

## The Effects of Earthquakes on the Behavioral and Emotional Problems of Preschoolers

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**Abstract:** This study relies on information obtained from mothers to examine how earthquakes affect the behaviors and emotional problems of preschool children with respect to gender and mother's level of education. This is a descriptive study including a control group. The sample consists of a total of 482 children, 210 of whom were attending preschools in the Sultandagi (Afyon) earthquake zone (participants) and the remaining 272 were attending preschools in Ankara (control group). The study used the Child Behavior Checklist for Ages 1<sup>1/2</sup>-5; (CBCL/1<sup>1/2</sup>-5) and the Parent Demographic Information and Earthquake Experience Form to gather data. The data was then analyzed by using the Multivariate ANOVA (MANOVA) technique in line with the aim stated above. The results of statistical analyses revealed that children in the earthquake zone displayed more problem behaviors than those in the control group. With respect to gender, girls were found to have more problem behaviors than boys. Also, children of mothers with lower levels of education seemed to have more behavioral/emotional problems than children of mothers with higher education levels.

**Key words:** Earthquake, natural disaster, preschool students, posttraumatic stress disorder, child behavior checklist

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### INTRODUCTION

Earthquakes are natural disasters that may cause casualties and widespread destruction (Basoglu *et al.*, 2002). The devastation caused by earthquakes is beyond the daily experiences of human beings. Their unpredictability and the desperation they cause exacerbate their already negative effects on humans. The psychology literature includes numerous resources which maintain that natural disasters such as earthquakes are related to psychological sequelae. It is generally accepted that such natural disasters trigger the emergence of psychopathological symptoms and problems in children, adolescents and adult survivors (Miller and Basoglu, 1992; Rubonis and Bickman, 1991). Studies have shown that children, teenagers and the elderly are particularly at risk. Children are scared of earthquakes and unlike adults, they have difficulty accepting them as a natural disaster beyond control. The extent to which, children are affected by earthquakes is determined by factors such as the reaction of the family, the extent of loss, age/gender, previous experiences, the indirect effects of the earthquake, daily life, separation, interfamily relationships, economic conditions and social support. Preschool children (aged 2-5) have difficulty

coping with the losses and lifestyle changes brought on by earthquakes as their coping skills have not developed fully due to their lack of life experience. They therefore need adult support (Berument *et al.*, 1999).

Children may react differently to an earthquake. While, some display behavioral change immediately following an earthquake, others may function normally for days, weeks or even months as if nothing has happened and then display problem behaviors (Berument *et al.*, 1999). Following the trauma, children may also display concentration and memory problems, which show not only in learning new information but also in retrieving the old one. It has also been stated that preschool children display much more regression, behavior disorders and aggression after a trauma (Erol and Oner, 1999).

Apart from earthquakes and other natural disasters, manmade ones such as rape, assaults, wars, road accidents, the killing of a loved one may also lead to similar reactions in humans (Erol and Oner, 1999). Among these reactions, those who are severe enough to disrupt an individual's daily functioning are named as Acute Stress Disorder during the 1st month and Posttraumatic Stress Disorder (PTSD) thereafter.

In various studies, the estimated PTSD frequency rate was found to vary among children. While, some studies

report its frequency as 94% (Pynoos *et al.*, 1987), others report it as 62.5% (Earls *et al.*, 1988). Goenjian and Pynoos (1995) studied 111 children aged between 8-16 and found that the PTSD rate was 70%.

Reactions given by children in the event of a trauma vary by age group. When, 1-5 years old preschool children experience a disaster, they mostly feel helpless (hopeless), fearful and insecure. Not yet equipped fully with oral and conceptual skills, many of these children need intensive help to cope with this unexpected stress. The reactions of their parents and families greatly affect them too. The biggest source of worry for preschool children is separation; when they lose a toy, pet or family member, they need additional comfort. Typical reactions to a trauma in preschool children include bedwetting, fear of dark or animals, over-reliance on parents, night terror, incontinence, constipation, speech difficulties (e.g., stuttering), overeating or undereating, crying for help or screaming, passivity, shivering and face-pulling, running towards an adult or aimless behavior, fear of loneliness, fear of strangers and distraction (Pataki *et al.*, 2000).

