

## FACTOR ANALYSIS OF POSTTRAUMATIC STRESS DISORDER IN CHILDREN EXPERIENCED EARTHQUAKES IN TURKEY

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### Abstract

There are some countries that because of their situation on disaster prone areas, their children are more at risk than the rest of the world. For example, Turkey is located on the first degree earthquake fault lines and thus Turkish children are at risk for developing posttraumatic stress disorder (PTSD) due to exposure to the earthquakes and threat of the anticipated earthquakes as well as aftershocks and other post disaster adversaries. Two hundred 4<sup>th</sup> and 5<sup>th</sup> grade students were given OSU Child-PTSD Inventory eleven months after the 1999 Marmara earthquakes in the city of Sakarya. The purpose of the present study was to identify items that characterize fundamental dimensions of PTSD as it is demonstrated by Turkish children. The investigation of underlying dimensions of PTSD was assessed with exploratory principal component factor analysis technique. Factor analysis revealed 4 factor solutions, these appear to be: (1) interpersonal and adjustment problems (2) re-experiencing, (3) foreshortened future and (4) anxiety and avoidance. The results indicate that it may be more useful to re-consider the DSM-IV symptoms into four underlying dimensions. Therefore, psychologists and school counselors should consider these various dimensions of PTSD when developing intervention and treatment programs for disaster victims and students in their schools. Cross cultural differences are also need to be taken into account when applying the western-based knowledge in other countries.

**Key words:** Post traumatic stress disorder – PTSD, Factor analysis of post traumatic stress disorder, Child survivors of natural disaster

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Natural disasters pose a significant threat to millions of children living in all over the world. Especially, earthquakes constitute one of the most dangerous types of natural disasters due to lack of advance warnings and post disaster difficulties (Durkin & Thiel, 1993).

In the same way, Turkey lies at the junction of three major converging plates, continents and on the first degree earthquake zone and it there are three big fault lines on it (Sucuoğlu, Nurtuğ, Ergünay, & Genceoğlu, 1997). Thus, people who are living in Turkey experience earthquakes some degree on and off almost on a regular basis. It is possible to experience or hear news from TV everyday regarding the earthquake occurrences. Therefore, the potential and possible earthquakes creates a significant threat to the personal safety, property and mental health of people and children who live in earthquake prone areas in Turkey as well as other part of the world, including Japan and United States, which as very similar geographical and topographical regions.

Due to rare occurrences of earthquakes in the U.S and Western Europe, there are not many earthquake studies in the literature. However, earthquakes are very common natural disasters in other parts of the world. In these developing countries studies mostly focused on adult sample and ignored children post traumatic stress reactions (Wang, et al. 2000).

As it happens very often, Turkey experienced one of the worst harming and most expensive natural disasters in its history on August 17, 1999, when a 7.4 Richter scale magnitude earthquake struck at 3:15 a.m. and continued for 45 seconds in the Marmara region. The earthquake disaster originated at a depth of 17 km and had a 130 km length of heavily damaged zone (Scawthorn, 2000). This earthquake left behind 20,000 deaths and 500,000 homeless and many disabled and dislocated people. The tremor affected 5,000 sq-ml radius around and extended 700 km between two metropolitan cities of Ankara and Istanbul. This tragedy had impact on 15 million people living in this region, which is a quarter of Turkey's population. Furthermore, the initial earthquake was followed by many aftershocks and finally with another major earthquake on November 12, 1999. Along with these big earthquakes, there has been thousands of smaller magnitude of earthquakes and aftershocks every day.

Obviously, these natural disasters created physical and psychological stress for the survivors. In particularly, this study is concerned with 4<sup>th</sup> and 5<sup>th</sup> grade elementary school children's posttraumatic stress reactions to a major earthquakes and investigating the symptom constructs of the PTSD as it is observed in pre-adolescent children.

The fact that children who experience traumatic incidents experience similar symptoms to adults has been taken granted for a long time for a long time. First time the Diagnostic and Statistical Manual of Mental Disorder (DSM IV-TR) (APA, 2000) recognized that children might have different manifestation of traumatic symptomatology.

There have been no other studies employed mathematical approaches to study the symptomatology of traumatized children by earthquakes and to examine the degree of similarity with posttraumatic stress disorder arising in adulthood due to exposure to earthquakes.

