

Effects of Depression, Anxiety, and Stress on Disaster Preparedness: Evidence from the February 6 Türkiye Earthquakes

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Abstract

Natural disasters such as earthquakes, floods, tsunamis, hurricanes, and tornadoes pose a risk to the psychological well-being of individuals. Disaster preparedness is a crucial factor that plays a fundamental role in reducing loss and destruction in any disaster situation. It is of great importance to be prepared for these natural events that have the potential to harm mental health. The aims of the current study are to reveal whether the depression symptom, anxiety symptom, stress, and disaster preparedness levels of individuals differ according to demographic characteristics, to clarify the current status of depression symptom, anxiety symptom, stress and disaster preparedness levels in adults who have been directly or indirectly exposed to the last dual earthquake in Türkiye, and to identify that whether depression symptom, anxiety symptom and stress predict disaster preparedness. Data were collected from 418 individuals. The findings revealed that the socio-demographic characteristics of the participants showed significant differences in the depression symptom, anxiety symptom, and stress levels of the individuals. The main factors affecting disaster preparedness were gender, age, education level, marital status, and experiencing the February 6 earthquakes. Individuals directly exposed to dual earthquakes reported higher depression symptom, anxiety symptom and stress levels and lower disaster preparedness levels than indirectly exposed individuals. Post-earthquake depression symptoms and stress predicted individuals' ongoing disaster preparedness. In the light of these results, mental health professionals, psychologists, psychological counselors, sociologists, and authorities should focus on this vulnerable population and implement practices that improve mental health and increase preparedness for disasters.

Keywords: Anxiety, Depression, Disaster Preparedness, Earthquake, Stress

1. INTRODUCTION

Natural disasters such as earthquakes, floods, tsunamis, hurricanes, and tornadoes are more common in some parts of the world. Earthquake is one of the most devastating disasters. Türkiye is located on the earthquake belt. For this reason, earthquakes occur at intervals. On February 6, 2023, two earthquakes with moment magnitudes of 7.8 and 7.6 occurred with approximately 9h intervals. It was determined that 11 provinces in the south and middle of Türkiye were severely affected and damaged by the earthquakes due to their proximity to the epicenters of the earthquakes. It was announced by the Disaster and Emergency Management Presidency that 50.783 people lost their lives and 115.353 people were injured as of June 2, 2023 (AFAD, 2023). The earthquake was recorded as the most severe earthquake in more than 80 years in Türkiye and the fifth deadliest earthquake of the 21st century in the world (Dal Zilio & Ampuero, 2023).

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Destructive earthquakes of high intensity can cause negative situations such as loss of life, injury, and physical destruction. These adverse outcomes may also lead to the development of psychological problems. Common among these problems are depression, anxiety and stress symptoms that indicate impaired mental health (Pandey & Dubey, 2022). World Health Organization (WHO) defines depression as "*Depressive disorders are characterized by sadness, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, feelings of tiredness, and poor concentration*" (WHO, 2017). People with high depression symptoms are more likely to get stuck with past events that are perceived as difficult or impossible to regain when something or someone they value is lost (Eysenck et al., 2006). Anxiety refers to many mental and physiological phenomena, including a person's conscious state of worry about an undesirable future event or fear of a real situation (Foa et al., 2017). People with high anxiety symptoms have more difficulty regulating their emotional functioning and have a tendency to display negative emotions in uncertain situations (Wang et al., 2021). On the other hand, the excitement, feelings of anxiety and/or physical tension that occur when an individual thinks that the demands placed on them exceed their ability to cope are related to stress. It is often referred to as distress or negative stress. Stress can be caused by a busy schedule, an important deadline to meet, problems at work or in social relationships or an argument with a friend (Tandon, 2017). However, when stress is experienced intensely and becomes uncontrollable, this affects the individual negatively. In such cases, depression, anxiety, and stress may lead individuals to have problems in maintaining their daily lives.

In Tang et al. (2014) meta-analysis study, it was determined that the risk factors for depression after exposure to natural disasters were having poor education, experiencing fear, injury, prior trauma and having poor social support. It was also found that disaster-related post-traumatic stress disorder was common after the natural disasters (Bromet et al., 2017). In the study, which included participants who were directly exposed to the February 6 earthquakes in Türkiye, it was determined that post-earthquake anxiety levels were high and it was suggested that support initiatives for earthquake survivors should be systematic (Karaarslan et al., 2023). In a study conducted after the same disaster, the traumatic reactions exhibited by earthquake victims included feelings such as pain, fear, guilty, meaninglessness, uncertainty, anger, tension, introversion and hopelessness (Kirman, 2023).

