

Examination of Risk Perception, Fear and Preparedness of Individuals Experiencing Earthquakes

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Abstract

An earthquake, which can directly affect individual and social life, is a natural event that is difficult to predict. However, previous earthquake experiences can trigger earthquake risk perception and fear. Reasonable risk perception and fear generally affect earthquake preparedness behaviour positively. This study aims to reveal the earthquake risk perception, fear, and actual and perceived preparedness levels of the people in a region in Turkey where a destructive earthquake occurred. Data were collected from 388 respondents who experienced the Elazig earthquake in 2020 through a structured questionnaire. The findings indicate that earthquake risk perception and fear are high, but actual and perceived preparedness levels are low. The results showed that gender, earthquake education, the way the earthquake is explained differ significantly with the risk perception, fear, actual and perceived preparedness levels. In addition, it has been determined that risk perception, fear, actual and perceived preparedness levels are related to each other at certain levels. The research is considered necessary because it deals with many variables and offers a holistic view of the research field.

Keywords: Earthquake Risk Perception, Fear, Actual Preparedness, Perceived Preparedness, Elazığ

1. INTRODUCTION

Disasters are events that disrupt daily life and the functioning of social institutions, damage social norms, and negatively affect the quality of life (Fritz, 1996). Especially destructive earthquakes of high intensity can cause radical social upheavals/changes in countries that are not prepared for earthquakes (Fırat, 2020, p. 163). Earthquake is one of the most devastating disasters. It is not possible to predict and prevent a natural event such as an earthquake; however, it is possible to make individuals, places, and society resistant to earthquakes. The main thing that leads to the characterization of a natural event as a disaster is the effect it creates on social life (Guggenheim, 2014) and the results it produces (Dombrosky, 1998). Scholars have reached a consensus (Zhuang et al., 2020) that the most effective way to minimize disaster-related losses and vulnerabilities is to increase disaster preparedness. However, people's preparedness for disasters can make them resilient for dealing with a future disaster.

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Turkey is a country where many severe earthquakes occur, and Elazığ is one of Turkey's most earthquake-prone provinces (AFAD, 2019). In the earthquake in Elazığ on January 24, 2020, 38 people died, nearly 2000 people were injured, and more than 7 thousand people lost their homes (AFAD, 2020). The main goal of this study is to examine the earthquake-related risk perception, fear, and actual and perceived preparedness levels of individuals living in the city of Elazığ, which has an earthquake-prone area and where a severe earthquake occurred in the recent past. Thus, it is targeted to reveal a community's attitudes and behaviors that have experienced the earthquake. In this context, a questionnaire consisting of questions and scales was directed to the participants to measure their future earthquake expectations, how much they feared the earthquake, how ready they felt for the earthquake, and how prepared they were for it. The research is considered necessary because it deals with many variables and offers a holistic view of the research field.

2. LITERATURE REVIEW

Risk perception, fear, and preparedness are among the topics frequently discussed in disaster literature. Risk perception expresses a subjective opinion about the possibility of realizing risk (Sherman et al., 2011). Fear is an emotional response to perceived risk and danger (Pain, 2009). In disaster literature, risk perception and disaster fear are generally evaluated together. One of the most studied topics in disaster studies is household disaster preparedness since it is one of the crucial elements of coping with disasters (Xu et al., 2018). Disaster preparedness is defined as to what extent individuals are ready to deal with a possible future disaster and the measures they take (Perry et al., 2001). Perceived preparedness is the self-evaluation of individuals about how prepared they are for an upcoming earthquake (Kirschenbaum et al., 2017).

Some studies reveal the relationships between perceived disaster risk and fear and preparedness. Numerous studies have revealed perceived disaster risk (Miceli et al., 2008; Xu et al., 2018) and fear (Takao et al., 2004; Rüstemli and Karancı, 1999) positively affect disaster preparedness. There are also studies stating a negative relationship between disaster preparedness and perceived disaster risk and fear (Qing et al., 2021) or that there is no relationship between risk perception and preparedness (Lindell and Whitney, 2000; Siegrist and Gutscher, 2006).

Numerous studies have evaluated factors such as household socioeconomic characteristics, disaster knowledge, and making sense of disaster as the main variables affecting risk perception, fear, and preparedness (Russel et al., 1995; Perry et al., 2001; Ao et al., 2021). Sociodemographic factors can affect disaster risk perception, fear, and preparedness. The literature states that gender, age, education and income level, and homeownership are critical sociodemographic factors affecting disaster preparedness (Mulilis, 2000; Takao et al., 2004). Some empirical research; found that women, youth, educated, high-income, and homeowners are more prepared for disasters (Russel et al., 1995; Mulilis et al., 2000; Ao et al., 2021). However, some studies found that men, the elderly, and tenants are more prepared for disasters (Mohammad-pajoo and Aziz, 2014; Azim and Islam, 2016). Some studies reveal that perceived preparedness is related to factors such as age, gender, and living in high seismic risk areas (Kirschenbaum et al., 2017). In addition, studies show significant relationships between gender, age, education level, number of children, ethnicity, and social class and perceived risk and fear (Armaş, 2006; Baytiyeh and Öcal, 2016; Goltz and Bourque, 2017).