Trauma literature includes various studies involving natural disasters, those includes studies with adult sample among them are the early studies with more descriptive approaches (Weinreb, 1954; Perry, Silber, & Block, 1956; Crawford, 1957; Moore, 1958; Perry & Perry, 1959) and later studies utilized more empirical statistical methodology, (Hurst, 1981; Mulilis & Duval, 1997; Chinnici, 1985; Penick, Powell, & Sieck, 1976; Zarle, Hartsough, & Ottinger, 1974; Madakaria & O'Brien, 1987; Palmer, 2001; Bulut 2003; Bulut, Bulut, & Taylý 2005; Bulut, 2006). There are also other studies on the effect of the hurricanes on children (Vernberg, La Greca, Silverman, & Prinstein, 1996; Lonigan, Anthony, & Shannon, 1998) and with adolescents Garrison, Weinrich, Hardin, Weinrich, & Wang 1993; Lonigan, et al., 1994; Garrison, et al., 1995).

Despite the frequency of the occurrence of earthquakes, the damage which they incur, the significant loss of life and hundreds of injures inflicted, earthquakes and their effects upon people have seldom been studied; and a review of the literature revealed very few studies examining the effects of earthquakes upon the mental health of the people and especially; children in Latin America or other third world countries, in which the traditional psychiatric studies have mostly focused on the adult samples (Ahearn, 1982; Wang, et al., 2000). Unfortunately the same trend was also observed in the US that many studies have been conducted with convenient college student samples (Nolen-Hoeksema & Morrow, 1991; Wood, Bootzin, Rosenhan, Nolen-Hoeksema & Jurgden, 1992; Durkin, 1993). Studies concerning children started with Howard and Gordon (1972) and Galante and Foa (1986) and Bradburn, (1991) studied the proximity and parental reactions of the earthquakes. Later studies carried out by Pynoos, et al. (1993); Goenjian, et al. (1995, 1997) with Armenian children; and Asarnow (1999) with American children. Thus, this study provides us a unique opportunity to study Turkish children reactions to two major earthquakes, which constitutes a multiple and prolonged trauma experience for them (Terr, 1991).

Previous researches were mostly epidemiological and prevalence studies (Bradburn, 1991; Lonigan, Shannon, Taylor, Finch & Sallee, 1994; Shannon, Lonigan, Finch & Taylor, 1994; La Greca, Silverman, Vernberg & Prinstein, 1996) and ignored factor structure of the PTSD which would be more suitable for PTSD criteria for assessment of traumatic events. In the same way, very few studies attempted to study the dimensionality of PTSD, particularly for an earthquake; there was no study about the factor structure of PTSD after an earthquake disaster involving children. Thus, this study attempted to fill the gap in the trauma literature and look at the symptom structure of PTSD as it has been manifested in Turkish culture. Such findings would improve professionals' understanding of the nature of natural disasters;

in particular earthquake-related PTSD by detailing the constellation of symptoms reported by earthquake survivors of children. Furthermore, the findings would allow for comparison of the PTSD symptoms structure across a broader range of trauma populations that can be either man-made or natural.

Finally, the factor analysis of the PTSD symptom structure in an earthquake survivors would add to existing data on the validity of the DSM-IV-TR PTSD symptom clusters and shed more light on the symptoms of PTSD that has been a topic of dispute among trauma experts.

### Historical Developments in the Understanding of PTSD

The diagnostic criteria for posttraumatic stress disorder have changed with each revision of the Diagnostic and Statistical Manual of Mental Disorders by the American Psychiatric Association. (APA, 1987, 1994, 2000). Indeed, posttraumatic stress disorder did not appear as a disorder until the DSM-III was published in 1980 (Sauter & Franklin, 1998). Since the traditional focus was on adults and their reaction to traumatic events, it was not until the publication of the DSM-III-R (American Psychiatric Association, 1987) that specific clinical guidelines were established for children (McNally, 1991) following publication of Terr's Chowchilla research (Terr, 1979, 1981, 1983). The DSM-III criteria have been empirically demonstrated to have appropriate specificity for diagnosing PTSD in children (Nader, Pynoos, Fairbanks, & Frederick, 1990; Pynoos et al. 1987; Saigh, 1989) but are considered by many to be too general and lacking in detail (Webb, 1991).