Earthquakes have detrimental effects on the psychological well-being of individuals all over the world (Marthoenis et al., 2019; Xi et al., 2020). For example, the 2010 earthquake in Haiti was found to be highly associated with post-traumatic stress disorder, depression, anxiety and other mental health problems (Cénat et al., 2020). Similarly, high levels of depression, post-traumatic stress and anxiety were determined after the earthquake 2016 in Ecuador (Gerstner et al., 2020) and the Marmara earthquake with a moment magnitude of 7.4 in Türkiye in 1999 (Ekşi et al., 2007). In addition, the injury of a nuclear family member, hospitalization, and feeling stressed after the earthquake were significant predictors of depression, while being injured, having a house collapsed, and being afraid of staying in a building were found to predict anxiety (Marthoenis et al., 2019). After unpredictable and uncontrollable disasters such as earthquakes, the feeling of lack of behavioral, cognitive, and emotional control causes people to experience intense distress (Uğur et al., 2021). Increasing disaster preparedness is one of the practical solutions to overcome this situation.

A natural event such as an earthquake cannot be predicted and prevented. However, possible negative consequences can be reduced or prevented by making individuals, places and society prepared and resistant to earthquakes. At this point, disaster psychology and psychology of disaster preparedness becomes of vital importance. Disaster psychology covers activities such as examining the psychosocial effects of disasters, implementing various psychosocial support initiatives to maintain the post-disaster well-being of individuals and communities, and mobilizing individuals or communities for disaster preparedness (Karancı & İkizer, 2017). Disaster

preparedness refers to planning, implementation, and evaluation to reduce the destruction that risks and hazards may cause (Şentuna & Çakı, 2020). Preparedness for disasters is the responsibility of all individuals. Therefore, it is vital for all individuals to raise awareness about disaster preparedness and create positive behavioral changes to combat disasters. When disaster preparedness is ensured, it will be easier to deal with natural events that pose a risk to people, such as earthquakes. On the other hand, psychologists can provide insight into how individuals perceive and respond to disasters and how disasters affect people. This includes behaviors before, during, and after the disaster and the effects of the disaster experience on mental and physical health. It is possible to reduce the potential harm of a disaster with effective disaster planning and preparation (Mishra & Mazumdar, 2015).

In the literature, disaster preparedness was positively associated with resilience (Weber et al., 2020), psychological well-being (Olivia, 2021), happiness and life satisfaction (Qing et al., 2021). It was found that approximately 50.9% of respondents in Turkey perceived themselves as prepared for disasters, but 74.4% perceived themselves as unprepared for disasters and were worried (Ünal Karaçam et al., 2022). Higher psychological distress was associated with a lack of three domains of preparedness including an overall measure of preparedness, having an evacuation plan, and having a 3-day supply of medication (Clay et al., 2014). Similarly, lower average scores for disaster preparedness were scored by the participants with depressive symptoms in a recent study (Ying et al., 2023). However, rather few studies have examined the relationship between depression, anxiety, stress and disaster preparedness (Ying et al., 2023). Thus, more research is needed to explore depression, anxiety and stress symptoms levels following the last earthquake experience and disaster preparedness levels.

In the systematic review, the main risk factors for the development of mental health disorders after the earthquake were identified as sociodemographic status such as gender, age, education, level of exposure to earthquakes, peritraumatic distress, low social support, personal or family history of mental disorders, and victimization of other trauma types (Cénat et al., 2020). Therefore, in this study, it was aimed to determine the associations of some risk factors such as age, gender, education level, marital status, homeownership, previous earthquake experience and recent earthquake exposure on depression, anxiety, stress, and disaster preparedness. Additionally, it was aimed to clarify the current status of depression, anxiety, stress and disaster preparedness levels in adults who have been directly or indirectly exposed to the last dual earthquake in Türkiye. In addition, in the literature, it has been determined that the studies evaluating the variables of this study together are quite limited. Since this geographical region is more prone to disasters such as earthquakes, it is imperative to identify the factors that affect individuals' disaster preparedness. Thus, it is clear that more research is needed on possible predictors of disaster preparedness. To fill this gap, it was also aimed to determine the relationship between depression, anxiety, stress symptoms and disaster preparedness. To this end, we generated the following hypothesis:

H1: There would be significant differences according to age, gender, education level, marital status, homeownership, previous earthquake experience and recent earthquake exposure on depression, anxiety, stress, and disaster preparedness.