Disaster knowledge is another factor that affects risk perception, fear, and disaster preparedness. Studies often reveal that disaster knowledge positively impacts disaster preparedness. Some studies conducted in Japan (Shaw et al., 2004), Indonesia (Adiyoso and Kanegae, 2013), and China (Ao et al., 2021) have revealed that in addition to the education level of the individual, the ability

to access disaster information positively affects disaster preparedness by increasing awareness. Some studies determine that disaster knowledge or previous disaster education significantly impacts earthquake risk perception and fear (Shaw et al., 2004; Johnson et al., 2014).

Making sense of disasters can also affect risk perception, fear, and preparedness. In addition to sociodemographic characteristics, knowledge, awareness, and fatalistic beliefs about disasters come to the fore in making sense (Baytiyeh and Öcal, 2016). Studies show that the meanings attributed to disasters affect preparedness (McClure et al., 2001; Baytiyeh and Naja, 2016; Bilik, 2019). According to these studies, denial and fatalistic belief harm disaster preparedness. Although natural phenomena are uncontrollable events, the results of these events can be controlled partially. While individuals prone to fatalistic beliefs believe that they are helpless in the face of the magnitude and damage of disasters, those who believe that the consequences of disasters can be controlled relatively think that damage is related to human design (McClure et al., 2001).

The literature review has shown that the studies evaluating the variables examined in this study together are quite limited. This research provides the opportunity to look at the area in question from a holistic perspective by evaluating earthquake risk perceptions, fears, actual and perceived preparedness of individuals in an earthquake-prone region who have experienced an earthquake in the recent past. For this purpose, the research aims to reveal whether individuals' risk perceptions, fears, and actual and perceived preparedness levels differ according to demographic factors and to reveal the nature of the relationships between these variables.

3. METHOD

3.1. Study Design and Sample

Within the scope of quantitative research methods, this research was designed with a descriptive and relational design (Kumar, 2011; Gay et al., 2012) to describe the current situation and investigate the existence, direction, and strength of the relationships between two or more variables. In the research, the relationships between earthquake risk perceptions, fears, actual and perceived preparedness levels of individuals who have experienced earthquakes, both with each other and with sociodemographic variables, are examined.

The research sample consists of 388 individuals who were chosen to represent the population of 443,363 people living in the center of Elazığ. The minimum sample size representing the universe was determined as 385, with a confidence interval of 0.95 and a margin of error of 0.05, using the sample calculation formula whose universe is known (Krejcie and Morgan, 1970). Data were collected from 388 individuals, exceeding the number determined in this study. People living in Elazığ city center and experiencing the 2020 earthquake were included in the scope of the study. For this reason, the participants were first asked whether they experienced the Elazığ earthquake, and the participants who answered positively to this question were included in the research sample. The demographic characteristics of the individuals participating in the study are given in Table 1.

The mean age of the individuals participating in the research is 32.93 ± 11.02 . 47.9% of the participants are female, and 52.1% are male. 31.4% of the participants are at high school or below, 68.6% are at university or higher education level. 67.8% of the individuals participating in the research belong to the middle-low and low-income level, while 32.2% belong to the middle and middle-upper income group. 13.9% of the participants live in a detached house and 586.1 in an apartment. 39.7% of the individuals participating in the research are tenants, and 60.3% are homeowners.

Table 1. Demographic Characteristics of the Participants

		n	%
Gender (n= 388)	Female	186	47,9
	Male	202	52,1
Education level (n= 388)	High school and below	122	31,4
	University and above	266	68,6
Montly income (n= 388)	Low	110	28,4
	Lower middle	153	39,4
	Medium	80	20,6
	Up	45	11,6
Type of house (n= 388)	Private	54	13,9
	Apartment	334	86,1
Homeownership (n= 388)	Tenant	154	39,7
	Homeowner	234	60,3

3.2. Data Collection Tool

The data collection tool used in the research consists of 35 questions and two parts. In the first section, there is an introductory information form. In the introductory information form, seven questions aim to determine sociodemographic characteristics (age, gender, monthly income, type of ownership of the house, etc.).

In the second part of the data collection tool, three 10-point Likert questions and disaster preparedness scales aim to measure earthquake risk perception, earthquake fear, and perceived and actual earthquake preparedness. Questions questioning the participation in earthquake education and the way of making sense of the earthquake are the other questions in the form.

The disaster preparedness scale in the form was developed by Şentuna and Çakı (2020) and aimed to measure the disaster preparedness of households. The lowest score obtained from the 13-item 5-point Likert scale is 13, and the highest score is 52. The Cronbach Alpha reliability coefficient of the scale was calculated as 0.82. In this study, the Cronbach Alpha reliability coefficient of the scale was calculated as 0.87.