Another commonly discussed variable, which affects the psychology of humans following natural disasters is gender. Studies have shown that the symptoms of PTSD are more commonly observed in girls (Milgram *et al.*, 1988; Pynoos *et al.*, 1993). Rubonis and Bickman (1991) also found that women were reported to be more vulnerable than men in many studies concerned with the effects of disasters.

An examination of the relevant literature shows that many studies have focused on the symptoms of posttraumatic stress. However, only few studies have been concerned with the reactions given in the event of a disaster with respect to age. The great majority of pre and post-disaster studies have been conducted on adults and only a limited number on children (Allen, 1993). These few studies have mostly centered on the reactions of children to traumatic events and have largely remained inconclusive (Lonigan *et al.*, 1991).

While, it is accepted that disasters have a negative effect on children's mental health and psychological functions, research-based information about how their post-disaster needs will be met is still limited (Terr, 1979; Udwin, 1993; Weinstein, 1989; Zhang and Zhang, 1991). Posttraumatic stress disorder in children has been the focus of very few studies (Burke *et al.*, 1982). However, the examination of children's post-disaster reactions is the first step in meeting children's needs and organizing prevention and treatment programs.

In this research, no study focusing on the post-traumatic behavioral and emotional problems of Turkish children was found. This study therefore, aims to use data

obtained from mothers to identify the post-traumatic behavioral and emotional problems of preschoolers who experienced an earthquake with respect to gender and mother's educational level. It is hoped that the findings of this study will provide an insight into how earthquakes affect children in high risk areas and contribute to disaster intervention programs.

## MATERIALS AND METHODS

**The study area and the disaster:** The study was conducted in Afyon (Sultandagi), a Western Anatolian city in Turkey. History and seismic data shows that the area is a high risk earthquake zone. In this 1st degree earthquake zone, 33 earthquakes occurred between 1901-1986 with magnitudes ranging between 4 and 6.8 and causing many casualties and destruction. The earthquake, which occurred in the area on 15 December 2000 ( $M_s = 6$ ) caused the death of 6 people and the collapse of numerous buildings. The most recent earthquake in the area (before the time of writing) was recorded on 3 February 2002 at 9: 11 am local time and measured 6.1 on the Richter scale. This earthquake caused great damage to Sultandagi and Eber. Only 15 min following this first earthquake, the Cay earthquake ( $M = 5.8$ ) happened and destroyed the towns of Cay, Bolvadin and Cobanlar. Three serious aftershocks were recorded on the same day in Sultandagi with magnitudes ranging between 5.0 and 5.3. While, the earthquake could be felt in a big area, its impact was limited to small towns, thus minimizing casualties and damage to buildings. Forty-three died in this earthquake, 277 were wounded and 340 houses, 246 work places, 36 government buildings and 4 mosques were fully destroyed (Celebi and Saatcioglu, 2002).

**Study group:** The participants of the study included a total of 210 children aged 4 and 5 attending the official preschools (kindergarten and preschools) affiliated to the Ministry of Education in the earthquake-affected city of Afyon and its small towns Sultandagi, Cay, Cobanlar, Bolvadin and Eber. Of these children, 112 (53.33%) were girls and 98 (46.66%) were boys (mean age for both sexes 4.33,  $S_s = 0.72$ ) and 110 (52.38%) were 4 years old and the remaining 100 (47.61%) were 5. The control group was comprised of a total of 272 children also aged 4 and 5. These children were attending middle-class preschools affiliated to the Ministry of Education in Ankara. Of these, 139 (51.10%) were girls and 133 (48.89%) were boys (mean age for both sexes 4.19,  $S_s = 0.80$ ) and 154 (56.61%) were aged 4 while, 118 (43.38%) were 5. The total number of participants was, then, 482.