H2: Adults directly exposed to the last dual earthquake in Türkiye would have higher levels of depression, anxiety, and stress symptoms and lower disaster preparedness levels than those indirectly exposed.

H3: Depression, anxiety, and stress symptoms would predict disaster preparedness.

1. METHOD

1.1. Study Design and Sample

Quantitative research methods and techniques, which are based on the positivist paradigm in social sciences and use numerical data and statistical tests to reveal the reality of the outside world, are preferred in the research (Jupp, 2006). The research is also designed in descriptive and relational design to investigate the existence, direction, and strength of the relationships between two or more variables. In this study, the relationship between individuals' depression, anxiety and stress symptoms levels and disaster preparedness is examined after the earthquakes in Türkiye on February 6, 2023.

1.2. Participants and Procedures

Since this research is quantitative research with the aim of generalization, simple random sampling, which is one of the probability-based sampling techniques, is preferred as the sample selection technique. In this type of sampling, all units in the universe have an equal and independent chance to be selected as a sample (Büyüköztürk et al., 2012). The sample size was determined by G Power, which allows researchers to determine the required sample size. The parameters were as follows: $f^2 = 0.15$; $\alpha = 0.05$; power = 0.95; number of predictors = 3. G power analysis showed that the minimum sample size to perform Multiple Linear Regression was 119 participants. However, the researchers included more participants in the study to ensure the reliability of the study and to take precautions against non-response error. Snowball sampling was used to recruit participants; early participants passed on the details of the study to other participants in their networks. This study was conducted using online survey in Google Form format. The link was shared with the individuals aged 18 years and over through various social media platforms such as Twitter, Facebook, and WhatsApp. The general information of the study, participants' right to withdraw from the survey during or after participation, the anonymity and confidentiality of their personal information and the consent form were included in the first page of the online survey. After participants approved the informed consent, they were allowed to access the questionnaires. All participants contributed to the research voluntarily and did not receive any payment. Since there were no individuals aged 18 and 19 participating in the study, the sample of the current research consisted of adults aged 20 years and over. Within the scope of the research, 418 adults, which were above the sufficient number for three predictive variables, were reached. Before collecting the data of the study, necessary permissions were obtained from the Scientific Research Ethics Committee of Agri Ibrahim Cecen University.

237 (56.7%) of the participants were female and 181 (43.3%) were male. The age range of the participants was between 20-77. %29.4 (N=123) of the participants were at high school or below, %52 (N=220) were at university or higher education level. 65.6% (N=274) of the participants were married and 26.6% (N=111) were single. 53.2% (N=222) were homeowners, and 46.8% (N=196) were tenants. 30% of the participants (N=125) experienced the 6 February earthquakes, 54.5% (N=228) stated that they had experienced earthquakes before the 6 February earthquakes (Table 1).

1.3. Data Collection Tool

Questionnaire form was used as data collection tool in the research. Data were collected through a 64-item questionnaire form including "Depression Anxiety Stress Scale", "Disaster Preparedness Scale", and the socio-demographic characteristics of the participants.

Table 1. Demographic Characteristics of the Participants

		n	%
Gender (n=418)	Females	237	56.7
	Males	181	43.3
Age (n=418)	20-30	135	32.3
	31-40	133	31.8
	41-50	77	18.4
	51-60	38	9.1
	60 and over	35	8.4
Marital status (n=418)	Married	274	65.6
	Single	111	26.6
	Widow	39	7.9
Education level (n=418)	High school and below	165	39.5
	University and above	253	60.5
Homeownership (n=418)	Tenant	196	46.8
	Homeowner	222	53.2
Experiencing the February 6 earthquakes (n=418)	Yes	125	29.9
	No	293	70.1
Previous earthquake experience (n=418)	Yes	228	54.5
	No	190	45.5

1.3.1. Depression Anxiety Stress Scale

The scale was developed by Lovibond and Lovibond (1995) and Turkish validity and reliability analyzes were performed by Bilgel and Bayram (2010). It was used in the study to determine the depression, anxiety, and stress levels of the participants. The scale consists of 42 items and the items are scored on a 4-point Likert scale ranging from 0 (never) to 3 (always). The scores of the subgroups of the scale are calculated separately.

Within the scope of the validity of the scale, exploratory factor analysis was performed on 42 items to determine the basic dimensions and factor structure of the scale. As a result of the factor analysis, it was found that 42 items (variables) included in the analysis were grouped under 3 factors with an eigenvalue greater than 1. The variance explained by these three factors regarding the scale was 64.94%. 14 items for each dimension and a total of 42 items met the validity condition. It was observed that the common variances of the three sub-dimensions defined in relation to the items ranged from 0.448 to 0.904. Accordingly, it was concluded that the three sub-dimensions that emerged as important factors in the analysis together explained the majority of the total variance.