3.3. Data Collection Process

Ethical approval for this study was obtained from University Ethics Committee (12.11.2021/21000650067) before the study could be conducted. Due to the pandemic conditions, an online questionnaire was used in the data collection process. The questionnaire was prepared through the Google form and applied to the individuals who voluntarily agreed to respond. Data were collected between September and November 2021.

3.4. Analysis of Data

The data were coded and evaluated with the SPSS (Statistical Package for Social Sciences for Windows 25.0) package program. Descriptive statistics such as number and percentage distributions, mean and standard deviation were used to evaluate descriptive information. The normal distribution of the data was evaluated by examining the kurtosis and skewness values. Two independent samples t-test was used to compare two groups inhomogeneously distributed data, and one-way ANOVA was used to compare multiple groups. Tukey test was used to determine the group that made a difference due to the ANOVA test. Cronbach's Alpha internal consistency test was used to test the internal consistency of the scales. The $p < 0.05$ level was taken as the basis for the statistical significance of the results.

4. RESULTS

The earthquake risk perception mean score of the individuals participating in the study was $6,917 \pm 2,627$; earthquake fear mean score was $6,721 \pm 2,901$; perceived earthquake preparedness mean score was $4,025 \pm 2,577$; the mean score of actual preparedness levels is $31,340 \pm 7,807$ (Table 2).

It was investigated whether the demographic characteristics of the participants differed according to earthquake risk perception, fear, perceived preparedness, and actual preparedness levels. The results are presented in Table 3.

A significant difference was found between women’s and men’s average scores of earthquake fear ($t=5.671$; $p=0.0001$) and perceived earthquake preparedness ($t=4.687$; $p=0.0001$). Earthquake fear mean scores of women are higher than that of men. The perceived earthquake preparedness mean scores of men are higher than the mean scores of women.

A significant difference was found between the average scores of the earthquake preparedness levels of tenants and owners ($t=3,804$; $p=0.0001$). The average score of the preparedness level of the owners is higher than the average of the tenants.

Between earthquake education ($t=3.292$; $p=0.001$) and earthquake risk perceptions ($t=2.782$ $p=0.006$), earthquake fear ($t=3.697$; $p=0.0001$), perceived earthquake preparedness ($t=4.828$; $p=0.0001$), and actual preparedness ($t=3,292$; $p=0.001$) mean scores were found to be significantly different. The earthquake fears score averages of those who received earthquake training were lower than those who did not. In addition, the perceived and actual earthquake preparedness levels and earthquake risk perception mean scores of those who received earthquake training were higher than those who did not.

The average earthquake fear scores of individuals who interpret the earthquake as negligence are higher than those who interpret the earthquake as natural phenomena and divine providence ($F=5.543$, $p=0.04$).

Table 2. Participants' Risk Perception, Fear, Perceived and Actual Preparedness Average Scores

	N	Minimum score	Maximum score	\bar{X}	SS
Earthquake risk perception	388	1	10	6,917	2,627
Earthquake fear	388	1	10	6,721	2,901
Perceived earthquake preparedness	388	1	10	4,025	2,577
Actual earthquake preparedness	388	13	52	31,340	7,807

The relationships between the participants' earthquake risk perception, earthquake fear, perceived and actual earthquake preparedness levels were analyzed using the Pearson product-moment correlation coefficient. The results are presented in Table 4.

Table 3. Earthquake Risk Perception, Earthquake Fear, Perceived and Actual Preparedness Level Scores According to Participants' Demographic Characteristics

Variables	N	Earthquake risk perception	Earthquake fear	Perceived earthquake preparedness	Actual earthquake preparedness
Gender		$\bar{x} \pm SS$	$\bar{x} \pm SS$	$\bar{x} \pm SS$	$\bar{x} \pm SS$
Female	18 6	7,021±2,477	7,559±2,695	3,403±2,321	30,634±7,077
Male	20 2	6,821±2,760	5,950±2,876	4,599±2,673	31,990±8,389
<i>Assesment</i>		$t=0,748, p=0,455$	$t=5,671, P=0,0001$	$t=-4,687, p=0,0001$	$Z=41,85, p=0,040$
Homeownership					
Tenant	15 4	6,883±2,871	7,032±2,725	3,974±2,654	29,513±7,092
Homeowner	23 4	6,940±2,459	6,517±2,99	4,059±2,531	32,542±8,034
<i>Assesment</i>		$t=-0,209, p=0,835$	$t=1,716, P=0,087$	$t=-0,320, p=0,749$	$t=-3,804, P=0,0001$
Earthquake education					
Yes	11 9	7,470±2,339	5,916±2,947	4,949±2,673	33,277±7,352
No	26 9	6,672±2,713	7,078±2,813	3,617±2,429	30,483±7,862
<i>Assesment</i>		$t=2,782, p=0,006$	$t=-3,697, P=0,0001$	$t=4,828, p=0,0001$	$t=-3,292, P=0,001$
Evaluation of the earthquake					
Natural phenomena	19 5	6,759±2,645	6,594±3,073	3,953±2,514	31,133±7,471
Negligence	14 6	7,143±2,485	7,226±2,617	3,849±2,544	31,431±7,918
Divine providence	47	6,872±2,968	5,680±2,719	4,872±2,825	31,914±8,902
<i>Assesment</i>		$F=0,903, p=0,406$	$F=5,543, p=0,04$	$F=2,983, p=0,052$	$F=0,205, p=0,815$