The mean age of participants' mothers ( $n = 210$ ) was 30.75 ( $Ss = 5.46$ ). Of these, 40 (19.04%) were literate, 21 (10.0%) were primary school graduates, 67 (31.90%) were secondary school graduates, 39 (18.57%) were high school graduates and 43 (20.47%) were university graduates. The mean age of fathers ( $n = 210$ ), on the other hand, was 34.90 ( $Ss = 5.90$ ). Of the fathers, 19 (9.04%) were literate, 29 (13.80%) were primary school graduates, 61 (29.04%) were secondary school graduates, 39 (18.57%) were high school graduates and 62 (29.52%) were university graduates.

The mean age of control mothers ( $n = 272$ ) was 34.25 ( $Ss = 4.96$ ). Of these mothers, 14 (5.14%) were literate, 16 (5.88%) were primary school graduates, 57 (20.95%) were secondary school graduates, 34 (12.50%) were high school graduates and 151 (55.51%) were university graduates. The mean age of control fathers ( $n = 272$ ) was 37.67 ( $Ss = 5.19$ ). Of these, 4 (1.47%) were literate, 14 (5.14%) were primary school graduates, 64 (23.52%) were secondary school graduates, 40 (14.70%) were high school graduates and 150 (55.14%) were university graduates.

**Earthquake experiences of participants:** Among the participating children ( $n = 210$ ), 23 (10.95%) were separated from their parents for a certain time after the earthquake. The houses of 49 (23.33%) were damaged slightly to moderately due to the earthquake. The families of 40 (19.04%) lost their property in the earthquake. Twenty-four (11.42%) had a loved one seriously injured in the earthquake. One (0.47%) was physically wounded. Nineteen (9.04%) saw corpses after the earthquake and 2 (0.95%) had to watch someone die. None lost an immediate family member.

**Data collection tools:** Data for this study was collected by using the Child Behavior Checklist for Ages 1<sup>1/2</sup>-5; (CBCL/1<sup>1/2</sup>-5) developed by Achenbach and Rescorla (2000) for children and adolescents of different ages in the U.S. and checked for standardization and adaptation in 50 different countries. Also, the Parent Demographic Information and Earthquake Experience Form adapted from Stuvland's (1999) Psychosocial Assessment Battery was used.

**The child behavior checklist for ages 1<sup>1/2</sup>-5; (CBCL/1<sup>1/2</sup>-5):** This checklist was developed by Achenbach and Rescorla (2000) with the aim of assessing the problem behaviors of children aged 1<sup>1/2</sup>-5 in light of the information gained from parents or others who have daily contact with the children. The checklist includes 100 items defining the behavioral and emotional problems

of early childhood. It also includes demographic information about children and respondents to determine their names, their relationship to the children and the family's socioeconomic status. Each of the problem behaviors listed in the 99 items of the checklist is ranked by the respondents according to its frequency level within the last 2 months, with 0 meaning not true for the child; meaning slightly or sometimes true and meaning often or frequently true. Item 100 is reserved for the listing of problems not mentioned in the checklist.

The checklist also includes three open-ended items to supply the diseases that the children have, their disabilities and worrying or favorable characteristics.

The items of the checklist are grouped into various subtests. Two different behavior symptom scores are obtained from the checklist: Internalizing and Externalizing problems. The Internalizing problems consist of the subtests of Emotional Reactions, Anxiety/Depression, Somatic Problems and Introversion, whereas, the Externalizing problems include Attention Problems and Aggressive Behaviors. As another subtest that cannot be listed in either one of these two, Sleep Problems and Others is also included in the checklist. The totals of all subtests yield the Total Problem Score. Each child's profile was developed by marking the scores of each subtest on profile sheets prepared separately for boys and girls (Achenbach and Rescorla, 2000). In this study, children's problem behaviors were not assessed with regard to the total problem score but according to the score obtained on each subtest. The checklist was translated and adapted to Turkish by Erol (2002). The Cronbach Alpha reliability coefficient calculated by using the data from the subtests varied between 0.60 and 0.95 for the participants and between 0.55 and 0.95 for the control group.

