

## Mental Health Impact of the Kahramanmaraş Earthquake: An Analysis of Acute Stress, Depression, and Anxiety Indicators

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### ABSTRACT

**Objective:** This study aimed to examine acute stress, depression, and anxiety symptoms among individuals who sought medical care at Erciyes University Medicine Faculty following the Kahramanmaraş-centered earthquake in February 2023.

**Materials and Methods:** The study included 51 individuals aged 18 to 75 who received treatment at Erciyes University Medicine Faculty between February 6 and March 6. Participants were from earthquake-affected provinces and were admitted because of physical health concerns. The inclusion criteria included being aged 18–75, experiencing earthquake exposure, and voluntarily participating. Exclusion criteria included cognitive impairment and refusal to participate in the study. Participants completed a sociodemographic data form, the Acute Stress Symptom Severity Scale (Adult Form), and the Hospital Anxiety and Depression Scale (HADS). Data were analyzed using t-tests, the Mann-Whitney U test, Spearman correlations, and automatic linear regression.

**Results:** Women had significantly higher HADS-Depression scores than men ( $p=0.031$ ). Participants with limb loss also had higher depression scores ( $p=0.025$ ). Witnessing a death in the debris was associated with increased anxiety ( $p=0.037$ ). Individuals who were alone in the debris or who had a prior psychiatric history had higher ASBS ( $p=0.021$ ;  $p=0.013$ ) and HADS-Anxiety scores ( $p=0.028$ ;  $p=0.040$ ).

**Conclusion:** Female gender, limb loss, witnessing a death, being alone in the debris, and a history of psychiatric illness emerged as significant risk factors for acute stress, depression, and anxiety symptoms. These findings underline the importance of early psychological screening and targeted intervention strategies for at-risk populations in post-disaster settings.

**Keywords:** Acute stress, anxiety, depression, earthquake.



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### INTRODUCTION

Disasters are characterized by the World Health Organization (WHO) as sudden and unexpected ecological catastrophes of such magnitude that external assistance is requisite.<sup>1</sup> Witnessing a natural disaster is an experience that profoundly impacts individuals, resulting in anxiety and stress.<sup>2</sup> The psychological symptoms that emerge in the immediate aftermath of disasters are often



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considered normal responses to abnormal events.<sup>3</sup> Although initially perceived as normal reactions, these symptoms can lead to adverse mental health outcomes if the associated stress and anxiety levels do not diminish over time.<sup>4</sup> Among various types of natural disasters, earthquakes are recognized as particularly destructive, uncontrollable, significant drivers of migration, and among the most threatening to life.<sup>5</sup>

Earthquakes, due to their unpredictability and the physical and emotional devastation they cause, can precipitate sudden and adverse changes in an individual's mental health. Post-earthquake responses may include intense worry, anxiety, fear, sleep disturbances, altered perceptions of reality, palpitations, and difficulty breathing. Individuals may experience flashbacks, recurrent nightmares, and a persistent re-experiencing of the event. Over time, avoidance of reminders of the event, emotional numbness, inability to concentrate, hypervigilance, difficulties in anger management, and profound depressive moods can emerge.<sup>6</sup> The prevalence and incidence of psychiatric disorders, especially post-traumatic stress disorder (PTSD), have been observed to increase following earthquakes.<sup>7</sup> Increases in the frequency of generalized anxiety disorder (GAD), major depressive disorder (MDD), and acute stress disorder (ASD) have also been reported.<sup>8</sup> Variability in reported rates of PTSD following earthquakes is considerable.<sup>9</sup> A study conducted three years after the 1999 Marmara earthquake in Türkiye found PTSD rates at 40.1% and depression rates at 27.3%.<sup>10</sup> Wang and colleagues found a PTSD prevalence of 62.8% one month after the 2008 Wenchuan earthquake in China.<sup>11</sup> Another study in Türkiye revealed a 51.4% prevalence of PTSD three months after the 2023 Kahramanmaraş earthquake.<sup>12</sup> Moreover, recent studies have consistently recorded elevated levels of anxiety, sadness, and PTSD in the areas impacted by the Kahramanmaraş earthquakes. Increased psychological symptoms were noted in adjacent Syrian people subjected to the same seismic occurrences.<sup>13</sup> Survivors of the Kahramanmaraş earthquakes exhibit prevalence rates of 17.4% for PTSD, 61.2% for depression, 79.4% for anxiety, and 58.4% for stress.<sup>14</sup> These findings underscore the pressing necessity for early psychiatric evaluations and therapies customized according to gender and marital status.<sup>14</sup> A systematic review highlighted the significance of psychological resilience as a protective factor for children and adolescents impacted by the 2023 earthquakes, indicating that resilience was inversely correlated with depression, anxiety, and PTSD while positively correlated with social support and post-traumatic growth.<sup>15</sup>