Table 4. Investigation of the Relationships Between Earthquake Risk Perception, Earthquake Fear, and Perceived and Actual Preparedness Levels

	1	2	3	4
	Actual Preparedness	Perceived Preparedness	Earthquake risk perception	Earthquake fear
1 Actual Preparedness	-			
2 Perceived Preparedness	0,323**	-		
3 Earthquake risk perception	0,001	0,141**	-	
4 Earthquake fear	-0,159**	-0,287**	0,225**	-

** The correlation has a significance level of $p < 0.001$.

A moderate and positive correlation was found between the perceived and the actual earthquake preparedness ($r=0.323, n=388, p<0.01$). A weak and negative correlation was found between the actual preparedness and the earthquake fear ($r= - 0.159, n=388, p<0.01$). A positive and weak correlation was found between perceived preparedness and earthquake risk perception ($r=$

0.141, $n=388$, $p<0.01$). A negative and weak correlation was found between the perceived preparedness and the earthquake fear ($r= - 0.287$, $n=388$, $p<0.01$). A positive and weak correlation was found between earthquake risk perception and fear ($r= 0.225$, $n=388$, $p<0.01$).

5. DISCUSSION

In the study, earthquake-related risk, fear, actual and perceived preparedness levels, and the relations of these variables with sociodemographic variables and each other were examined.

The study determined that the earthquake risk perception and fear were above the average, but the actual and perceived preparedness levels were below the average. These results are compatible with the literature. A study conducted in Turkey, Serbia, and Macedonia showed that disaster risk perception and fear of disasters are well above the average, and earthquake (66.9%) is the type of disaster with the highest average fear among different disaster types. According to the research, the type of disaster that Turks fear most is the earthquake (Cvetković et al., 2019). The differentiation of the most common and severe disaster types in the countries may differentiate the feared disaster type. The earthquake risk perception and fear were higher than the average in this study may be due to the seismic risk of the region where the participants live and their previous earthquake experiences.

Research indicates that disaster risk perceptions, fears, and disaster preparedness of individuals who have experienced a disaster before are high (Najafi et al., 2015). However, in the present study, the preparedness levels of the participants are below the average. It should be noted that this result is compatible with other results in the literature (Rüstemli and Karancı, 1999; Takao et al., 2004). In a few studies on perceived preparedness, the preparedness values are very high (Ablah et al., 2009), and in some studies, they are very low (Lovekamp and Tate, 2008). Nevertheless, some studies found preparedness values below the average in line with the results of this study (Azim and Islam, 2016).

The research results reveal that some sociodemographic variables, earthquake education, and how to make sense of the earthquake affect the perceived earthquake risk, earthquake fear, actual and perceived preparedness.

5.1. Influence of Sociodemographic Factors

Sociodemographic factors are the main factors affecting earthquake risk perception, fear, and preparedness, but in this study, only gender and homeownership were found to influence these variables. Generally, women perceive risks more than men (Cutter, 1995). Studies reveal that women had higher levels of seismic risk perception than men (Armaş, 2006). However, this study found no relationship between gender and perceived earthquake risk. Similarly, studies conducted in various countries show that women are more fearful of earthquakes than men (Goltz and Bourque, 2017), consistent with our findings. This study shows that the perceived risk does not differ according to gender, while the fear of earthquakes is higher in women.

Significant differences were found between actual and perceived preparedness levels and gender in the study. Numerous studies have commonly concluded that women are more prepared than men, motivated by their high-risk perceptions and fears (Russel et al., 1995). However, the present study determined that men are more prepared for earthquakes than women. As in this study, other studies show that men are more prepared for disasters than women (Mohammad-pajooch and Aziz, 2014) and perceive themselves as more prepared (Kirschenbaum et al., 2017).

Gender has been accepted as an essential determinant of vulnerability in the risk and crime literature and has been considered one of the leading causes of women's high risk perceptions and fears. However, gender is not considered a critical determinant when considering vulnerability to natural hazards (King and MacGregor, 2000). Therefore, while women are more fearful of an earthquake, men are more prepared, which can be explained by the socially determined differences between men and women and the gender roles attributed to disaster preparedness (Azim and Islam, 2016; Najafi et al., 2015). As a matter of fact, traditional gender roles still have a strong presence in Turkish society. However, another reason women feel more fearful and less prepared is their level of earthquake education. The findings show a statistically significant relationship between earthquake education and gender ($p=0.001$). The proportion of women who have received earthquake training is much lower than that of men. As stated below, having received earthquake education makes individuals less fearful and more prepared.

