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Original Article

The Prevalence of Internalizing and Externalizing Behavior Problems and Their Relationship with Demographic Characteristics in Children Surviving the 2017 Earthquake in West of Iran

Vahid Farnia [1], Omran Davarinejad [1], Maryam Khanegi [1], Touraj Ahmadi Jouybari [1], Safora Salemi [1] *, Shima Pajouhinia [2], Mostafa Alikhani [1], Sara Hookari [1], Behrouz Behrouz [1]

[1] Substance Abuse Prevention Research Center, Health Institute, Kermanshah University of Medical Sciences, Kermanshah, Iran
[2] Psychological Department, Education and Psychology Faculty, Allameh Tabatabai University, Tehran, Iran

* **Corresponding Author:** Safora Salemi, Substance Abuse Prevention Research Center, Health Institute, Kermanshah University of Medical Sciences, Kermanshah, Iran. **Email:** s_salemi85@yahoo.com

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Abstract

Background: Natural disasters may lead to personal and social dysfunction in children.
Objectives: The present study was conducted to determine the prevalence of behavioral problems and their relationship with demographic characteristics in children surviving the 2017 earthquake in western Iran.
Methods: This was a cross-sectional-analytical study. The statistical population included all children surviving the 2017 earthquake in western Iran. The sample size included 335 subjects selected by convenience sampling. The Achenbach Child Behavior Checklist (Parent Form) was the tool used to collect data and chi-square and Fisher's exact tests were used to analyze the data.
Results: The rule breaking (5.3%) and somatic complaints (2.4%) were the most and least prevalent behavioral problems in children, respectively. General behavior problems (8.3%), internalizing behavior problems (7.4%), and externalizing behavior problems (7.1%) were the most prevalent, respectively. Gender had a significant statistical relationship with somatic complaints and attention problems; loss of home with rule breaking, internalizing behavior problems, and general behavior problems; the number of children in a family with anxiety; age of the father with social problems, aggression, internalizing and externalizing behavior problems; the father's educational level with withdrawal; mother's educational level with attention problems, aggression, externalizing behavior problems and general behavior problems; and economic status with aggression ($p<0.05$) were apparent.
Conclusion: Given the significant prevalence of behavioral and psychiatric disorders in children who survived the earthquake, identifying children at risk is important for the prevention, early diagnosis, and treatment of aforementioned problems in these children.

Keywords: Behavior problem, Surviving, Earthquake.

Introduction

Earthquakes are demolishing and recurrent natural disasters that cause many injuries and deaths.[1] Unlike other natural disasters, an earthquake usually occurs without warning, and its effects are intense and usually remain for a long time.[2,3] It appears that facing natural disasters can cause general stress and a whole range of psychological syndromes and psychiatric disorders such as post-traumatic stress disorder (PTSD), fear and anxiety, recurring disturbing memories, depression, substance abuse, and in general, mental health problems for survivors. These symptoms can disrupt the psychosocial function and quality of life of individuals.[1,2,4-6]

Children are strongly vulnerable to the adverse consequences of natural disasters and may be affected through adolescence into adulthood.[7,8] The prevalence of some psychiatric disorders among survivors of an earthquake varies from 25% to 89.9%, due to differences in earthquake severity, destruction rates, and mortality, and in differences in research methodology.[2] Risk factors for PTSD also differ and include greater exposure to real danger or threat during an earthquake, proximity to the center of events, disruption of life and social networks, history of emotional problems, financial losses, female gender, low level of education, and lack of support.[2,5]

Most previous studies have addressed PTSD or depression as a mental health outcome among children, but few have examined the influence of exposure to natural disasters on

behavioral problems. Thus, the effects of earthquakes and other natural disasters on the mental and physical health of children and adolescents has been ignored.[8,9]

Internalizing behavior problems (such as depression and anxiety) and externalizing behavior problems (such as aggression, rule breaking, and conduct problems) are common in children and adolescents who have faced natural disasters, either immediately after the event or over the long run.[9-14] In a study by Fujiwara et al.,[9] the percentages of internalizing, externalizing, and general behavior problems of children between 5 and 8 years of age that appeared two years after the earthquake were 27.7%, 21.2%, and 25.9%, respectively. Behavioral problems caused by an earthquake and other disasters can be constant, disturbing the mental health of the survivors and continuing for years after the disaster.[9,10,15,16]

Given that cultural differences can affect the incidence and severity of mental disorders, generalizing the findings of other countries may have estimation errors. Therefore, research to examine the epidemiology and prevalence of disorders caused by natural disasters in Iran is essential.