To test the reliability of the scale and to determine the internal consistency of the items, the reliability analysis was performed, and the Cronbach Alpha coefficient was calculated. In the Turkish adaptation study of the 42-item scale, the Cronbach Alpha coefficient was calculated as 0.92, 0.86 and 0.88 for depression, anxiety, and stress, respectively. In this study, this value was found to be 0.95, 0.96 and 0.94 for depression, anxiety, and stress, respectively.

1.3.2. Disaster preparedness scale

The scale was developed by Şentuna and Çakı (2020) and was used in this study to measure the disaster preparedness levels of the participants. The scale consists of 13 items and the items are scored on a 4-point Likert scale ranging from 1 (definitely no) to 4 (definitely yes).

As a result of the exploratory factor analysis performed within the scope of the validity of the scale, it was seen that 13 items (variables) included in the analysis were grouped under 4 factors with an eigenvalue greater than 1. The variance explained by these four factors regarding the scale was

58.95%. Of the 13 items, 5 of them met the validity condition under the 1st dimension, 3 in the 2nd dimension, 3 in the 3rd dimension and 2 in the 4th dimension.

It was observed that the common variances of the four sub-dimensions defined in relation to the items ranged from 0.479 to 0.859. Accordingly, it was found that the four sub-dimensions that emerged as important factors in the analysis together explained the majority of the total variance. As a result of the reliability analysis performed to test the reliability of the scale and to determine the internal consistency of the items, the Cronbach Alpha coefficient was obtained as .82. For this research, it was obtained as .94.

1.4. Data Collection Process

Ethics committee approval of the study was received from Agri Ibrahim Cecen University Scientific Research Ethics Committee on June 22, 2023 (decision no: 73552). In the present study, where an online questionnaire was used in the data collection process, the questionnaire prepared through the Google form was applied to the participants who voluntarily agreed to answer. Data were collected in July 2023.

1.5. Data Analysis

In the study, the relationship between the scores obtained from the scales according to the socio-demographic characteristics of the participants and the relationships between the scales themselves were calculated using the SPSS 25.0 package program. First, Cronbach's Alpha internal consistency test was used to test the internal consistency of the scales and independent samples t-test and one-way ANOVA were performed to analyze the relationship between the scores of the participants according to their socio-demographic variables. Then, the relationship between the scales was examined by Pearson Correlation coefficient and Multiple Linear Regression analysis. The enter method was used to identify which variables predicted the disaster preparedness. The $p < 0.05$ level was considered statistically significant in the study.

2. RESULTS

The findings of the preliminary analysis showed that skewness and kurtosis values were between -1.00 and +1.00. These values suggested that all variables had a normal distribution. Depression, anxiety, stress, and disaster preparedness total score averages of the participants were calculated. Accordingly, the depression, anxiety, stress, and disaster readiness mean scores of the participants were 16.880 ± 11.087 , 16.119 ± 11.887 , 18.308 ± 10.213 , 32.169 ± 9.152 , respectively (Table 2).

It was examined whether the depression symptom, anxiety symptom, stress, and disaster preparedness levels of the participants differed according to their socio-demographic characteristics, and it is presented in Table 3.

Table 2. Depression symptom, anxiety symptom, stress, and disaster preparedness mean scores of the participants and skewness and kurtosis values.

Variables	N	\bar{X}	SD	Skewness	Kurtosis
Depression	418	16.880	11.087	.51	-.65
Anxiety	418	16.119	11.887	.62	-.86
Stress	418	18.308	10.213	.26	-1.00
Disaster Preparedness	418	32.169	9.152	.25	-.58

Table 3. Depression symptom, anxiety symptom, stress, and disaster preparedness scores according to the socio-demographic characteristics of the participants.