Another significant difference was found between homeownership and actual preparedness level. Owners are more prepared for earthquakes than tenants. This result is in line with studies (Russell et al., 1995) that found homeownership to be a significant predictor of actual preparedness in earthquakes. Studies show that owning a home affects the actual preparedness level for other disasters such as floods and hurricanes (Takao et al., 2004; Mulilis et al., 2000). Past earthquake experiences and the fact that they have to cope with the earthquake may explain that the owners are more prepared for the earthquake than the tenants. Indeed the owners cannot give up the risky geography or residence as readily as the tenants.

5.2. Earthquake Education

The most striking result of our research findings is earthquake education. This study questioned whether individuals had received earthquake training on what to do before, during, and after an earthquake. As a matter of fact, 2021 has been declared as the Disaster Training Year in Turkey, and disaster training has been carried out throughout the country. Findings show significant differences between earthquake education and earthquake risk perception, earthquake fear, actual and perceived preparedness. It was determined that those who received earthquake training had higher earthquake risk perceptions and lower earthquake fears. Studies conducted in Japan show that earthquake education and knowledge increase risk perception (Shaw et al., 2004). The fact that earthquake-trained individuals report less fear of earthquakes is in line with the literature (Johnson et al., 2014). Researches conducted in Indonesia reveal that perceived high earthquake risk motivates earthquake preparedness (Adioso and Kanegae, 2013). Earthquake preparedness requires a certain level of knowledge and awareness, thus reducing the level of fear (Johnson et al., 2014). Earthquake education also affects actual and perceived preparedness. Our findings revealed that those who received earthquake training were more prepared and felt more prepared for earthquakes. The literature also reveals that knowing strategies for coping with and surviving earthquakes increase actual (Shaw et al., 2004; Johnson et al., 2014) and perceived earthquake preparedness (Collins, 2017). These results show that earthquake education increases the perception of earthquake risk, makes individuals more prepared for earthquakes, and reduces the fear of earthquakes. As individuals' knowledge, consciousness, and awareness of earthquakes increase, their actual and perceived preparedness for earthquakes increases.

5.3. Making Sense of Earthquake

Another variable taken into consideration in disaster studies is making sense of disaster. How disasters are interpreted often has a decisive influence on risk, fear, and preparedness for disasters. Researchers have revealed that individuals living in areas at risk of earthquakes generally have strong fatalistic beliefs against earthquakes (Baytiyeh and Naja, 2016). A study carried out in Turkey revealed that 88% of participants saw earthquakes as God's will, a fate, and a warning from God, and this thought harmed earthquake preparedness (Bilik, 2019). Another study conducted in Indonesia showed that most participants viewed disasters as God's

punishment and thought God warned people to correct their behavior (Adiyoso and Kanegae, 2013).

In this study, no significant difference was found between the making sense of earthquake and the perceived earthquake risk, actual and perceived preparedness. However, a significant difference was found between the earthquake fears of those who evaluated the earthquake as negligence and those who evaluated the earthquake as the act of God. This result can be interpreted as people who consider earthquakes as irresistible and insurmountable events, such as divine causes, exhibit a more submissive approach, and therefore, they report less fear. This way, Individuals who see the earthquake as a result of negligent attitudes and behaviors may think they have been made consciously vulnerable and may have expressed more fear because they have to live in environments without resistance.

Studies reveal that the meanings attributed to disasters affect preparedness (McClure et al., 2001; Baytiyeh and Naja, 2016; Bilik, 2019). Many studies show that seeing disasters as natural phenomena negatively affects disaster preparedness for the same reasons as fatalistic belief (McClure et al., 2001; Baytiyeh and Naja, 2016). Studies show that dominant religious and fatalistic attitudes also affect disaster risk perception and mitigation actions, especially in Middle Eastern societies (Baytiyeh and Naja, 2016). Religious individuals can easily cope with their stress and fears by attributing other and positive meanings to disasters (Taufik and Ibrahim, 2020). A study conducted in the sample of Japan and Turkey revealed that the fatalistic cultural framework, which sees earthquakes as insurmountable power of nature or by divine, constitutes an essential obstacle in taking protective measures (Joffe et al., 2013, p. 392).

These discussions show that gender, ownership, earthquake education, and making sense of earthquakes affect various earthquake-related risk, fear, and preparedness levels. In addition, negative or positive, moderate or weak relationships were found between risk, fear, and actual and perceived preparedness.