Variations in the prevalence of PTSD and its predictors can be attributed to differences in study measurements, assessment timings, as well as demographic factors such as age, gender,

## KEY MESSAGES

- Identifying at-risk individuals early is crucial for effective mental health support in earthquakes.
- Women, individuals with limb loss, those trapped alone under debris, and those who witnessed death experience the highest psychological distress.
- Prioritizing these groups in post-disaster mental health services can reduce severe psychological outcomes.

previous illness, and cultural background of the sample.<sup>16</sup> In addition, the potential predictors of psychiatric illness and symptoms following disasters have been extensively examined in the literature.<sup>17</sup> A recent meta-analysis indicated that being female, having low education or socio-economic status, previous trauma, entrapment during the disaster, and experiencing fear, injury, or grief were significant risk factors for developing PTSD in adults.<sup>9</sup> Furthermore, a decline in PTSD prevalence over time has been observed among survivors in disaster-affected regions.<sup>18</sup>

On February 6, in the early hours, a powerful earthquake of 7.7 magnitude struck the southeast of Türkiye and some regions of Syria, followed nine hours later by another earthquake of magnitude 7.4, accompanied by over 200 aftershocks. Occurring along the East Anatolian Fault Line, these earthquakes had a devastating impact, resulting in over 50,000 deaths across 11 provinces. Besides the fatalities, the earthquakes left numerous individuals homeless, jobless, and without families, causing them to suffer both material and emotional losses. The immediate assessment of acute stress symptoms and psychiatric symptomatology post-earthquake is vital for the proper organization of aid activities and monitoring of potential long-term psychiatric disorders.

This study aimed to screen for sociodemographic characteristics, psychiatric diseases, and acute stress symptoms among those seeking treatment at Erciyes University Medicine Faculty following the Kahramanmaraş earthquake. Furthermore, this research explored the relationship between psychiatric problems among earthquake survivors and sociodemographic factors.

## MATERIALS AND METHODS

### Study Procedure

The study was conducted between February 6 and March 6, 2023, shortly after the Kahramanmaraş earthquakes. This study was designed as a cross-sectional, observational study. Participants were selected from among individuals admitted

to Erciyes University Medicine Faculty hospital for medical treatment related to the earthquake. No a priori sample size calculation was performed due to the emergency conditions following the earthquake; instead, all eligible individuals who presented to the hospital and consented to participate were included. Inclusion criteria included being between 18 and 75 years of age, having directly experienced the earthquake, and voluntarily consenting to participate. Individuals with severe cognitive impairment or communication difficulties were excluded. All psychiatric assessments, including the administration of the scales, were conducted by a psychiatric physician under standardized conditions. Ethical approval was obtained from the Erciyes University Ethics Committee (Decision No: 2023/492), and informed consent was obtained from all participants in accordance with the Helsinki Declaration.

### Psychometric Assessment

#### *Acute Stress Symptoms Severity Scale – Adult Form (ASBS)*

Published by the American Psychiatric Association, this scale assesses the severity of acute stress disorder symptoms following an extremely stressful event or experience. The Turkish validity and reliability study was conducted by Aşçıbaşı et al.<sup>19</sup> It consists of 7 items that evaluate the intensity of acute stress disorder symptoms experienced over the last 7 days.