Variables	N	Depression	Anxiety	Stress	Disaster Preparedness
Gender		$\bar{x}\pm SS$	$\bar{x}\pm SS$	$\bar{x}\pm SS$	$\bar{x}\pm SS$
Females	287	17.932±10.688	16.544±11.134	19.654±9.175	29.430±7.805
Males	181	15.502±11.473	15.563±12.817	16.547±11.215	35.756±9.558
Assessment		t=2.231, p=0.026	t=0.820, p=0.413	t=3.032, p=0.002	t=-7.248, p=0.000
Education level					
High school and below	165	19.078±11.694	18.872±12.840	18.787±11.432	35.230±10.663
University and above	253	15.446±10.449	14.324±10.879	17.996±9.344	30.173±7.381
Assessment		t=3.235, p=0.001	t=3.755, p=0.000	t=0.743, p=0.458	t=5.317, p=0.000
Homeownership					
Tenant	195	17.400±11.703	15.712±12.332	19.707±10.652	31.482±9.412
Homeowner	222	16.477±10.520	16.518±11.509	17.130±9.670	32.779±8.916
Assessment		t=0.848, p=0.397	t=-0.689, p=0.491	t=2.589, p=0.010	t=-1.444, p=0.149
Experiencing the February 6 earthquakes					
Yes	125	21.328±11.018	22.512±11.096	21.800±9.687	28.296±9.075
No	293	14.982±10.578	13.392±11.161	16.819±10.083	33.822±8.688
Assessment		t=5.454, p=0.000	t=7.661, p=0.000	t=4.678, p=0.000	t=-5.875, p=0.000
Previous earthquake experience					
Yes	228	17.491±10.997	14.745±11.355	17.530±9.770	32.662±8.607
No	190	16.147±11.179	17.768±12.325	19.242±10.672	31.578±9.756
Assessment		t=1.235, p=0.218	t=-2.587, p=0.010	t=-1.696, p=0.091	t=1.192, p=0.234
Age					
20-30	135	17.392±10.992	16.125±10.980	18.851±8.895	29.948±7.319
31-40	133	15.285±10.587	12.985±10.777	16.609±9.857	31.834±8.328
41-50	77	19.662±11.144	17.714±11.797	19.610±10.805	32.324±9.964
51-60	38	16.684±11.106	16.131±12.475	20.000±12.006	35.342±10.596
60 +	35	15.057±12.345	24.485±14.506	17.971±12.363	38.228±11.563
Assessment		F=2.238, p=0.064	F=7.422, p=0.000	F=1.608, p=0.171	F=7.448, p=0.000
Marital status					
Married	274	16.740±11.670	16.266±12.438	17.821±10.589	32.459±9.678
Single	111	17.252±9.960	14.783±9.610	18.153±8.391	30.414±6.444
Widow	33	16.787±9.917	19.393±13.663	22.878±11.706	35.666±11.212
Assessment		F=0.085, p=0.919	F=1.983, p=0.139	F=3.675, p=0.026	F=4.668, p=0.010

t, independent samples t-test; One way ANOVA

Significant differences were found between gender and the participants' depression symptom levels (t=2.231, p=0.026<.05), stress levels (t=3.032, p=0.002<.05) and disaster preparedness levels (t=-7.248, p=0.000<.05). It was determined that women had higher levels of depression symptoms (\bar{X} =17.932) and stress (\bar{X} =19.654) than men and experienced moderate depression higher levels of depression symptoms and stress. On the other hand, male participants had higher disaster preparedness levels than females (\bar{X} =35,756). Significant differences were found between the education level of the participants and depression higher levels of depression symptom (t=3.235, p=0.001<.05), anxiety symptom (t=3.755, p=0.000<.05) and disaster preparedness levels (t=5.317, p=0.000<.05). According to the results, those with high school or below education experienced moderate depression symptoms (\bar{X} =19.078) and severe anxiety symptoms (\bar{X} =18.872), while their disaster preparedness scores were higher than those with university or above education (\bar{X} =35.230). A significant difference was found between homeownership and stress level of the participants (t=2.589, p=0.010<.05). The stress levels of the tenants were higher (\bar{X} =19,707) than the homeowners, and the participants who declared that they were tenants experienced moderate stress. In addition, a significant difference was found between the participants' previous earthquake experiences and anxiety symptom levels (t=-2.587, p=0.010<.05). Participants who have not

experienced an earthquake before had more anxiety symptoms than those who have experienced ($\bar{X}=17.768$).

Significant differences were found between experiencing the February 6 earthquakes and depression symptom ($t=5.454$, $p=0.000<.05$), anxiety symptom ($t=7.661$, $p=0.000<.05$), stress ($t=4.678$, $p=0.000<.05$) and disaster preparedness levels ($t=-5.875$, $p=0.000<.05$). It was determined that those who experienced the February 6 earthquakes had higher depression symptom ($\bar{X}=21,328$), anxiety symptom ($\bar{X}=22,512$) and stress ($\bar{X}=21,800$) levels than those who did not experience the earthquake, and participants who were directly exposed to the earthquakes experienced severe depression symptoms, extremely severe anxiety symptoms, and moderate stress. On the other hand, disaster preparedness of those who did not experience the February 6 earthquakes were high ($\bar{X}=33.822$).