5.4. Relationships Between Earthquake Risk Perception, Fear, and Perceived and Actual Preparedness

Similar and differentiating results with the literature were obtained regarding the relationships between perceived risk, fear, perceived and actual preparedness. This study found a positive but weak relationship between earthquake risk and actual preparedness. This result differs from the broad literature (Han et al., 2017; Azim and Islam, 2016). However, some studies found a weak or insignificant relationship between risk perception and preparedness, consistent with the results of this study (Lindell and Whitney, 2000; Siegrist and Gutscher, 2006). In this study, a positive but weak relationship was found between the perceived earthquake risk and the perceived preparedness. This result is similar to the study of Lovekamp and Tate (2008), which showed that participants perceived earthquake risk but did not feel prepared and did not take any action for preparation.

A negative relationship was determined between the participants' fears and their preparedness in the study. As the fears of the participants' increase, their preparedness decreases. Studies also reveal that fear and preparedness are related (Miceli et al., 2008) because anxiety and fear can motivate precaution and preparation (Ao et al. 2021). However, studies (Ao et al., 2021) show that intense earthquake experience negatively affects preparedness and find a negative relationship (Qing et al., 2021) as compatible with this research. The negative correlation of high fear with actual and perceived preparedness can be explained by the idea that individuals who experience an earthquake destructively believe that nothing can withstand earthquakes in any way, as Ao et al. (2021) state.

This study found a moderately positive relationship between actual earthquake preparedness and perceived earthquake preparedness. There are studies that found a solid relationship between these two variables (Russel et al.,1995). Additionally, significant relationships can be detected between these two variables, as the level of actual preparedness affects the individual's sense of readiness and improves awareness and preparedness behaviors for disasters.

6. CONCLUSION

Earthquake experience can increase the perceived earthquake risk and earthquake fear. Perceived risk and fear play essential roles in assessing and dealing with dangers. However, although it has a practical side, the excessive increase in perceived risk and fear can negatively affect living standards and preparedness behavior. The following two results are noteworthy in this study. (1) Women have higher earthquake fears and lower actual and perceived preparedness. (2) Those who received earthquake training are less afraid of earthquakes, and their actual and perceived preparedness is higher than those who did not receive training. This research shows significant parallelism between knowledge and attitudes. Individuals who are conscious of disasters develop their protective preparedness behaviors more.

Another issue that should be considered is how the participants made sense of the earthquake. The research was carried out in a seismic risk region where traditional and religious perspectives are relatively dominant. As a matter of fact, Turkey's Values Atlas (Esmer, 2012) shows that this region is both the most religious and the most conservative in Turkey. In traditional societies living in areas with high earthquake risk, earthquakes are often viewed as an irresistible natural phenomenon or divine providence. However, this research shows that the earthquake is seen as a result of negligence and imprudence at a substantial rate, and the rate of explaining the earthquake with religious fatalism is very low. The belief that relatively preventable factors cause earthquake damage positively affects preparedness. In this sense, the earthquake region where the research was conducted provides a suitable backdrop for struggling earthquakes.

As a result, although earthquakes are natural hazards, preventing these hazards from turning into disasters is achievable. Effective policies, courses of action, and precautions at the governmental, societal, and individual levels are vital in reducing social and spatial vulnerabilities and creating earthquake-resilient societies. An earthquake preparedness culture should be developed, and an earthquake-resistant society should be built by disseminating earthquake training and making them accessible to all social segments.

REFERENCES

- Ablah E, Konda K, Kelley CL (2009). Factors predicting individual emergency preparedness: a multi-state analysis of 2006 BRFSS data. *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 7(3):317-330. <https://doi.org/10.1089/bsp.2009.0022>
- Adiyoso W, Kanegae H (2013). Effectiveness of disaster-based school program on students' earthquake-preparedness. *Journal of Disaster Research* 8(5): 1009-1017. DOI: 10.20965/jdr.2013.p1009
- AFAD. (2019). Turkey earthquake risk map. Republic of Turkey Prime Ministry, Disaster & Emergency Management Authority Presidential of Earthquake Department. <https://deprem.afad.gov.tr/deprem-tehlike-haritasi?lang=en> (Accessed: 02.01.2022)
- AFAD. (2020). 24 January 2020 Elazığ earthquake. Republic of Turkey Prime Ministry, Disaster & Emergency Management Authority Presidential of Earthquake Department. Access, <https://deprem.afad.gov.tr/tarihTeBuAy?id=79> (Accessed: 02.01.2022)