#### *Hospital Anxiety and Depression Scale (HADS)*

Developed by Zigmond and Snaith (1983),<sup>20</sup> this scale is designed to screen for anxiety and depression in individuals with physical illness. HADS-A is the anxiety subscale comprising 7 questions, and HADS-D is the depression subscale, also with 7 questions. Both tests are scored from 0-21, with Turkish validity and reliability established by Aydemir et al.,<sup>21</sup> identifying cut-off points of 10 for the anxiety subscale and 7 for the depression subscale.

The internal consistency reliability (Cronbach's alpha) of the scales in their Turkish versions was as follows: 0.89 for the Acute Stress Symptoms Scale (ASBS), 0.83 for the HADS-Anxiety subscale, and 0.85 for the HADS-Depression subscale.

### Statistical Analysis

All statistical analyses were performed using IBM SPSS Statistics 23.0.0.3 (IBM Corporation). The distribution of the data was evaluated using the Shapiro-Wilk test. Among the variables, only ASBS scores were found to be normally distributed, while age, number of children, duration of stay under debris, HADS-Anxiety, and HADS-Depression scores did not follow a normal distribution. Accordingly, the Student's t-test was used for normally distributed

variables, and the Mann-Whitney U test was applied for non-normally distributed variables. No data transformations were performed prior to the statistical analysis.

Correlation analyses were performed using the Spearman correlation test. Automatic linear regression analysis was employed to determine predictors. In statistical analyses, a p-value of <0.05 was considered statistically significant. Categorical data were presented as numbers and percentages, data with normal distribution were presented as mean±SD, and data with non-normal distribution as median (25%-75%) with minimum and maximum values.

### RESULTS

This study included 25 women (49%) and 26 men (51%) who were affected by the earthquake on February 6, 2023. The median age of the participants was 39 years (IR: 23–53 years). Of the participants, 20 were single (39.2%), 25 were married (49%), and 6 (11.8%) were widowed or divorced. During the earthquake, 28 individuals (54.9%) resided in the city, 16 (31.4%) in districts, and 7 (13.7%) in villages. Among the participants, 4 (7.8%) had the death of their mothers, 4 (7.8%) their fathers, and 8 (15.7%) their siblings due to the earthquake. The spouses of 12 out of 25 married participants (48%) had died during the earthquake, and 14 out of 30 participants with children (46.7%) had lost at least one child. A total of 43 participants (84.3%) were trapped under the debris, while 8 (15.7%) were not. The average duration under the debris was found to be 22.10±28.66 hours. The scores obtained from the scales used in the study were: for ASBS: 13.09±6.24, for HAD-Anxiety: 14 (range 8-16), and for HAD-Depression: 16 (range 10-19). The sociodemographic and clinical characteristics of the participants have been summarized in Table 1.

The participants were categorized into binary groups based on gender, limb loss, experience of being trapped under the debris, witnessing someone's death in the debris, and history of psychiatric illness to compare the acute stress, anxiety, and depression symptom scores. It was found that women scored significantly higher on the HADS-Depression scale compared to men ( $p=0.031$ ). The group with limb loss had significantly higher HADS-Depression scores than the group without ( $p=0.025$ ). No significant differences were found between those who were trapped in the debris and those who were not in their ASBS, HADS-Depression, and HADS-Anxiety scores ( $p=0.473$ ,  $p=0.362$ ,  $p=0.362$ , respectively). Similarly, no significant differences were noted in ASBS, HADS-Depression, and HADS-Anxiety scores between individuals who had lost a first-degree relative and those who had not ( $p=0.762$ ,  $p=0.448$ ,  $p=0.558$ , respectively). However, those who had witnessed someone's death in the debris had higher HADS-Anxiety scores compared to those who had not ( $p=0.037$ ). Individuals