The DSM-III-R provides clusters of symptoms specific to children with PTSD such as a) reliving the traumatic event through repetitive play on the theme of the trauma; b) losing interest in activities may be expressed in the loss of recently learned developmental skills; c) acquiring a belief that future life goals will not be attainable; d) developing "omen formation", and e) exhibiting psychological and physical symptoms, such as separation anxiety and stomachaches (APA, 1987). The DSM-IV has few major changes from the DSM-III-R. The primary and most significant change was to acknowledge that children might react to a traumatic event with disorganized or agitated behavior (APA, 1994). Previously, the definition of the reaction to the stress was that of "intense fear, helplessness, or horror" (APA, 1987). The DSM-IV also got rid off the criterion of "loss of newly learned skills". However, the dispute is still remains regarding the appropriateness of the diagnostic criteria of DSM. Therefore, using the current criteria for diagnosis of PTSD, intervention and treatment makes it difficult for those who are working with child trauma populations.

The DSM-IV diagnostic approach assumes that PTSD represents a unitary concept, and demonstrated by three distinct symptoms structures. Keane (1993) argued that although clinical evidence and descriptive data support DSM-IV formulations,

empirical evaluations of the PTSD symptom clusters continue to be an important issue in trauma research. Additionally, Taylor, Kuch, Koch, Crockett and Passey (1998) suggested that further factor analytic studies of PTSD symptoms can advance our understanding and conceptualization of PTSD, because distinct factors may correspond to distinct mechanisms. Then, if the DSM-IV PTSD symptom clusters are not supported by empirical data, the DSM-IV diagnostic approach to PTSD and its undying assumptions have to be reconsidered (Cordova, Studts, Hann, Jacobsen & Andrykowski, 2000). Given the gaps in the literature and the risk to children living in Turkey and other disaster prone areas, the present study was aimed to assess the effects of surviving an earthquake, to examine more appropriate methods of assessment and a factor analyze the underlying dimensions of PTSD that are presented in 4<sup>th</sup> and 5<sup>th</sup> grade Turkish children. Thus, the main purpose of the study was to investigate the underlying dimensions of posttraumatic phenomenology as it is experienced by Turkish children who had been in massive and continuous earthquake disasters and experienced the post-disaster adversaries 11 months after the notorious 1999 Marmara earthquake in Turkey.

### Participants

Data were collected in two different neighborhoods in the city of Sakarya, which is situated in northwestern part of Turkey. Participants are composed of children whose houses and schools were located on the epicenter and on the fault line of the earthquake. They were from the hardest hit neighborhoods of Sakarya in the downtown section of the city. Therefore, these children have been directly affected by the earthquake disaster. The degree of traumatic experience varied from very severe to severe.

The participants of this research is described in (Bulut et al., 2005) since the same date set was used to predict the prevalence and severity of PTSD in earthquake survives children in another research article.

Random sampling method is utilized in data collection and subject recruitments. First, the Sakarya Board of Education was contacted and information were received regarding the current schools 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. Thereby, school names and information about schools' conditions was obtained. Then, since it is aimed to measure traumatic effects of the earthquakes, the most severely affected schools were chosen as a representative samples. Two different neighborhoods and 4 different schools were deliberately chosen in order to increase the generalizeability.

Two clusters of samples were chosen form four different schools. Thereby, approximately 200 students were specifically selected as a representative sample, a number almost equal to 1/5<sup>th</sup> of the total 4<sup>th</sup> and 5<sup>th</sup> grade student population in the

*Table 1.* Demographic and Descriptive Information about the Participants of the Study, and OSU-PTSDI

	Frequency	Percentage	Minimum OSU-PTSDI	Maximum OSU-PTSDI	Mean OSU-PTSDI	SD OSU-PTSDI
<b>Gender</b>						
Female	97	48.5	8	109	56.38	21.59
Male	103	51.5	2	111	51.49	25.39
<b>Age</b>						
9	2	1.0	18	48	33.34	20.72
10	65	32.5	3	92	53.52	22.44
11	110	55.0	2	109	52.14	23.52
12	23	11.5	11	110	64.87	25.89
<b>Grade</b>						
4th	85	42.5	2	89	50.77	22.27
5th	115	57.5	4	110	56.15	24.53
Total	200	100.0	2	110	53.86	23.69

city of Sakarya. There were 97 boys and 103 girls and 85 of them were 4<sup>th</sup> and 115 were 5<sup>th</sup> graders. The age range was 9-12 years, with a mean of 10.77 years, and a standard deviation of 0.66.