**Parent demographic information and earthquake experience form:** This list comprises 19 questions prepared to collect information from the parents or minders of children below 12 about the children's gender, age, place of residence, family, losses and injuries in the family and whether, they witnessed trauma. This form is a version of Stuvland's (1999) Psychosocial Assessment Battery, which was adapted into Turkish by the Turkish Center for Crisis Psychology (CCP) in 1999. This form was only administered on families living in the earthquake zone.

**Procedure:** In order to measure psychopathology, the instruments were administered on the mothers of participants 7 months after the earthquake. The researcher went to the earthquake zone and initially identified the

official preschools in the area. After obtaining the consent of the Directory of Education, the administrators and teachers of these preschools were visited to inform them about the aim of the study and to familiarize them with the instruments. Mothers of the preschoolers were then invited to the school to inform them of the study and its aims and to obtain their approval for the checklist. The respondents were told that their responses to the items would be kept confidential. Mothers were shown how to complete the checklist and a few sample items were completed together. The checklist and the demographic form were then given to mothers for completion. The checklist and the form were collected from mothers a week later. Data from the control group was also collected in the same way, except the fact that the control group was not asked to complete the Parent Demographic Information and Earthquake Experience Form.

**Data analysis:** Data obtained by using the instruments was analyzed by Multivariate ANOVA (MANOVA).

## RESULTS

This part presents a comparison of the behavioral and emotional problems of children who did and did not experience an earthquake, by their mothers' account, with respect to gender and mother's educational level.

In order to identify the effects of group, gender and mother's educational level on the scores obtained from mother's evaluations regarding children's behavioral and emotional problems, 2 (group: participants, control)  $\times$  2 (gender: girls, boys)  $\times$  2 (mother's educational level: low, high) Multivariate ANOVA (MANOVA) was performed. The results have shown that group ( $F(6.469) = 2.65$ ,  $p < 0.05$ ,  $\eta^2 = 0.03$ ); mother's educational level ( $F(6.469) = 6.59$ ,  $p < 0.01$ ,  $\eta^2 = 0.07$ ) and gender ( $F(6.469) = 4.29$ ,  $p < 0.01$ ,  $\eta^2 = 0.05$ ) have meaningful effects on behavioral and emotional problems. No meaningful difference was found with respect to the combined effects of group  $\times$  mother's educational level; group  $\times$  gender; mother's educational level  $\times$  gender. However, ANOVA results have shown that the combined effect of group  $\times$  mother's educational level  $\times$  gender ( $F(1.474) = 4.08$ ,  $p > 0.05$ ,  $\eta^2 = 0.01$ ) on aggressive behaviors is meaningful.

Table 1 presents the mean scores and standard deviations of children's behavioral and emotional problem scores on each subtest, according to their mothers' evaluations. Table 2 shows the results of the scores with respect to group, mother's educational level and gender.

The ANOVA results given in Table 2 reveal meaningful differences between the anxiety/depression ( $F(1.474) = 10.67$ ,  $p < 0.01$ ,  $\eta^2 = 0.02$ ) and introversion

( $F(1.474) = 4.78$ ,  $p < 0.05$ ,  $\eta^2 = 0.01$ ) problem behaviors of the participants and the control group. Mothers of the participants evaluated their children as more problematic regarding anxiety/depression ( $X = 5.08$ ,  $Ss = 3.01$ ) than did control group mothers ( $X = 3.93$ ,  $Ss = 2.38$ ). Similarly, with respect to introversion, mothers of the participants believed their children ( $X = 2.26$ ,  $Ss = 2.48$ ) to be more problematic than control group mothers ( $X = 1.53$ ,  $Ss = 1.75$ ).