Objectives

Because of the low number of studies that have considered the impact of traumatic events on children along with the fact that Iran is highly prone to earthquakes, conducting research to determine the prevalence of behavioral problems in children is necessary. Therefore, the current study aimed to estimate the prevalence of behavioral problems among survivors of the 2017 earthquake in western Iran and to search for demographic factors associated with these disorders.

Materials and Methods

This cross-sectional study was conducted to determine the prevalence of behavioral problems and their relationship with demographic characteristics in children surviving the 2017 earthquake in Kermanshah, one of the western provinces of Iran.

Participants

TThe statistical population of the study consisted of all survivors of the 2017 Kermanshah earthquake who lived in the stricken areas. Taking into account the proportion of 50% (to achieve maximum sample size), with 95% confidence, 6% accuracy, and a 25% (68 subjects) sample loss, the necessary sample size was determined to be 335 subjects, who were selected from among the study population based on inclusion and exclusion criteria by convenience sampling.

The inclusion criteria were residing in the earthquake-stricken areas, presence in the earthquake-stricken areas during the earthquake, lack of a history of previous psychiatric disorders, and aged 7-15 years old. Children were excluded from the study if they had a history of mental illness, a history of physical illnesses, or mental retardation. Participation was contingent upon meeting the inclusion criteria as assessed by the subject's history and an interview based on DSM-IV conducted by child psychologists.

Data gathering

After obtaining permission and a letter of introduction from the Kermanshah University of Medical Sciences, the researchers traveled to areas affected by the 2017 Kermanshah earthquake and systematically visited the tents or shelters. When possible based on the inclusion criteria, a child was selected through convenience sampling and enrolled with the permission of the child's legal guardian.

Assessment of behavioral problems

Achenbach Child Behavior Checklist (Parent Form): CBCL measures emotional-behavioral problems in children aged 6-18 years from the perspective of parents and includes 115 items scored from 0 to 2 on a 3-point Likert scale. This tool evaluates the problems of children and adolescents in the 8 scales of anxious/depressed, withdrawn/depressed, somatic complaints, social problems, thought problems, attention problems, rule-breaking behavior, and aggressive behavior. The general reliability coefficient of CBCL was 0.97 using Cronbach's alpha and 0.94 using test-retest reliability. Content validity, criterion validity (using a psychiatric interview with a child and correlation with the CSI-4 scale) and construct validity (internal relations of scales and group differentiation) of these forms have been reported to be desirable.[17]

Minaei (2006 reported the reliability of CBCL in Iran to be 0.63-0.95 using Cronbach's alpha. The reliability of the scales across time was investigated using the test-retest method with a time interval of 5 to 8 weeks. The range of time stability coefficients were 0.32-0.67. The agreement among respondents was also examined, which ranged from 0.09 to 0.67.[18]

Data analysis

Data was ultimately collected from 337 people, entered into SPSS-20 software, and analyzed by statistical methods. Descriptive statistics (frequency and percentage) were used to determine the distribution of age, gender, and education of children with information about the age, education, occupation, number of children, and economic status of the parents as well as self-reported histories, including histories of addiction in the family, the death of family members or relatives in the earthquake, family disruption, loss of home, current residence, and the prevalence of behavioral problems. Descriptive statistical methods such as number, mean and standard deviation were used to determine the mean age, behavioral problems, and their dimensions. The chi-square test and Fisher's exact test were used to determine the relationship of each behavioral problem and its dimensions with the demographic characteristics of the child and his/her parents and their self-reported history. A *p*-value <0.05 was considered significant.

Ethical consideration

This study was approved by the Ethics Committee of the Vice Chancellery of Research and Technology, Kermanshah University of Medical Sciences (KUMS.REC.1396.496). Written informed consent was obtained from each participant after the purpose of the research was explained.