**Table 1.** Sociodemographic and clinical characteristics

	Earthquake victim (n=51)			Earthquake victim (n=51)	
	Mean±SD /Median (25–75%)/ Number (percentage)	Min–Max		Mean±SD /Median (25–75%)/ Number (percentage)	Min–Max
Age	39 (23–53)	18–75	Sibling's death		
Gender			Yes	8 (15.7%)	
Female	25 (49%)		No	43 (84.3)	
Male	26 (51%)		Spouse's death (n=25)		
Marital status			Yes	12 (48%)	
Single	20 (39.2%)		No	13 (52%)	
Married	25 (49%)		Child death (n=30)		
Widowed/divorced	6 (11.8%)		Yes	14 (46.7%)	
Location during the earthquake			No	16 (53.3%)	
City	28 (54.9%)		Presence of someone during the earthquake		
District	16 (31.4)		Yes	47 (92.2%)	
Village	7 (13.7)		No	4 (7.8%)	
Mother's death			Trapped under debris		
Yes	4 (7.8%)		Yes	43 (84.3%)	
No	44 (86.3)		No	8 (15.7%)	
Unknown	3 (5.9%)		Witnessed Someone's death		
Father's death			Yes	12 (23.5%)	
Yes	4 (7.8%)		No	39 (76.5)	
No	44 (86.3)		Number of children (n=30)	3 (3–4)	1–6
Unknown	3 (5.9)		Duration of stay in debris (n=43)	10 (6–17)	50–96 hours
			ASBS score	13.09±6.24	
			HADS-anxiety score	14 (8–16)	1–21
			HADS-depression score	16 (10–19)	3–21

Percentages related to spousal and child loss were calculated based on subgroups: 25 married participants and 30 participants with children, respectively. SD: Standard deviation; Min–Max: Minimum–Maximum; IQR: Interquartile range.

who were alone in the debris had higher scores in both ASBS ( $p=0.021$ ) and HADS-Anxiety ( $p=0.028$ ) compared to those who were with someone. Moreover, those with a history of psychiatric illness diagnosis and treatment had higher ASBS ( $p=0.013$ ) and HADS-Anxiety ( $p=0.040$ ) scores than those without such a history (Table 2).

In the conducted automatic regression analysis, when evaluating the predictors of acute stress disorder, it was found that being alone in the debris, having a history of psychiatric diagnosis and treatment, and the duration of stay in the debris were associated factors (adjusted  $r^2=0.221$ ) Figure 1.

## DISCUSSION

The consecutive occurrence of two major earthquakes in Kahramanmaraş and the substantial loss of life has introduced numerous challenges. Although many epidemiological studies on PTSD have been conducted post-earthquake, most have focused on the medium and long-term psychosocial impacts. Studies investigating trauma-related symptoms in the early phase are limited.<sup>11,22</sup>

One of the significant findings of our study is that individuals who were alone under the debris exhibited higher ASBS and HADS-Anxiety scores compared to those who were with

**Table 2.** Comparison of acute stress, depression, and anxiety scores among participants

Variables/categories	ASBS Mean±SD	HADS-depression Mean (range)	HADS-anxiety Mean±SD
Gender			
Female (n=25)	14.24±6.11	16 (12–19)	12.68±5.02
Male (n=26)	12.00±6.28	13 (9–17)	11.65±5.26
p-value	0.203	<b>0.031*</b>	0.480
Limb Loss			
Yes (n=9)	16.22±5.65	19 (16.50–19.50)	16 (8–18.50)
No (n=42)	12.42±6.22	14 (9.75–18.00)	12.5 (8–16)
p-value	0.098	<b>0.025*</b>	0.143
Trapped in debris			
Yes (n=43)	13.37±6.14	16 (10–19)	12.44±5.04
No (n=8)	11.62±7.00	14 (6.25–17.5)	10.62±5.62
p-value	0.473	0.362	0.362
First degree relative death			
Yes (n=27)	14 (8.5–16.5)	16 (9.5–19)	11.70±5.09
No (n=24)	11.5 (7.5–20)	14.5 (10–17.5)	12.66±5.22
p-value	0.762	0.448	0.558
Witnessed Someone's death			
Yes (n=12)	10.66±6.38	15 (9.25–19)	9 (6.25–14.25)
No (n=39)	13.84±6.08	16 (10–18)	15 (9–16)
p-value	0.124	0.592	<b>0.037*</b>
With Someone in the debris			
Yes (n=30)	11 (7.75–16.25)	12.5 (9–19)	11 (7.75–16)
No (n=13)	18 (14.5–20.5)	17 (16–19.5)	15 (11.5–18.5)
p-value	<b>0.021*</b>	0.059	<b>0.028*</b>
Presence of psychiatric diagnosis			
Yes (n=14)	16.57±4.94	17 (15.75–18)	14.07±3.14
No (n=37)	11.78±6.23	12 (9–19)	11.43±5.56
p-value	<b>0.013*</b>	0.065	<b>0.040*</b>