In studies including parents, it is usually mothers who emerge as evaluators. In order to discover whether mothers' education level caused a difference in their evaluations of their children, mothers' evaluations were studied from the perspective of their education level. To this end, 5 groups were established, Literate, Primary school graduate, Secondary school graduate, High school graduate and University graduate. However, when the numbers in these groups were observed to be insufficient for analysis, they were combined and grouped under two headings: low and high. Those who were literate and those who were primary and secondary school graduates were placed in the low group whereas, high school and university graduates were placed in the high group. The results of ANOVA on these 2 groups are summarized in Table 2.

As can be shown in Table 2, a meaningful difference was found between mothers' evaluations of their children's emotional orientation problem behaviors with respect to mothers' education level ( $F(1.474) = 24.89$ ,  $p < 0.01$ ,  $\eta^2 = 0.05$ ). Mothers with a low education level ( $X = 3.59$ ;  $Ss = 2.88$ ) evaluated their children as more problematic than mothers with a high education level ( $X = 2.22$ ;  $Ss = 2.23$ ). There was a meaningful difference between the children of mothers with low and high education levels with regard to anxiety/depression problems ( $F(1.474) = 9.71$ ,  $p < 0.01$ ,  $\eta^2 = 0.02$ ). Mothers with a low education level ( $X = 5.10$ ;  $Ss = 2.94$ ) reported more anxiety/depression problems in their children than mothers with a high level of education ( $X = 3.95$ ;  $Ss = 2.47$ ). A meaningful difference was found between the mothers' evaluation of their children's somatic problems with respect to their education level ( $F(1.474) = 19.87$ ,  $p < 0.01$ ,  $\eta^2 = 0.04$ ). Mothers with a low education level ( $X = 3.91$ ;  $Ss = 2.53$ ) reported more somatic problems in their children than mothers with a high level of education ( $X = 2.84$ ;  $Ss = 2.22$ ). A meaningful difference was also found between the mothers' evaluation of their children's introversion problems with respect to their education level ( $F(1.474) = 21.53$ ,  $p < 0.01$ ,  $\eta^2 = 0.04$ ). Mothers with a low education level ( $X = 2.50$ ;  $Ss = 2.58$ ) perceived their children as more introverted than those with a high level of education ( $X = 1.38$ ;  $Ss = 1.59$ ). A similar meaningful