Results

In total, 337 children participated in this study, of whom 175 (51.9%) were girls and 162 (48.1%) were boys; 111 (32.9%) were 7-9 years old, 126 (37.4%) were 10-12 years old, and 100 (29.7%) were 13-15 years old. The average age of the children was 11.9 years. Other characteristics of the children and their parents are described in Table 1.

The study of behavioral problems in children showed that the highest prevalence of behavioral problems was that of rule-breaking (18, 5.3%), followed by withdrawal (17, 5.0%), aggression (16, 4.7%), anxiety (15, 4.5%), social problems (15, 4.5%), attention problems (10, 3.0%), thought problems (9, 2.7%) and somatic complaints (8, 2.4%), respectively. Overall behavioral problems (28, 8.3%), internalizing behavior problems (25, 7.4%), and externalizing behavior problems (24, 7.1%) were the most prevalent (Table 2).

Table 1. Demographic characteristics of children and their parents along with behavioral problems

Variable	Levels	Frequency (%)	Variable	Levels	Frequency (%)
Child's age	7-9	111(32.9)	Child sex	Girl	175(51.9)
	10-12	126(37.4)		Boy	162(48.1)
	13-15	100(29.7)	Mother's job	Employee	309(91.7)
Father's age	25-35	51(15.1)		Medium	193(57.3)
	36-45	208(61.7)		Good	26(7.7)
	>= 46	78(23.1)	The most important problem of current life	Health	229 (68.0)
Mother's age	25-35	146(43.3)		Housing	108(32.0)
	36-45	161(47.8)	Deaths of family members or relatives	Yes	57(16.9)
	>= 46	30(8.9)		No	280(83.1)
Father's education	Middle and lower education	188(55.8)	Disorder in the family	Yes	82(24.3)
	Diploma & Associate Degree	107(31.8)		No	255(75.7)
	Bachelor	42(12.5)	Losing home	Yes	277(82.2)
Mother's education	Middle and lower education	225(66.8)		No	60(17.8)
	Diploma & Associate Degree	97(28.8)	Current place	Tent	167(49.6)
	Bachelor	15(4.5)		CONEX box	170(50.4)

Table 2. Evaluation of behavioral problems in children surviving the earthquake

Variable	Levels	Frequency (%)	Variable	Levels	Frequency (%)
Anxiety	Normal (T<65)	322(95.5)	Rule-breaking	Normal (T<65)	319(94.7)
	Abnormal (T>= 65)	15(4.5)		Abnormal (T>= 65)	18(5.3)
Withdrawal	Normal (T<65)	320(95.0)	Aggression	Normal (T<65)	321(95.3)
	Abnormal (T>= 65)	17(5.0)		Abnormal (T>= 65)	16(4.7)
Somatic complaints	Normal (T<65)	329(97.4)	Internalizing behavior problems	Normal (T<65)	312(92.6)
	Abnormal (T>= 65)	8(2.4)		Abnormal (T>= 65)	25(7.4)
Social problems	Normal (T<65)	322(95.5)	Externalizing behavior problems	Normal (T<65)	313(92.9)
	Abnormal (T>= 65)	15(4.5)		Abnormal (T>= 65)	24(7.1)
Thought problems	Normal (T<65)	328(97.3)	Overall behavioral problems	Normal (T<65)	309(91.7)
	Abnormal (T>= 65)	9(2.7)		Abnormal (T>= 65)	28(8.3)
Attention problems	Normal (T<65)	327(97.0)	Total		337(100%)
	Abnormal (T>= 65)	10(3.0)			

Gender had a significant statistical relationship with withdrawal, somatic complaints, and attention problems ($p<0.05$). Withdrawn subjects were mostly female (15, 88.2% of girls vs. 2, 11.8% of boys). All children who had somatic complaints (8, 100%) and 9 (90%) of the children with attention problems were female. Additionally, 19 (76%) of the children with internalizing behavior problems and 18 (75%) with externalizing behavior problems were female. Also, 8 (28.6%) of the children with general behavior problems were male and 20 (71.4%) were female (Table 3).