Significant differences were found between the age of the participants and their anxiety symptom levels ($F(4-413)=7.422$, $p=0,000<.05$) and disaster preparedness scores ($F(4-413)=7.448$, $p=0,000<.05$). While the anxiety symptom levels of the participants over the age of 60 were extremely severe ($\bar{X}=24.485$), their disaster preparedness scores were high ($\bar{X}=38.228$). Significant differences were also found between the marital status of the participants and stress levels ($F(2-415)=3.675$, $p=0.026<.05$) and disaster preparedness scores ($F(2-415)=4.668$, $p=0.010<.05$). Widowed individuals ($\bar{X}=22.878$) had higher stress levels than married individuals. Married ($\bar{X}=32.459$) and widowed ($\bar{X}=35.666$) individuals had higher disaster preparedness levels than singles. While widows experienced moderate stress, their disaster preparedness scores were high. Pearson correlation analysis was conducted to reveal the relationship between depression, anxiety, stress levels and disaster preparedness of the participants. The results are presented in Table 4.

Table 4. Correlations between participants' depression symptom, anxiety symptom and stress levels and their disaster preparedness

	1 Depression	2 Anxiety	3 Stress	4 Disaster Preparedness
1 Depression				
2 Anxiety	.362**			
3 Stress	.462**	.436**		
4 Disaster Preparedness	-.270**	-.248**	-.363**	

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

A moderate positive and significant relationship was found between the anxiety and depression symptoms levels ($r=0.362$, $n=418$, $p<0.1$), between the stress and depression symptom levels ($r=0.462$, $n=418$, $p<0.1$), and between the stress and anxiety symptom levels of the participants ($r=0.436$, $n=418$, $p<0.1$). On the other hand, a low negative and significant relationship was found between the depression symptom levels and disaster preparedness ($r=-0.270$, $n=418$, $p<0.1$), and between the anxiety symptom levels and disaster preparedness of the participants ($r=-0.248$, $n=418$, $p<0.1$) while a moderate negative and significant relationship was found between the stress levels and disaster preparedness of the participants ($r=-0.363$, $n=418$, $p<0.1$).

Multiple linear regression analysis was performed to determine whether the depression symptom, anxiety symptom and stress levels of the participants significantly predicted disaster preparedness and the results are given in Table 5.

The model was found to be significant according to multiple linear regression analysis ($F=24,571$, $p.00$). When the R^2 value was examined, it was determined that depression symptom, anxiety symptom, and stress levels predicted 15% of disaster preparedness. Accordingly, it was determined that depression symptom levels ($\beta=-.113$, $p<.05$) and stress levels ($\beta=-.272$, $p<.05$) significantly

predicted disaster preparedness, but anxiety symptom levels ($\beta = -.089$, $p > .05$) did not significantly predict disaster preparedness.

Table 5. Regression analysis results of participants' depression, anxiety and stress levels predicting disaster preparedness.

Model	B	(S E)	β	t	p
Constant	39,304	,933		42.138	.00
Depression	-,093	,043	-,0113	-2.164	.03
Anxiety	-,068	,040	-,0089	-1.730	.08
Stress	-,244	,048	-,0272	-5.036	.00

Note: $R^2 = 0.151$ for the model ($p < 0.001$).

3. DISCUSSION

Natural disasters have been one of the main concerns of public mental health in recent years as they have had substantial effects on all aspects of individuals lives. In particular, earthquakes have psychological effects as well as physical destruction. The current study has provided precious findings about disaster related factors. However, when the results are evaluated according to demographic characteristics, it should be taken into account that the sample the sample consists mainly of women, adults between the ages of 20-40, individuals with university or above education level, and married individuals.