Table 1: Descriptive statistics for CBCL/1<sup>1/2</sup>-5

Scale (subtests)	Mother's education	Gender	Participant group		Control group		Total	
			$\bar{X}$	SS	$\bar{X}$	SS	$\bar{X}$	SS
Emotional orientation	Low	Girls	3.54	3.03	3.93	2.49	3.69	2.83
		Boys	3.80	3.21	2.77	2.23	3.46	2.95
		Total	3.66	3.11	3.45	2.44	3.59	2.88
	High	Girls	2.53	2.62	2.15	2.15	2.27	2.31
		Boys	2.22	2.75	2.15	2.11	2.16	2.15
		Total	2.39	2.46	2.15	2.13	2.22	2.23
	Total	Girls	3.13	2.90	2.70	2.40	2.89	2.64
		Boys	3.20	2.98	2.29	2.15	2.68	2.57
		Total	3.17	2.93	2.50	2.28	2.79	2.61
Anxiety/depression	Low	Girls	5.27	3.04	5.02	2.49	5.17	2.83
		Boys	5.39	3.39	4.27	2.19	5.02	3.08
		Total	5.33	3.20	4.71	2.38	5.10	2.94
	High	Girls	4.67	2.95	3.80	2.27	4.08	2.53
		Boys	4.70	2.33	3.50	2.37	3.81	2.41
		Total	4.68	2.67	3.64	2.32	3.95	2.47
	Total	Girls	5.03	3.00	4.18	2.40	4.56	2.71
		Boys	5.13	3.04	3.67	2.35	4.29	2.75
		Total	5.08	3.01	3.93	2.38	4.43	2.73
Somatic problems	Low	Girls	3.66	2.41	4.49	2.29	3.98	2.39
		Boys	3.97	2.93	3.53	2.19	3.82	2.70
		Total	3.80	2.66	4.10	2.28	3.91	2.53
	High	Girls	3.04	2.42	2.97	2.12	2.99	2.21
		Boys	2.81	2.54	2.65	2.11	2.69	2.23
		Total	2.94	2.46	2.80	2.12	2.84	2.22
	Total	Girls	3.41	2.42	3.44	2.28	3.43	2.34
		Boys	3.53	2.83	2.85	2.15	3.14	2.48
		Total	3.47	2.62	3.15	2.23	3.29	2.41
Introversion	Low	Girls	2.67	2.39	2.56	2.08	2.63	2.27
		Boys	2.72	3.27	1.57	1.87	2.34	2.92
		Total	2.70	2.83	2.15	2.04	2.50	2.58
	High	Girls	1.80	1.77	1.45	1.63	1.56	1.68
		Boys	1.32	1.33	1.17	1.52	1.21	1.47
		Total	1.59	1.60	1.30	1.58	1.38	1.59
	Total	Girls	2.32	2.20	1.79	1.85	2.03	2.02
		Boys	2.19	2.78	1.26	1.61	1.65	2.23
		Total	2.26	2.48	1.53	1.75	1.85	2.13
Attention disorders	Low	Girls	3.18	1.83	3.21	2.09	3.19	1.93
		Boys	2.72	2.09	2.17	1.93	2.54	2.05
		Total	2.96	1.97	2.78	2.08	2.90	2.00
	High	Girls	2.91	1.83	2.41	1.79	2.57	1.81
		Boys	1.86	1.15	2.00	1.50	1.96	1.42
		Total	2.44	1.64	2.20	1.66	2.27	1.65
	Total	Girls	3.07	1.82	2.65	1.92	2.84	1.89
		Boys	2.40	1.84	2.04	1.60	2.19	1.71
		Total	2.76	1.86	2.35	1.80	2.53	1.83
Aggressive behavior	Low	Girls	11.85	6.64	13.84	6.26	12.63	6.54
		Boys	10.98	7.74	8.90	6.17	10.30	7.29
		Total	11.44	7.17	11.81	6.64	11.57	6.97
	High	Girls	11.87	6.69	9.34	5.49	10.15	5.99
		Boys	9.49	4.52	7.70	4.64	8.17	4.66
		Total	10.79	5.90	8.49	5.12	9.16	5.45
	Total	Girls	11.86	6.63	10.73	6.08	11.24	6.35
		Boys	10.42	6.72	7.97	5.03	9.01	5.92
		Total	11.19	6.69	9.38	5.75	10.17	6.24

Table 2: ANOVA results of scores with respect to group, mother's educational level and gender

Scale	$F_G$	$\eta^2$	$F_{MEL}$	$\eta^2$	$F_{Ge}$	$\eta^2$	$F_{G \times MEL}$	H2	$F_{G \times Ge}$	$\eta^2$	$F_{MEL \times Ge}$	H2	$F_{G \times MEL \times Ge}$	$\eta^2$
Emo. or.	1.21	0.00	24.89**	0.05	1.47	0.00	0.03	0.00	1.23	0.00	0.34	0.00	3.04	0.00
Anx/dep.	10.67**	0.02	9.71**	0.02	0.73	0.00	0.44	0.00	1.35	0.00	0.12	0.00	0.26	0.00
Som. prob.	0.03	0.00	19.87**	0.04	1.63	0.00	0.46	0.00	2.08	0.00	0.01	0.00	1.59	0.00
Introversion	4.78*	0.01	21.53**	0.04	4.36*	0.01	0.86	0.00	1.08	0.00	0.05	0.00	2.29	0.00
Attention prob.	1.60	0.00	8.73**	0.02	17.35**	0.03	0.05	0.00	0.01	0.00	0.00	0.00	2.98	0.00
Aggression	3.43	0.00	9.10**	0.02	17.08**	0.03	3.14	0.00	1.97	0.00	0.56	0.00	4.08*	0.01