Loss of home had a statistically significant relationship with rule breaking, internalizing behavior problems, and general behavior problems in children ($p<0.05$). Among the children who had broken rules (18, 5.3%), 12 (66.7%) had lost their homes and 6 (33.3%) were still living in their homes. In children with internalizing behavior problems (25, 7.4%), 17 (68%) had lost their homes. Also, 19 (67.9%) of children with general behavior problems had lost their homes (Table 3).

There was a significant relationship between the number of children in the family and anxiety ($p<0.05$). The majority of children with anxiety problems 14 (82.4%) were from families with 1-2 children. The mean age of fathers had a statistically significant relationship with social problems and aggression, internalizing and externalizing behavior problems in children; with increases in age of the father, the number of children with anxiety, social problems, and aggression as well as internalizing and externalizing behavior problems decreased. The significant relationship between father's education and children's withdrawal showed that the majority of withdrawn children 14 (82.4%) had fathers with low educational levels. Most children with attention problems, aggression, externalizing, and general behavior problems had mothers with low levels of education. On the other hand, more than 50% of children with aggression (14; 82.4%) were in a household with poor economic status (Table 4).

Discussion

The aim of this study was to investigate the prevalence of behavioral problems and their relationship with the demographic characteristics of children who survived the 2017 earthquake in western Iran. In this study, rule breaking was the most and somatic complaint was the least prevalent behavioral problems. In explaining this finding, it can be argued that externalizing behavior problems (such as rule breaking) in survivors of natural disasters may be indirectly explained through parental disturbances.[19] A consistent study in this field showed that three years after the Katrina storm, mothers who showed more significant disturbances reported more problems in their children.[20] The high prevalence of rule breaking can also be attributed to the fact that exposure to an earthquake could be involved in the creation of problems related to emotion regulation and irritability, which in turn, in response to relatively mild interpersonal arousals, can lead to increased externalizing behaviors such as rule breaking and aggression.[21] The prevalence of somatic complaints in the current study was consistent with one of the few studies that examined somatic complaints in children and adolescents surviving earthquakes. Thus, it can be concluded that somatic complaints related to the respiratory system, cardiovascular system, nervous system, gastrointestinal tract, and excretory

system are common in these people.[22] In line with other studies, the incidence of somatic complaints and symptoms appears to decrease[23] after six months. These symptoms may improve gradually or spontaneously over time in earthquake survivors. In this period, the surviving children might have received useful emotional information and support from family, teachers, government, etc., which may have reduced their somatic complaints.

Table 3. The results of the correlation of child's gender and loss of home with behavioral problems (internalizing, externalizing, and general)

		Sex			X^2 (Sig)	OR (Sig)	95% Confidence Interval for OR
Variables	Levels	Girl	Boy	Total			
Withdrawal	Normal (T<65)	160(50%)	160(50%)	320(100%)	9.45	0.133	(0.03,0.59)
	Abnormal (T>= 65)	15(88.2%)	2(11.8%)	17(100%)	(0.002)	(0.008)	
Social problems	Normal (T<65)	167(50.8%)	162(49.2%)	329(100%)	7.59	---	----
	Abnormal (T>= 65)	8(100%)	0(0%)	8(100%)	(0.005)		
Attention problems	Normal (T<65)	166(50.8%)	161(49.2%)	327(100%)	5.98	0.115	(0.01,0.91)
	Abnormal (T>= 65)	9(90%)	1(10%)	10(100%)	(0.01)	(0.04)	
Internalizing behavior problems	Normal (T<60)	156(50%)	156(50%)	312(100%)	6.27	0.316	(0.12,0.81)
	Abnormal (T>= 60)	19(76%)	6(24%)	25(100%)	(0.01)	(0.01)	
Externalizing behavior problems	Normal (T<60)	157(50.2%)	156(49.8%)	313(100%)	5.51	0.335	(0.13,0.87)
	Abnormal (T>= 60)	18(75%)	6(25%)	24(100%)	(0.01)	(0.02)	
Overall behavioral problems	Normal (T<60)	155(50.2%)	154(49.8%)	309(100%)	4.65	0.403	(0.17,0.94)
	Abnormal (T>= 60)	20(71.4%)	8(28.6%)	28(100%)	(0.02)	(0.03)	
		Losing home					
		Yes	No				
Rule-breaking	Normal (T<65)	265(83.1%)	54(16.9%)	319(100%)	3.13	2.45	(0.88,6.82)
	Abnormal (T>= 65)	12(66.7%)	6(33.3%)	18(100%)	(0.04)	(0.04)	
Internalizing behavior problems	Normal (T<60)	260(83.3%)	52(16.7%)	312(100%)	3.72	2.35	(0.96,5.74)
	Abnormal (T>= 60)	17(68%)	8(32%)	25(100%)	(0.04)	(0.04)	
Overall behavioral problems	Normal (T<60)	258(83.5%)	51(16.5%)	309(100%)	4.29	2.40	(1.03,5.60)
	Abnormal (T>= 60)	19(67.9%)	9(32.1%)	28(100%)	(0.04)	(0.04)	
	low (8-14)	157(78.5%)	43(21.5%)	200(100%)			