### Instruments

Since its first inclusion of PTSD in DSM III (1980), there have been numerous attempts to create an assessment instrument for PTSD and some advances has also been made (Weathers, 1998). Previous research in PTSD constantly reported the heterogeneous symptoms clusters of this disorder and emphasized the need for multiple measures of the PTSD structure due to lack of single measure of the disorder (Keane, Weather, & Kaloupek, 1992). Furthermore, McNally (1991) mentions that many of the instruments used for children are derived form adult instruments but children themselves are not considered when they were written. Therefore, OSU research team, including the author, created a new trauma scale for children. The Oklahoma State University Child - Post Traumatic Stress Disorder Inventory (OSU-PTSDI) was constructed by modifying previous scales and by choosing highly predictive items from previous PTSD inventories (Palmer, 2001). The researchers collected various previous trauma instruments and carefully selected items that are highly representative of PTSD symptoms and more suitable for children. These scales include; Frederick's Posttraumatic Stress Reaction Index for Children (Frederick, 1985), the Kauai Recovery Index (Hamada, Kameoka, and Yanagida in

press), When Bad Things Happen (Fletcher, 1996), and the Children's Posttraumatic Stress Inventory (Saigh, 1989). The problems with these scales were; they were either not covering all the trauma symptoms that are mostly associated with children responses or covering only one of two clusters of symptoms out of three major clusters of PTSD. The norms were developed in a dissertation study with child survivors of the earthquakes (Bulut, 2003) and cutoff scores for PTSD relative to these groups were also established.

The OSU-PTSDI was originally designed as a 5-point Likert-like scale ranging from 0 to 4. In the original form, it had 40 items; however, when the instrument was examined, it was found that based on face validity, some of the items were not closely related to PTSD phenomenology; therefore these 9 unrelated items were deleted and not included in the total score calculations. In a previous study with Tornado survivors the reliability analysis of the OSU-PTSDI was reported as .93 (Palmer, 2001). For this current study, the Cronbach Alfa was found 0.91 for the 31-item inventory. The instrument was first developed in English language and then it was translated into Turkish language by the author, who is a native of Turkey. Then, it was shown to the Turkish trauma experts and some minor changes in cultural and language adaptations were made. In the same manner, the translated instrument was given a group of 4<sup>th</sup> and 5<sup>th</sup> grade children to test their reading and comprehension ability. Upon completion this process and receiving the feedbacks, the instrument was made ready for the use of Turkish children (Bulut, 2003).

### Procedure

Prior to the study, the research proposal and instruments were submitted to the Governor's Office and Board of Education in Sakarya, Turkey. And they were also provided information about the research, survey forms and consent forms. After reviewing the research proposal and the other documents, both of the Governor's Office and Board of Education approved the study and gave permission.

Four elementary school superintendents in the city of Sakarya were asked to cooperate in this study. The superintendents were informed about the potential benefits of this study for their students and communities. The researchers explained the purpose and rationale for the study, assessment strategies, and time requirements, and sent copies of all research instruments and survey protocol forms for the superintendents' review and approval. The superintendents then consulted with their teachers and parents for their personal approval. The school officials and board of educations were informed about the importance of confidentiality in research and assessment. Therefore, they were not involved in the data collection and did not see the survey forms during the course of the data collection process and afterwards.

Then, parents were sent the information packages which included parental consent forms, information about the study and procedure, survey instruments and con-

tact information. Parents were invited to participate in the study in order to screen the children in their schools for adverse psychological effects resulting from earthquakes and asked to give a written consent forms for their children to participate in this study.

Once consent forms were obtained from the parents, researcher, who is a native of Turkey, from counseling psychology department and received special training concerning the data collection involving in human subjects; particularly children, were in charge of data collection. The same researcher went to classes alone, read the script to students and discussed the research study with the students. The children were told that the findings would be used to help other students who experience traumatic incidents. Those who were willing to sign voluntarily assent forms were recruited for the study. Students were assured of the confidentiality of their responses by saying that their names were not required and the only person to see their answers was the researcher.

The OSU-PTSD Inventory was administered to the children in their classrooms. The researcher read 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 researcher walked around the classroom and offered help for those who needed more information and more time. Finally, the researcher checked the forms to see if they are fully completed and collected the test protocols. The surveys were completed in approximately 25-30 minutes 10<sup>th</sup> month after the main earthquake disaster. Data was analyzed using SPSS version 10 (SPSS INC, 2000).