\*p<0.05, \*\*p<0.01, G = Group (Participants/Control), MEL = Mother's Educational Level, Ge = Gender

difference was also found between the mothers' evaluation of their children's attention problems with respect to mothers' education level ( $F(1,474) = 8.73$ ,  $p < 0.01$ ,  $\eta^2 = 0.02$ ). Mothers with a low education level ( $X = 2.90$ ;  $Ss = 2.00$ ) reported more attention problems in their children than mothers with a high level of education ( $X = 2.27$ ;  $Ss = 1.65$ ). As regards aggressive behavior, a meaningful difference was also found between the opinions of mothers with a low and high level of education ( $F(1,474) = 9.10$ ,  $p < 0.01$ ,  $\eta^2 = 0.02$ ). Mothers with a low education level ( $X = 11.57$ ;  $Ss = 6.97$ ) reported more aggressive behavior in their children than mothers with a high level of education ( $X = 9.16$ ;  $Ss = 5.45$ ).

Mothers' evaluations of their children's behavioral/emotional problems with respect to gender shows meaningful differences for introversion ( $F(1,474) = 4.36$ ,  $p < 0.05$ ,  $\eta^2 = 0.01$ ), attention problems ( $F(1,474) = 17.35$ ,  $p < 0.01$ ,  $\eta^2 = 0.03$ ) and aggressive behavior ( $F(1,474) = 17.08$ ,  $p < 0.01$ ,  $\eta^2 = 0.03$ ). Mothers perceive girls ( $X = 2.03$ ;  $Ss = 2.02$ ) to have more introversion problems than boys ( $X = 1.65$ ;  $Ss = 2.23$ ). With regard to attention problems, mothers also perceived their girls ( $X = 2.84$ ;  $Ss = 1.89$ ) as more problematic than boys ( $X = 2.19$ ;  $Ss = 1.71$ ). In the dimension of aggressive behavior, too, mothers reported more problems in girls ( $X = 11.24$ ;  $Ss = 6.35$ ) than in boys ( $X = 9.01$ ;  $Ss = 5.92$ ).

As has been previously mentioned, MANOVA results have shown that children's behavioral/emotional problems do not vary with respect to the combined effect of group  $\times$  mother's education level; group  $\times$  gender; mother's educational level  $\times$  gender. However, ANOVA results have shown that the combined effect of these three factors on aggressive behavior was meaningful ( $F(1,474) = 4.08$ ,  $p < 0.05$ ,  $\eta^2 = 0.01$ ). Mothers with a high level of education in the participant group perceived their girls ( $X = 11.87$ ;  $Ss = 6.69$ ) and boys ( $X = 9.49$ ;  $Ss = 4.52$ ) to be more problematic than the mothers with a high level of education in the control group did for their girls ( $X = 9.34$ ;  $Ss = 5.49$ ) and boys ( $X = 7.70$ ;  $Ss = 4.64$ ). Control group mothers with a low level of education reported more problems in their girls ( $X = 13.84$ ;  $Ss = 6.26$ ) than the girls of low education mothers in the participant group ( $X = 11.85$ ;  $Ss = 6.64$ ). Inversely, the participant group mothers with a low level of education reported more problems in their girls ( $X = 10.98$ ;  $Ss = 7.74$ ) than the boys of low education mothers in the control group ( $X = 8.90$ ;  $Ss = 6.17$ ).

## DISCUSSION

This study used information from mothers to investigate the effects that earthquake has on 4-5 years

old children's behavioral/emotional problems with respect to the variables of group, mothers' education level and gender. The findings point to the existence of significant differences between the behavioral/emotional problems of children who did and did not experience an earthquake, according to their mothers' account.