Table 4. The results of the correlation between demographic characteristics and internalizing, externalizing and general behavior problems in children

Variable	**Levels**	**Number of children in the child's family (N)**			**Total**	**X2 (Sig)**
		1-2	3-4	> 4		
Anxiety	Normal (T<65)	180(55.9%)	120(37.3%)	22(6.8%)	322(100%)	9.08
	Abnormal (T>= 65)	14(93.3%)	0(0%)	1(6.7%)	15(100%)	(0.01)
Father's age						
		25-35	36-45	>= 46		
Anxiety	Normal (T<65)	45(14%)	201(62.4%)	76(23.6%)	322(100%)	7.64
	Abnormal (T>= 65)	6(40%)	7(46.7%)	2(13.3%)	15(100%)	(0.02)

Social problems	Normal (T<65)	45(14%)	204(63.4%)	73(22.7%)	322(100%)	10.24
	Abnormal (T>= 65)	6(40%)	4(26.7%)	5(33.3%)	15(100%)	(0.006)
Aggression	Normal (T<65)	45(14%)	204(63.6%)	72(22.4%)	321(100%)	10.72
	Abnormal (T>= 65)	6(37.5%)	4(25%)	6(37.5%)	16(100%)	(0.005)
Externalizing behavior problems	Normal (T<60)	44(14.1%)	199(63.6%)	70(22.4%)	313(100%)	6.98
	Abnormal (T>= 60)	7(29.2%)	9(37.5%)	8(33.3%)	24(100%)	(0.03)
Overall behavioral problems	Normal (T<60)	43(13.9%)	196(63.4%)	70(22.7%)	309(100%)	5.79
	Abnormal (T>= 60)	8(28.6%)	12(42.5%)	8(28.6%)	28(100%)	(0.04)
Father's education						
		Middle and lower education	Diploma & Associate Degree	Bachelor		
Withdrawal	Normal (T<65)	174(54.4%)	106(33.1%)	40(12.5%)	320(100%)	6.04
	Abnormal (T>= 65)	14(82.4%)	1(5.9%)	2(11.8%)	17(100%)	(0.04)
Mother's education						
	Middle and lower education		Diploma & Associate Degree	Bachelor		
Attention problems	Normal (T<65)	218(66.7%)	97(29.7%)	12(3.7%)	327(100%)	18.10
	Abnormal (T>= 65)	7(70%)	0(0%)	3(30%)	10(100%)	(<0.0001)
Aggression	Normal (T<65)	215(67%)	95(29.6%)	11(3.4%)	321(100%)	17.53
	Abnormal (T>= 65)	10(62.5%)	2(12.5%)	4(25%)	16(100%)	(<0.0001)
Externalizing behavior problems	Normal (T<60)	208(66.5%)	95(30.4%)	10(3.2%)	313(100%)	19.40
	Abnormal (T>= 60)	17(70.8%)	2(8.3%)	5(20.8%)	24(100%)	(<0.0001)
Overall behavioral problems	Normal (T<60)	205(66.3%)	94(30.4%)	10(3.2%)	309(100%)	15.89
	Abnormal (T>= 60)	20(71.4%)	3(10.7%)	5(17.9%)	28(100%)	(<0.0001)
The economic situation						
		Weak	Medium	Good		
Aggression	Normal (T<65)	108(33.6%)	187(58.3%)	26(8.1%)	321(100%)	6.07
	Abnormal (T>= 65)	10(62.5%)	6(37.5%)	0(0%)	16(100%)	(0.04)