### Data Analysis

The examination of underlying dimensions of PTSD was assessed with exploratory factor analysis with varimax rotation technique. First, Kaiser-Meyer-Olkin test was calculated to see if the sampling size was sufficient for the factor analysis.

### RESULTS

The Kaiser-Mayer-Olkin test of sampling adequacy was .862, meaning that the sampling size was sufficient for the statistical methods elected. For this study, Cronbach alpha reliability coefficients of the OSU-PTSD Inventory was found as  $\alpha = .91$  which indicates an appropriate reliability for the instrument.

An exploratory principal component analysis with Varimax rotation and Kaiser Normalization was converged in 8 iterations and yielded 4 factor solutions. The final results of factor solutions were based on the figures of eigen values bigger than 1 and the scree plot graph. A factor loading coefficient of .40 or above was selected as a cut-off score for factor loadings and those values less than this score were suppressed.



Table 2. Factor Loadings of the OSU-Child PTSD Inventory, after Varimax Rotation

OSU-Child Post Traumatic Stress Disorder Inventory's Items	Varimax factors			
	1	2	3	4
16 I try not to see people that make me think about the quake	.684			
26 I have trouble thinking since the earthquake	.668			
25 I get angry more since the earthquake	.651			
33 I have headaches, stomachaches or feel bad in other ways since the earthquake	.598			
30 These feelings make me feel bad and cause trouble with my school work	.534			
28 I am more jumpy (startle more easily) since the earthquake	.503			
20 I have more problems with my friends since the earthquake	.497			
17 I cannot remember some important things about quake	.447	.397		
18 I am not interested in things I used to like since the quake	.275	.279	.248	
9 I feel like the earthquake is happening again sometimes.		.657		
5 I dream about the earthquake		.602		
8 Sometimes, things do not feel real		.574		
10 I get upset when I see earthquakes on the TV		.571		
2 I really get scared when thinking about earthquake		.564		
6 I have more bad dreams now than before the quake.		.554	.440	
3 I feel like I could not help myself during the quake		.551		
4 I talk about the quake a lot (several times a week)		.410		
9 Sometimes, I feel like I am outside of my body		.390		
23 I don't feel I will marry			.825	
19 I feel different form others since quake			.648	
24 I don't feel like I will have children since quake			.591	
29 These feelings make me feel bad and cause trouble with my life			.529	
22 I worry that I might not grow up			.441	
32 I knew something bad is going to happen before the quake			.396	
14 I don't like to hear people talk about the quake				.777
13 I don't like to think about earthquake				.753
15 I try not to go to places that make me think about the quake				.683
21 I worry about the future now				.526
34 I feel guilty since the quakes, like maybe the quake would not have happened if I had been a better child			.386	.437
31 I don't like to be away from my parents now				.373
27 I watch out for bad things since the quake. I am very alert				.309

After Varimax rotation, only 4 of the 31 items loaded on more than one factor. It seemed that the 4 factor solution best explained the item distribution of earthquake survivors. The resulting factors explained approximately 43.38 of the variance.

The principal component factor analysis revealed four clinically interpretable factors;

1) Interpersonal and adjustment factor: items on this factor include (try to not to see people, have trouble thinking about disaster, get angry more, headaches, stomachaches, feel bad, cause trouble in school, more jumpy, problems with friends, partial amnesia) and seemed to be “a generic factor” that covered all of the fundamental characteristics of PTSD;

2) Re-experiencing: items on this factor refer to having more problems with intrusion and re-experiencing phenomenon (feel like the disaster happening again, partial amnesia, dreams about the earthquake, derealization, get upset when see the disaster on the TV, scared when thinking about it, have more bad dreams, could not help himself during the earthquake, rumination, depersonalization);

3) Sense of foreshortened future: Items indicating that children felt (different, will not marry, will not have children, bad and cause trouble in daily life, worry that they will not grow up, knew that something bad is going to happen);

4) Avoidance and anxiety: This factor revealed that children make cognitive and behavioral avoidances like, (do not like to hear and think about earthquake, no to go to places, worry about the future, feel guilty, do not like to be separated from parents and very alert).

Items that loaded on specific items and the number of in each factor are provided in the table below.