- Ao Y, Zhang H, Yang L, Wang Y, Martek I, Wang G (2021). Impacts of earthquake knowledge and risk perception on earthquake preparedness of rural residents. *Natural Hazards* 107(2): 1287–1310. <https://doi.org/10.1007/s11069-021-04632-w>
- Armaş I (2006). Earthquake risk perception in Bucharest, Romania. *Risk Analysis* 26(5):1223–1234. <https://doi.org/10.1111/j.1539-6924.2006.00810.x>
- Azim MT, Islam MM (2016). Earthquake preparedness of households in Jeddah, Saudi Arabia: A perceptual study. *Environmental Hazards* 15(3):189–208. <https://doi.org/10.1080/17477891.2016.1173006>
- Baytiyeh H, Öcal A (2016). High school students' perceptions of earthquake disaster: A comparative study of Lebanon and Turkey. *International Journal of Disaster Risk Reduction* 18: 56–63. <https://doi.org/10.1016/j.ijdrr.2016.06.004>
- Baytiyeh H, Naja M (2016). The Effects of fatalism and denial on earthquake preparedness levels. *Disaster Prevention and Management: An International Journal* 25(2): 1–19. <https://doi:10.1108/DPM-07-2015-0168>.
- Bilik MB (2019). Depremleri anlamlandırma ve açıklama biçimlerinin sismik risk azaltma süreçlerine etkisi açısından 2011 Van Depremleri. *Resilience* 3(2):229–237. <https://doi.org/10.32569/resilience.605213>
- Collins RN (2017). Disaster preparedness perception in a predominantly African-American community of a United States East Coast City. PhD diss., Capella University.
- Cutter SL (1995). The forgotten casualties: women, children, and environmental change. *Global Environmental Change* 5(3):181–94. [https://doi.org/10.1016/0959-3780\(95\)00046-Q](https://doi.org/10.1016/0959-3780(95)00046-Q)
- Cvetković VM, Öcal A, Ivanov A (2019). Young adults' fear of disasters: A case study of residents from Turkey, Serbia and Macedonia. *International Journal of Disaster Risk Reduction*. Advance online publication. <https://doi:10.1016/j.ijdrr.2019.101095>
- Dombrowsky WR (1998). Again and again: Is a disaster what we call a “disaster”? In Roland WP, Quarantelli EL (ed.) *What is a disaster*, Psychology Press, New York, pp 19-30
- Esmer Y (2012). Turkey's Values Atlas 2012. [http://content.bahcesehir.edu.tr/public/files/files/ATLAS%20SUNUM%202_10_2012%20\(2\).pdf](http://content.bahcesehir.edu.tr/public/files/files/ATLAS%20SUNUM%202_10_2012%20(2).pdf) (Accessed: 08.01.2022)
- Firat, M (2020). Doğal ve toplumsal bir afet olarak deprem. In Can İ (ed.) *Afet sosyolojisi*, Çizgi Kitabevi, Konya, pp 163-184
- Fritz CE (1996). *Disasters and mental health: Therapeutic principles drawn from disaster studies*. Wilmington, DE: Disaster Research Center.
- Gay LR, Mills GE, Airasian PW (2012). *Educational research: Competencies for analysis and application*. Pearson, New Jersey
- Goltz JD, Bourque LB (2017). Earthquakes and human behavior: A Sociological perspective. *International Journal of Disaster Risk Reduction* 21:251–265. doi:10.1016/j.ijdrr.2016.12.007
- Guggenheim M (2014). Introduction: Disasters as politics – politics as disasters. *The Sociological Review* 62(1): 1–16. <https://doi.org/10.1111%2F1467-954X.12121>
- Han Z, Lu X, Hörhager EI, Yan J (2017). The effects of trust in government on earthquake survivors' risk perception and preparedness in China. *Natural Hazards* 86(1): 437-452. <https://doi.org/10.1007/s11069-016-2699-9>