Another finding of the study showed that internalizing problems was more prevalent than externalizing problems. This finding is consistent with the studies by Fujiwara et al.,[9] and Lai et al.[24] Continuous stress, multiple losses, and remembering the disaster can lead to feelings of helplessness, isolation, and withdrawal and, in general, internalizing problems among people experiencing natural disasters, which can cause behavioral problems in children.[19]

In this study, the gender of the children had a significant relationship with withdrawal, somatic complaints, and attention problems. Girls reported withdrawal, somatic complaints, and attention problems more often, and girls also had more general behavior problems (both internalizing and externalizing) than boys. This finding is consistent with other studies that have shown girls to be significantly more psychologically distressed than boys after earthquakes and natural disasters.[2,24,25] Explaining this finding, one can point to the gender differences in cognitive and socialization assessments. For instance, studies have shown that females have different socialization and traumatic memory recording processes, because of which they experience fear more than males in similar traumatic events and are more likely to blame themselves for traumatic events.[26,27]

Another finding of the present study revealed significant relationships between the loss of home and rule breaking, internalized behavior problems, and general behavior problems. This finding is consistent with previous studies that have shown that people who experience more traumatic stresses are more likely to experience more mental health problems.[6] In studies by Police et al.,[2] and Paul and

Ramekat.,[28] loss of home was reported to be one of the major risk factors of increasing disturbances and mental health problems in earthquake survivors.

It was also found that with increases in the age of the father, the number of children with anxiety, social problems, and aggression as well as internalizing and externalizing behavior problems decreased. Usually, the age of parents reflects their experiences and knowledge. Younger parents are more prone to tension, because they have access to fewer financial resources and are more vulnerable to life-threatening outcomes. On the other hand, younger parents show less tolerance for inappropriate child behavior and have fewer parenting skills to educate children.[29]

The significant relationship between father's education and children's withdrawal showed that the majority of withdrawn children had fathers with low educational levels. Also, most children with attention problems, aggression, externalizing and general behavior problems had mothers with low educational levels. Similarly in a study by Wang et al.,[30] parents' low level of education was considered as a major risk factor for the mental health of survivors of earthquakes. The possible underlying mechanism is that a lower level of education may be accompanied by less flexibility, fewer coping skills, lower self-esteem, less insight, etc., which can expose parents to more problems and thus lead to behavioral problems in children.[30]

A significant relationship was found between economic situation and aggression in children who survived the earthquake. More than 50% of the children with aggression had a poor household economic status. This finding is consistent with the results of Shapira et al.[31] Studies have shown that socioeconomic vulnerability and environmental inequalities can exacerbate the negative consequences of disasters.[32] The impact of socioeconomic deprivation on children comes from the fact that socioeconomic status is a composite variable that has potential negative resources for creating destructive effects. In addition to low incomes, low socioeconomic status is often associated with poor educational level, low employment level, single-parent status, and negative life events such as exposure to violence and poor nutrition.

The present study had some limitations, including a small sample size. Moreover, this study only used CBCL. It is recommended that future studies use larger samples and gather information using different questionnaires using both the teacher's and the parent's forms of CBCL.

The identification of risk factors and early detection of behavioral disorders in survivors of earthquakes can help health planners design and apply interventions. In addition, identifying children at risk for behavioral and psychiatric disorders will facilitate making arrangements to take the necessary preventive measures for these children.

Conclusions

The present study showed that exposure to natural disasters could lead to behavioral problems in children who have survived an earthquake. Children and adolescents may develop behavioral problems when they experience traumatic events and natural events such as earthquakes because of their special physical and emotional conditions. In the event of a natural disaster, especially a sudden and surprising earthquake, especially one resulting in severe physical and financial damage, temporary or permanent behavioral problems in children can develop.

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Authors' Contribution

All authors pass the four criteria for authorship contribution based on the International Committee of Medical Journal Editors (ICMJE) recommendations.

Conflict of Interests

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