In this study, it was found that women had higher depression symptom and stress levels than men, and men had higher levels of disaster preparedness than women. Consistent with our findings, devastating earthquakes have long-term adverse psychological effects, such as depression and stress among women (Başoğlu et al., 2004; Dell'Osso et al., 2013). These studies have indicated that women are at higher risk for depression and stress after disasters while men are more prepared than women (Gün Çınğı & Yazgan, 2022). After the 2010 earthquake in Chile, the increased rate of depression, anxiety, and post-traumatic stress disorder confirmed the risk population of women who scored higher levels than men (Diaz et al., 2012). After the Great East Japan Earthquake, high psychological distress was observed in women than men, while younger age was associated with psychological distress in men (Ishiguro et al., 2019). However, in this study, it was found that individuals aged 60 years and over reported higher levels of anxiety symptoms and disaster preparedness. These results show that this age group is more vulnerable in terms of anxiety symptom levels, but they are more conscious in disaster preparedness. Older people are more vulnerable to psychological symptoms after trauma, possibly because they might have less social and economic resources to cope with adverse events or have less flexibility to adapt to a changing situation following a traumatic event (Phifer, 1990; Priebe et al., 2009).

The results of this study provided evidence that older adults are at risk with high anxiety symptoms and low disaster preparedness, and earthquake-exposed individuals are more prone to psychological disorders and less prepared for future earthquakes. In the literature, it has been suggested that pre-disaster social support in daily life can help older adults protect their psychological health following a disaster (Sasaki et al., 2019). Similarly, it was concluded that a study evaluating the effectiveness of a disaster preparedness training program followed by a disaster drill showed improvement in disaster preparedness knowledge and skills (Alim et al., 2015). It has been revealed through this research that these vulnerable individuals should be urgently considered by governments and relevant organizations with such practices to develop psychological resilience against disasters and prepare for disasters.

In this study, it was found that widows had higher levels of stress than married individuals and married and widowed individuals reported higher disaster preparedness scores than singles. There are studies in the literature that found similar or different results to these results. For example, a review was concluded that the risk of mental health problems following disasters was generally associated with marital status (married for women and unmarried for men) (Norris et al., 2002). Married couples with children were more likely to worry about earthquakes than single individuals (Kar & Bastia, 2006). In addition, a study showed that the disaster preparedness levels of single individuals were higher than those of married individuals (Tercan, 2022). In another study, it was concluded that the earthquake knowledge level of married health workers was higher than that of singles. The earthquake preparedness scores of married individuals are higher than those of single and widowed individuals (Oral et al., 2015). The results of some studies seem to be inconsistent with the current study findings. But in this context, it can be argued that even individuals exposed to the same disasters differ significantly in outcomes, and disasters of the same type differ significantly in associated mental health effects (Norris et al., 2002).

Higher levels of depression symptoms, anxiety symptoms and disaster preparedness were found in individuals with high school or below education level compared to individuals with university or above education. Similarly, higher education level has been determined as a protective factor for psychopathology (Heir et al., 2009). However, it has been found that individuals with higher education are better aware of disaster risk and are more likely to be prepared for disasters (Rahana et al., 2021). We also determined that significant differences were found between homeownership and stress, but not depression symptoms, anxiety symptoms, and disaster preparedness. Similar to our findings, previous research provided evidence that homeowners were more likely to develop stress after the disaster (Warsini et al., 2015). In addition, our results showed that disaster preparedness of both owners and tenants were moderate. However, this result is contrary to studies that homeowners took more initiatives to prepare earthquakes than tenants (Gün Çınğı & Yazgan, 2022; Oral et al., 2015; Russell et al., 1995).

The difference between previous earthquake experiences and study variables was found only in anxiety symptoms. It has been determined that the anxiety symptom levels of individuals who have not experienced an earthquake before were high. A direct experience of disaster can be assumed as a powerful motivator for preparedness. However, many people do not experience an earthquake that directly has a relationship with great damage in their lifetimes (Becker et al., 2017). This leads to obscurity which in turn enhances high anxiety. Furthermore, although there were studies showing that individuals who have experienced an earthquake before had higher levels of disaster preparedness (Kirschenbaum et al., 2017; Najafi et al., 2015), no difference was found in this study.

When the groups exposed to and not exposed to the earthquakes on February 6 were compared, it was determined that the individuals directly exposed to the earthquakes had high levels of depression symptoms, anxiety symptoms and stress, and low levels of disaster preparedness. It is obvious that the earthquake victims have suffered great difficulties due to the great destruction in the provinces affected by the earthquakes. In addition to losing their relatives, friends, and neighbors, they have faced problems in meeting their basic needs such as food and shelter. There are still citizens living in containers as earthquakes affect a wide area in the country. Therefore, it is reasonable for individuals directly exposed to earthquakes to report higher levels of depression, anxiety, and stress. In line with this reasoning, the reason for the low disaster preparedness may be that many of the earthquake survivors have sheltered in places such as containers and dormitories, as their houses are damaged.