- Joffe H, Rossetto T, Solberg C, O'Connor C (2013). Social representations of earthquakes: A study of people living in three highly seismic areas. *Earthquake Spectra* 29(2): 367-397. <https://doi.org/10.1193%2F1.4000138>
- Johnson VA, Ronan KR, Johnston DM, Peace R (2014). Evaluations of disaster education programs for children: A methodological review. *International Journal of Disaster Risk Reduction* 9: 107-123. <https://doi.org/10.1016/j.ijdr.2014.04.001>
- King D, MacGregor C (2000). Using social indicators to measure community vulnerability to natural hazards. *Australian Journal of Emergency Management* 15(3):52-57. <https://search.informit.org/doi/10.3316/informit.36980798774661>
- Kirschenbaum AA, Rapaport C, Canetti D (2017). The impact of information sources on earthquake preparedness. *International Journal of Disaster Risk Reduction* 21: 99-109. <https://doi.org/10.1016/j.ijdr.2016.10.018>
- Krejcie RV, Morgan DW (1970). Determining sample size for research activities. *Educational and Psychological Measurement* 30(3):607-610. <https://doi.org/10.1177%2F001316447003000308>
- Kumar R (2018). *Research methodology: A step-by-step guide for beginners*. Sage, London
- Lindell MK, Whitney DJ (2000). Correlates of household seismic hazard adjustment adoption. *Risk Analysis* 20(1): 13-26. <https://doi.org/10.1111/0272-4332.00002>
- Lovekamp WE, Tate ML (2008). College student disaster risk, fear and preparedness. *International Journal of Mass Emergencies and Disaster*, 26(2): 70-90. https://d1wqtxts1xzle7.cloudfront.net/34966975/Lovekamp_Tate-with-cover-page
- McClure J, Allen MW, Walkey F (2001). Countering fatalism: Causal information in news reports affects judgments about earthquake damage. *Basic and Applied Social Psychology* 23(2): 109-121. https://doi.org/10.1207/S15324834BASP2302_3
- Miceli R, Sotgiu I, Settanni M (2008). Disaster preparedness and perception of flood risk: A study in an Alpine Valley in Italy. *Journal of Environmental Psychology* 28(2): 164-173. <https://doi.org/10.1016/j.jenvp.2007.10.006>
- Mohammad-pajoooh E, Aziz K (2014). Investigating factors for disaster preparedness among residents of Kuala Lumpur. *Natural Hazards and Earth System Sciences Discussion* 2(5): 3683-3709. <https://doi.org/10.5194/nhessd-2-3683-2014>
- Mulilis JP, Duval TS, Bovalino K (2000). Tornado Preparedness of students, nonstudent renters, and nonstudent owners: Issues of PrE theory 1. *Journal of Applied Social Psychology* 30(6):1310-1329. <https://doi.org/10.1111/j.1559-1816.2000.tb02522.x>
- Najafi M, Ardalan A, Akbarisari A, Noorbala AA, Jabbari H (2015). Demographic determinants of disaster preparedness behaviors amongst Tehran inhabitants, Iran. *PLoS Currents* 7. <https://dx.doi.org/10.1371%2Fcurrents.dis.976b0ab9c9d9941cbbae3775a6c5fbe>
- Pain R (2009). Globalized fear? Towards an emotional geopolitics. *Progress in Human Geography* 33(4): 466-486. <http://dx.doi.org/10.1177/0309132508104994>
- Perry RW, Lindell MK, Tierney KJ (2001). *Facing the unexpected: Disaster preparedness and response in the United States*. Joseph Henry Press, Washington
- Qing C, Guo S, Deng X, Xu D (2021). Farmers' disaster preparedness and quality of life in earthquake-prone areas: The mediating role of risk perception. *International Journal of Disaster Risk Reduction Advance online publication*. <https://doi.org/10.1016/j.ijdr.2021.102252>

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Russell LA, Goltz JD, Bourque LB (1995). Preparedness and hazard mitigation actions before and after two earthquakes. *Environment and Behavior* 27(6):744-770. <https://doi.org/10.1177%2F0013916595276002>

Rüstemli A, Karanci AN (1999). Correlates of earthquake cognitions and preparedness behavior in a victimized population. *The Journal of Social Psychology* 139(1):91-101. <https://doi.org/10.1080/00224549909598364>

Shaw R, Kobayashi KSH, Kobayashi M (2004). Linking experience, education, perception and earthquake preparedness. *Disaster Prevention and Management: An International Journal* 13(1):39-49. <https://doi.org/10.1108/09653560410521689>

Sherman MF, Peyrot M, Magda LA, Gershon RRM (2011). Modeling pre-evacuation delay by evacuees in World Trade Center Towers 1 and 2 on September 11, 2001: A revisit using regression analysis. *Fire Safety Journal* 46(7):414-424. <https://doi.org/10.1016/j.firesaf.2011.07.001>

Siegrist M, Gutscher H (2006). Flooding risks: A comparison of lay people's perceptions and expert's assessments in Switzerland. *Risk Analysis* 26(4):971-979. <https://doi.org/10.1111/j.1539-6924.2006.00792.x>

Şentuna B, Çakı F (2020). Balıkesir örneğinde bir ölçek geliştirme çalışması: Afet hazırbulunuşluk ölçeği. *İdealkent* 11(31):1959-1983. <https://doi.org/10.31198/idealkent.728896>

Takao K, Motoyoshi T, Sato T, Fukuzondo T, Seo K, Ikeda S (2004). Factors determining residents' preparedness for floods in modern megalopolises: The case of the Tokai flood disaster in Japan. *Journal of Risk Research* 7(7-8):775-787. <https://doi.org/10.1080/1366987031000075996>

Taufik T, Ibrahim R (2020). Making sense of disaster: Affinity to God as a coping strategy of Muslim refugees in Central Sulawesi. *Journal of Loss and Trauma* 25(1):61-73. <https://doi.org/10.1080/15325024.2019.1655256>

Xu D, Peng L, Liu S, Wang X (2018). Influences of risk perception and sense of place on landslide disaster preparedness in southwestern China. *International Journal of Disaster Risk Science* 9(2):167-180. <https://doi.org/10.1007/s13753-018-0170-0>

Zhuang L, He J, Yong Z, Deng X, Xu D (2020). Disaster information acquisition by residents of China's earthquake-stricken areas," *International Journal of Disaster Risk Reduction*. Advance online publication. <https://doi.org/10.1016/j.ijdrr.2020.101908>