According to the data obtained from the mothers of control and participant children, the anxiety/depression and introversion scores of earthquake survivors were higher than those of the control group. This data is parallel to the findings of a study conducted after the great Erzincan earthquake in Turkey in 1992 (Karanci and Rustemli, 1995). Karanci and Rustemli (1995) also observed many more psychological problems in earthquake survivors than the control group. In other similar studies (Miller and Basoglu, 1992; Rubonis and Bickman, 1991), the effects of natural disasters are generally claimed to trigger psychopathological symptoms and problems in children, adolescents and adults who survive earthquakes. These findings corroborate those of ours. However, various characteristics of parents (such as depression in mothers) may affect their perception of their children. The relationship between mothers' problems and their evaluations of their children may also be a reflection of parental prejudice (Achenbach and Rescorla, 2000). Due to this prejudice, families may be more sensitive about their children's difficulties (Touliatos and Lindholm, 1981). However, prejudice is only one of many factors that may have an effect (Achenbach and Rescorla, 2000). It would be difficult to explain the high problem scores in mothers' evaluations with merely maternal prejudice (Richters, 1992). Much as families remain the most commonly available resource in collecting information about preschool children, studies relying on multiple sources of information-including families-are needed in order to come to a full understanding of the family-child relationship (Achenbach and Rescorla, 2000).

An examination of mothers' evaluations of their children's behavioral/emotional problems with respect to gender reveals meaningful differences between girls and boys. This is parallel to the results of certain previous studies in Turkey focusing on assessing infancy and early childhood (Erol and Ozebe, 1988; Gokler and Oktem, 1985). However, there are other studies in Turkey that have concluded otherwise (Epir, 1982; Savasir *et al.*, 1994; Sonuvar and Yalin, 1973). In gender comparative studies in other countries too, results have remained inconclusive. While, many studies concluded that problem behaviors do not vary between the two genders (Satake *et al.*, 2003; Coe *et al.*, 1999; Duker *et al.*, 1986; Vostanis *et al.*, 1996). In the present study, mothers were

found to evaluate their girls as more problematic in the dimensions of introversion, attention problems and aggressive behavior. These findings are parallel to several others studies in the study. To name a few, Lonigan *et al.* (1991) and Scott *et al.* (2003) all found more posttraumatic stress symptoms in girls than in boys. On the other hand, there are also several other studies (Verhulst and Achenbach, 1995; Bird *et al.*, 1989; Offord *et al.*, 1987; Rutter *et al.*, 1970) that found more problem behaviors in boys when compared to girls.

The evaluations of mothers with different education level varied in all subtests. When, compared to mothers with a high education level, those with a low education level reported more problem behaviors. In other words, as education level falls, mothers tend to perceive their children as more problematic. This suggests that mothers' education level is a predictor of problem behaviors in children. In certain studies conducted elsewhere in the world (Crijnen *et al.*, 1997), mothers from lower sociocultural levels were seen to score their children higher in Internalizing and Externalizing general syndrome groups. This conclusion also supports our findings. The literature holds evidence that the education level of the family is influential in recognizing children's problems (Kohen *et al.*, 1997). It has even been suggested that living premises affect antisocial behavior in children (Sampson *et al.*, 1997).

### CONCLUSION

As in any other study, this one also has several limitations. To start with, this is the first study to use the Child Behavior Checklist for Ages 1<sup>1/2</sup>-5; (CBCL/1<sup>1/2</sup>-5) with a Turkish sample and likewise, the first to investigate the effects of earthquakes on preschool children's problem behaviors. Thus, it is significant in forming a basis for future studies in the country. As another limitation, although volunteering mothers were admitted to the study in the earthquake zone, some checklists were not returned, thus reducing the sample size. Also, detailed information was not obtained about the personality traits of mothers. As the factors identifying behavioral and emotional problems are rather complex, evaluations of child psychopathology need to consider child behavior together with adult opinions. Future studies may benefit from considering mothers' affective, cognitive and behavioral characteristics carefully, using multiple sources of information such as parents and teachers and utilizing observation as a research technique.

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