## DISCUSSION

Four orthogonal factors emerged, rather than three which would be expected based on the logical grouping of DSM-IV diagnostic criteria. DSM-IV requires that the person be exposed to an extraordinary stimulus which 1) the individual re-experiences, 2) seeks to avoid and 3) causes symptoms of arousal. Factor analysis of the participants' responses, however, indicated that it may be more useful to reconsider the DSM-IV symptoms into four underlying dimensions. These dimensions are as described aforementioned; interpersonal and adjustment factor, re-experiencing, sense of foreshortened future, and avoidance and anxiety.

The 4 factor model in this study proved to be the most appropriate for pre-adolescence children. However, the clusters did fit the DSM-IV's three general symptom categories. The children who had been in earthquakes had most of the symptoms reported in DSM-IV but the clusters of these symptoms seemed to go outside the general categories. Specific items which might logically related by DSM-IV criteria did not cluster as it is classified in DSM IV TR. Instead, the source of the disaster and the nature of the stimulus had played a key role in symptom appearance. As the other authors argued that different type of trauma creates different symptoms.

For example, somatization, alertness, school problems loaded on the interpersonal relationships and adjustment factor. The first factor seemed to be a very ge-

neric one and it covered almost all of the major trauma symptoms. It appeared to be small trauma scale by itself. Furthermore, it seemed that disaster led to depression-like symptoms. This was very obvious in the first factor that it had items associated with the interpersonal problems and adjustment difficulties. Since the trauma was greater in magnitude, it destroyed the whole residential areas and damaged the whole texture of the community. Therefore, these children experienced very strong adjustment and interpersonal problems in their life. This seemed to be very characteristic of the larger scale disasters. McFarlane (1987) also reported very similar results after a cyclone destroyed the whole town of Darwin in Australia.

The second factor appeared to be the most homogeneous cluster of symptoms, and the most similar one to the DSM IV re-experiencing cluster. This was also reported to be most consistent symptoms cluster across cultures (Marsella, Matthew & Spain, 1996).

The sense of foreshortened factor also seemed to be quite consistent. Items measuring a sense of foreshortened future, which in the DSM-IV it is under avoidance cluster, created a separate and unique dimension. The sense of foreshortened factor included items that related to how people conceptualize their future life an individual and as a family member when they grow up. Children were changed in a fundamental way that they did not want to marry and have children and they did not think that they would become an adult. This was a new finding and was not mentioned in DSM IV and in other previous literature. It seemed that this sense of foreshortened future is a very unique and child specific factor that needs further attention and investigation.

Paradoxically, avoidance and anxiety items loaded together, which indicates purposeful avoidance to stay away from the people and the places that reminded them of the earthquakes. Foa and Riggs (1993) proposed that both avoidance and numbing symptoms prevent adequate processing of the trauma; consequently, sustaining the major PTSD symptoms. As a result, trauma survivors find themselves in a vicious cycle, in which intrusion promote avoidance and numbing. This was very clear in children who survived the earthquake, which destroyed their schools, community and residential buildings. The systematic exposure of the damaged and destroyed buildings and debris for a long time led to continue exposure to traumatic stimuli. In turn, Turkish children did not want to go to places, to see people that reminded them of the events and did not want to think about it. However, this was not possible since they also continued living in the same area. Then this ended up being an effortful avoidance attempt at avoidance requiring much effort, which led to helplessness and hopelessness; consequently it contributed to very traumatic reactions similar to depression in nature. Unfortunately, diagnoses of depression were not assessed in this study.

Similarly, as observed in this study, other authors report that numbing might reflect community response to the event and that some communities are 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, numbing symptoms may be more apparent (McMillen, North & Smith, 2000). This was clearly observed here. Since the earthquake and post earthquake adversities were so powerful, the survivors were not able to provide help and support to each other.

In the same way, Garrison et al. (1995) found that common stressful events occurring after the disasters may be more strongly associated with PTSD than magnitude of contact with the actual disaster. Most of survivors had to live in tent cities and moved out of their neighborhoods and cities into other regions. Therefore, it was not possible to maintain the friendship ties and provide support that they have needed in most.

Pynoos et al. (1993) study with Armenian earthquake survivors children documented that the impact of a major catastrophe may directly affect an entire child population of a large area. The psychological sequale of this magnitude of disaster may alter the individual and social character of whole generation of children and their families and PTSD rates may reach "epidemic proportions". In fact, in other studies the by Bulut (2005; 2006) reported 73% of PTSD for the same group of children. Since the disaster affected the entire city of Sakarya, children's families, teachers, and friends were also victims themselves; therefore, the child survivors of earthquakes were not able to receive support and assurances from parents and friends. Instead, they developed cognitive and physical avoidance. Similarly, Foa, Riggs, & Greshuny (1995) noted that numbing and effortful avoidance represents separate phenomena. Thus, for practical reasons, PTSD could be more accurately described if symptoms of numbing and avoidance were not placed in the same symptom cluster.

