSM IV for PTSD is a traumatic event requiring a real or hypothetical threat to life of the individuals or their loved ones. The traumatic incidents have to be a serious injuries, threats to life and they should cause feelings of intense fear, terror, helplessness and hopelessness (Criteria A, APA 2000). Most of the children in the trauma-exposed group indicated that they had been "in an earthquake, experienced the moment of the earthquake shakes consciously and remembered the moment of the earthquake." The trauma-exposed students reported that they got very scared and felt very helpless during the event of 45 second earthquake. Children reported that they were aware of the earthquake and experienced the disaster in a very real and lively manner. Along with the tremor itself, children in the trauma group were subject to the post disaster adverse living conditions. For example, almost all of the children reported that their houses were damaged very badly and as a result of this, they had to move in tent city or a different location nearby to a family member. A majority of the children have witnessed that at least one person to have died under the debris, or injured and bladed. These traumatizing pictures have lasted for a while and it took years for the municipal authorities to clean the devastated areas.

The earthquake was such a big magnitude that it had the most destructive effect in terms of financial, physical and psychological in the history of Turkey. Therefore, children were exposed to the disastrous event from multiple sources. This descriptive data provides evidence that child survivors

fulfilled the requirement for the DSM IV TR criterion A 1 "the real traumatic event" and criterion A 2 "feelings of helplessness and hopelessness" for the PTSD diagnosis.

Even though children have not experienced the earthquakes in the city of Edirne, they were still distressed by the catastrophe. Similar to trauma group but not as severe as the trauma group, in the in the control group, 42% of the children got scared when thinking about the earthquake, 33% talked about the earthquake very often with their friends and teachers, 23% had bad dreams about earthquake, and 20% felt like the earthquake was happening again. It seems that although the control group were approximately 500 kilometers away from the main disaster area, and where there were no actual damage and loss of life and properties, about half of the children from control group reported some degree of upsetting feelings emerged from seeing the news on the TV.

The findings of the present study indicate that children exposed to the disaster showed a high degree of PTSD symptomology than the non-exposed control group. As illustrated in Table 2, children in the trauma group had significantly higher frequencies and more severe PTSD symptoms. The numbers of PTSD cases were 2,5 times in the mild category (50 versus 20 students), and than 13,5 times in moderate (54 versus 4 students) category in trauma group. Trauma group had 16% (34 students) severe and 4% (8 students) very severe PTSD symptoms whereas there was no severely or very severely effected children in the control group.

Tables 2 and 3 presents information about the frequency and percentage information of PTSD cases in trauma exposed group.

Table 2: Trauma Group' PTSD Rates.

Trauma Group (N=200)	Mild	Moderate	Severe	Very Severe	Total Number of PTSD
Frequency	50	54	34	8	144
Percentage	25	28	16	4	73
Means	47.48	69.66	82.20	99.62	53.87

Table 3: Control Group's PTSD Rates.

Control Group (N=200)	Mild	Moderate	Severe	Very Severe	Total Number of PTSD
Frequency	20	4	0	0	24
Percentage	7	2	0	0	9
Means	47.25	65.69	0	0	24.68

The results of this study indicated that in the 11th month of the following earthquake, children in the trauma exposed group were still highly affected and it seemed that this effect was 2.5 to 13.5 times that of the control group. This numbers represents a considerably higher PTSD rates. Therefore, based on the results in Table 2, it is clear that children in the trauma group were harshly affected and they carry the effects of earthquakes 11 months after the disaster. The es-

timated epidemiological PTSD prevalence rate was around 73 percent for the trauma group, whereas it was 9 percent in the control group (See Table 3). Overall results indicated that children in the trauma group had 6 times more PTSD diagnosis than the control groups (73% versus 9%). Additionally, the groups also differed in terms of severity of trauma and frequencies.

Furthermore, the groups mean differences was intended to explore via a series of independent group *t* tests. However, due to shortage of subjects in moderate category and lack of subjects in the severe and very severe category in the control group, *t* test was computed only for the mild category. The significance level was set at .05 to test the results. The *t* test results for the mild category was not significant ($t(63) = .146, p = .884$). This means that children in this lowest category have been affected at the same level and got their share from disaster equally. The mean scores were 47.25 versus 47.48 respectively. See Table 4 below.

Table 4: *t* Tests for high and low impact groups categories.

Groups	N	M	SD	df	<i>t</i>	<i>p</i>
Mild						
Control Group	20	47.25	5.31	63	.146	.884
Trauma Group	50	47.48	5.74			
Moderate						
Control Group	4	65.07	5.14	54		
Trauma Group	54	69.66	1.52			
Severe						
Control Group	0	-	-	34		
Trauma Group	34	82.50	2.82			
Very Severe						
Control Group	0	-	-	8		
Trauma Group	8	99.62	6.15			

Equal variances assumed.