In a longitudinal study, living in a severely affected area and exposure to post-earthquake trauma were associated with the symptoms of stress and depression at a 31-month follow-up. Based on these results, it can be interpreted that high exposure to earthquakes increases the risk of

psychiatric symptoms in terms of deaths and destruction (Sanju et al., 2022). Parallel to the results of this study, the results of our study also provide evidence for the higher incidence of psychological disorder symptoms in earthquake victims after 5 months. On the other hand, exposure to television images of earthquake victims has adverse effects on psychopathology in the general population (Ohnuma et al., 2023). Therefore, it is suggested to provide psychological support to all individuals, especially those directly affected by the earthquake, immediately after such disasters.

Additionally, it was determined that the depression symptom, anxiety symptom, and stress levels of those who were directly exposed to the earthquakes were categorized as severe, extremely severe, and moderate, respectively. On the other hand, the depression and anxiety symptoms levels of those who were indirectly exposed to the earthquakes were moderate and their stress levels were mild. This classification shows that the psychological effects of earthquakes differ between the two groups. These results are consistent with a previous study that found exposure to environmental disaster to be more strongly associated with depressive symptoms (Fung et al., 2023). In addition, the study following the L'Aquila 2009 earthquake found higher stress levels among individuals located in areas closest to the epicenter (Dell'Osso et al., 2013).

In this study, it was also found that depression symptoms and stress negatively predicted disaster preparedness. Low disaster preparedness was reported by participants with high levels of depression symptoms and stress 5 months after the earthquake. There were some similarities and some differences between the findings of the current study and those of previous depression, anxiety, and stress research in terms of relationships with disaster preparedness. For example, depression and anxiety were negatively associated with disaster preparedness (Bodas et al., 2017; Ying et al., 2023). Depressive, anxiety, and stress symptoms after trauma reduce the quality of life (Park & Bae, 2022) and psychological consequences of disaster lead to hopelessness and helplessness (Kar & Bastia, 2006) which can reduce a person's willingness and motivation to respond to disaster. It has been concluded from these studies that individuals with poor mental health are more at risk for negative consequences after a disaster, and therefore these people are less prepared. In line with the results of this study, it has been suggested that improving mental health will promote disaster preparedness and improve the capacity of earthquake-vulnerable community members to cope with disasters.

As a result, this study revealed risk factors to disaster preparedness. More important, depression symptoms and stress predicted disaster preparedness. Although earthquakes are natural disasters, it is possible to prevent their negative consequences. The government and mental health professionals should provide disaster awareness among the vulnerable groups identified in this study with effective policies, action plans, coping and prevention programs. The aim should be to create disaster-resistant, conscious societies. Knowledge of actions prior to, during, and after the disaster that can mitigate the effects of disasters may reduce the potential damage of a disaster (Mishra & Mazumdar, 2015). Conscious societies have higher psychological resilience, overcome situations such as depression, anxiety and stress and have higher disaster preparedness.

This study has several strengths and contributing results, as well as a number of limitations. First, all measurements were self-reported, so they may be biased by the self-observation attitude of the respondents. Cross-sectional research design does not allow us to identify causal relationships between study variables. In future studies, different designs such as longitudinal may be preferred by researchers. The data of the study were obtained only by online means. Therefore, the results of this study cannot be generalized beyond individuals with Internet access. Group numbers differ from each other in terms of demographic characteristics such as gender, age, and marital status. This situation limits the generalizability of the study results. These variables should be examined separately with different target groups (adolescents, young people, older adults, etc.) or with an

equal number of groups within the sample. No psychological interviews were conducted with the participants within the scope of the study. This does not make it possible to make diagnoses such as depression or anxiety disorder. Therefore, the study involves measuring the severity of depression and anxiety symptoms.

4. CONCLUSION

In this study, first, various variables having a relationship with individuals' depression symptoms, anxiety symptoms, stress, and disaster preparedness were examined. Various vulnerable groups and factors related to disaster were determined. One of the most noteworthy results is that depression symptom, anxiety symptom, and stress levels of individuals who experienced the February 6 earthquakes were found to be high and their disaster preparedness levels were low. This result underlines the importance of providing support to individuals exposed to earthquakes. Then, it was examined whether depression symptoms, anxiety symptoms and stress predict disaster preparedness and it was determined that depression symptoms and stress predicted disaster preparedness. The current study shows significant association between psychological well-being and preparedness behaviors. In addition, one of the most practical and effective ways to minimize the damage and losses accompanying an earthquake and to cope with a future disaster is to increase people's levels of disaster preparedness. In this way, people become resistant to these natural events (Weber et al., 2020).

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