Findings from adult samples yielded two (Buckley, Blanchard & Hickling, 1998; Taylor et al. 1998; Bağodlu, Talcıođlu & Livanou, 2002) three (Foa et al., 1995) and four (Keane, 1993) factor solutions. In adolescent refuge studies, Sack, Seeley, & Clarke (1997) found four factors solution. In another study with children Bulut (2003) found 6 interpretable factor solutions. Ippen, Briscos-Smith and Lieberman (2004) study with young children found 5 factor solutions and they have reported age-specific factor structures. In a more recent study, Bal and Jensen (2007) reported 3 symptom cluster which was concurrent with DSM IV guidelines. In sum, previous research attempted to validate the DSM IV PTSD symptom structure and resulted in very similar but not exactly the same factors. It seemed that the sample population, subjects' age, kind of trauma, context of trauma, magnitude, strength and duration of trauma has detrimental effects on the manifestation of the trauma symptoms.

It has been noted that item variances and the underlying factor structure may vary across the trauma populations (Foa et al., 1995). Consequently, the results of Turkish earthquake disaster study revealed that the 4 factor solutions best describes the PTSD disorder in children who survived a multiple and continues earthquake tragedy in a specific culture. The differences in the findings described above may be

attributed to the differences in the characteristics of both the study samples and the stressors the survivors experienced after two major life-threatening earthquakes.

The study is limited in that the current results are exploratory and replication of the analysis is necessary with a larger sample size of child and adolescent trauma population. Yet, the results are promising and some of the first data yielded from children who have experienced earthquakes. The symptom structure documented here with earthquake survivors children should be replicated on the samples of man-made and other natural disasters in order to enable generalizations of findings about potential mechanisms of underlying dimensions of PTSD.

School psychologist and counselors working with a disaster exposed or at risk student population should consider the heterogeneous and trauma-specific, age-specific and culture-specific nature of PTSD symptoms clusters when planning intervention strategies and treatment programs. It seems that it is hard to give a generic recipe for the treatment of the children, instead helping professionals have to consider multiple dimensions of the problems and take a multi level approach.

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## FAKTORSKA ANALIZA POSTTRAUMATSKOG STRESNOG POREMEĆAJA U TURSKOJ KOD DJECE KOJA SU DOŽIVJELA POTRESE

### Sažetak

U nekim zemljama, zbog položaja u područjima sklonim prirodnim nepogodama, djeca su izložena većem riziku od ostatka svijeta. Na primjer, Turska se nalazi na spojevima tektonskih ploča prvog stupnja, te su djeca u Turskoj podložnija razvo-

ju posttraumatskog stresnog poremećaja (PTSP) zbog izloženosti potresima, prijetnji očekivanih potresa, podrhtavanja i drugih nedaća. OSU PTSP inventar za djecu primijenjen je na 200 učenika 4. i 5. razreda 11 mjeseci nakon potresa u gradu Sakarya. Cilj istraživanja bio je utvrditi čestice koje određuju osnovne dimenzije PTSP-a manifestiran kod djece u Turskoj. Istraživanje temeljnih dimenzija PTSP-a provedeno je pomoću faktorske analize temeljnih komponenti. Faktorska analiza dala je 4 faktorska rješenja: (1) interpersonalni i problemi prilagodbe, (2) ponovno proživljavanje, (3) uskraćena budućnost i (4) anksioznost i izbjegavanje. Rezultati upućuju na potrebu podjele simptoma prema DSM-IV u četiri osnovne dimenzije. Psiholozi i školski savjetnici trebali bi dimenzije PTSP-a uzeti u obzir pri razvoju programa intervencije i liječenja žrtava prirodnih katastrofa i učenika njihovih škola. Potrebno je također uzeti u obzir kros-kulturalne razlike pri primjeni spoznaja do kojih se došlo u zapadnim zemljama.

**Cljučne riječi:** posttraumatski stresni poremećaj – PTSP, faktorska analiza posttraumatskog stresnog poremećaja, djeca žrtve prirodnih katastrofa

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