Additionally, independent samples t-test was also computed to examine the group mean differences between the trauma and control groups as a whole. The t-test demonstrated that the trauma group and control group were significantly different at the .001 level ($t(398) = 9.96, p = .000$). Moreover, Cohen's *d* statistic was executed to scrutinize the effect size. This was $d = 1.22$, considered to be a very large effect size (see Table 5 below). Briefly, it appears that the trauma and control group were affected by the earthquakes in a different level. It is also observed that the trauma group's mean score was 2.5 times of the control group's evaluated means. The mean scores for the trauma and control groups were 53.81 versus 24.68, respectively.

Table 5: *t* Tests for trauma and control groups as total.

Groups	N	M	SD	df	<i>t</i>	<i>p</i>	Cohen's <i>d</i>
Trauma Group	200	53.81	23.84	398	9.96	.000	1.22
Control Group	200	24.68	23.89				

Equal variances assumed.

Discussion

The findings of the study clearly confirm the occurrence of PTSD symptoms in children following exposure to the 1999 Marmara earthquakes, in Turkey. The mean score in trauma expose children were comparable with other child disaster victims reported in previous studies (Kua, Tang, Tsay, Lin, Hu & Chen, 2003; Pynoos *et al.* 1993). The present study also provides support to the many previous studies for the effect of exposure effect on children's reactions because trauma groups PTSD mean scores were found higher than non-exposed groups (Pynoos *et al.* 1993; Goenjian *et al.* 2000).

A most often reported findings of the disaster studies is that the severity of PTSD symptoms is associated with the degree of exposure to severe injury and vulnerability, which is phenomenon is commonly known as "exposure effect" (Groome & Soureti, 2004). Also other studies mentioned about the importance of the proximity to the main disaster areas (Bradburn, 1991). Several disaster researches also pointed out the "dose of exposure pattern" in PTSD reactions which emerged from disaster. In Pynoos *et al.* (1993) Armenian children study, it was found that children living close to the epicenter reported more severe PTSD reactions than those living further away. Similarly, in Chen, Lin, Tseng, & Wu (2002) study with Taiwanese children also revealed that children who were close to epicenter were experiencing more PTSD. It seems that the same results were also replicated in the present study with the exception that the number of children to have qualified for the PTSD were far more than the previous studies. The results from frequency analyses indicated that children in the trauma group were qualified to diagnosis of PTSD 9 times than that of the control group. The incidence of PTSD in this study reached a very high percentage of prevalence (73 %) rate for a trauma group. This inflated PTSD prevalence rates were almost two or three times higher than previous studies. The results suggest that children in trauma groups were more severely affected by the direct exposure of the earthquake. There were also other studies reported as high as 80% PTSD prevalence rates (Titchener, Kapp, and Frederick 1991). These higher rates should not be surprising since younger children were more strongly affected by directly observed events (Groome & Soureti, 2004). Garrison, Bryant, Addy, Spurrier, Freedy & Kilpatrick (1995) argued that common stressful events occurring after the disasters might be more strongly associated with PTSD than the magnitude of contact with the actual disaster. This was also another possible explanation for the high and severe PTSD cases observed in this study. Actually, other studies of earthquake survivors with high trauma exposure (Groome & Soureti, 2004) have also reported high rates. High rates of PTSD for nearly one year post earthquake imply a chronic course for traumatic stress, and concurrent results were also reported in other studies (Goenjian *et al.*, 2000; Roussos *et al.*, 2005).

Furthermore, the results in the non-exposed control group were also astonishing since the children in this group also verified some degree of traumatic reactions (9%) even though they did not have experienced any sequele. Comparable results also reported by Wang, Shinfuktu, Zhang & Shen (2000) with Chinese, Pynoos *et al.* (1993) Armenian, Groome & Soureti (2004) Greek, Bradburn, (1991) American and Chen, Lin, Tseng, & Wu (2002) Taiwanese children. In consistent with the aforementioned studies, Roussos *et al.* (2005) reported that even children who were not in directly affected and did not experience the earthquake at first hand were significantly affected by the earthquakes in Greek via media coverage.

As it is observed in other studies, children in control group have had a plenty of indirect experience of earthquake damage via TV reports, news and hearing the survivors stories. This also provides further evidence that "vicarious traumatization" and "indirect traumatization" can also be as distressing as the real event (APA, 2000). Therefore, it appears that non-exposed children have experienced a certain degree of vicarious trauma as it is reported in elsewhere (Groome & Soureti, 2004).

Furthermore, some argue that PTSD symptoms might reflect community response to the event such that some communities were able to provide intense support for survivors that may minimize social withdrawal and numbing. On the other hand, when the community lacks the social support, PTSD rates may increase (McMillen, North & Smith, 2000). Since the earthquake in Turkey affected the entire metropolitan region, children's families, teachers, and friends were also victims themselves; therefore, they were not able to provide support for the loved ones.

Mental health counselors who are working with a trauma-exposed, trauma prone or at risk population should consider the nature of chronic, severe and high epidemiological rates of PTSD when planning intervention and prevention programs. Intervention and screening should be made as early as possible since the PTSD tends to be chronic in nature.

Additionally, further studies after a natural disaster should clarify the etiology and longitudinal course of PTSD. Practical and effective treatment models are also needed for children who are the victims of a major disasters. This is particularly needed in places where natural and technological disasters happens very frequently.

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