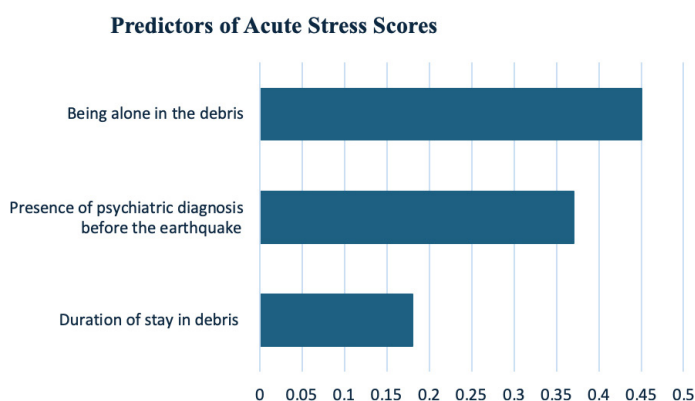
\*: P&lt;0.05; SD: Standard deviation; IQR: Interquartile range.

companions. Although no previous studies have specifically investigated the psychological impact of being alone under debris during the early post-earthquake phase, this condition may constitute a clinically significant risk factor for adverse mental health outcomes in disaster survivors. Isolation under life-threatening circumstances may intensify the fear of death, feelings of helplessness, uncertainty, and acute stress responses. A study conducted after the 1999 Marmara earthquake found that being trapped under debris and experiencing building collapse increased the risk of developing depression.<sup>23</sup> It is well-established that

the catastrophic nature of trauma amplifies psychiatric complaints. Therefore, being alone during entrapment may represent an additional psychological burden, exacerbating both the immediate and long-term mental health consequences following earthquakes.

Our study found that women had higher HADS-Depression scores than men. The gender difference in mental symptoms is notable in many psychiatric conditions. Research on disasters has shown that the risk of developing PTSD after exposure to a disaster is significantly higher in women than





**Figure 1.** Predictors of acute stress scores.

in men.<sup>24</sup> A recent meta-analysis also found that women had a higher risk of developing PTSD after earthquakes.<sup>9</sup> Moreover, depression is more common in women than in men.<sup>25</sup> A meta-analysis has shown higher rates of PTSD, anxiety, and depression in women following earthquakes.<sup>9</sup> The difference between genders may be due to genetic and biological factors, with women interpreting disasters more negatively and being more sensitive to threats.<sup>26</sup> Considering the traditional role of women in our society, their higher exposure to stress and use of inadequate coping mechanisms might explain why their depression scores are higher than men's. In addition to general biological and societal factors, the observed gender difference in depression scores may also be influenced by genetic vulnerability, differences in post-traumatic coping mechanisms, varying levels of perceived social support, prior mental health history, and sociocultural expectations placed on women.

Individuals with limb loss exhibited elevated HADS-Depression levels compared to those without limb loss. It is suggested that the physical and mental health effects of disasters often co-occur, and physical deterioration may contribute to psychological decline.<sup>27</sup> Literature review indicates that severe injuries and amputations post-earthquake are associated with high PTSD levels,<sup>28,29</sup> and higher rates of depression have also been shown in individuals with limb and organ loss.<sup>29</sup> A study conducted following the 2023 earthquakes revealed that individuals with earthquake-related limb loss experienced markedly elevated levels of depression, PTSD, and psyche compared to those without such injuries, with limb loss identified as an independent predictor of depressive symptoms.<sup>30</sup> Similar findings were observed in our study. Specifically, body image disruption and self-stigmatization in patients with limb loss may have heightened susceptibility and facilitated the emergence of depressive symptoms.

Those who witnessed someone's death while trapped had higher HADS-Anxiety scores than those who did not. Our finding is consistent with the literature. A study conducted in Syria after the February 2023 Kahramanmaraş earthquake found higher rates of depression, anxiety, and PTSD in severely damaged areas compared to less damaged ones.<sup>13</sup> A study investigating risk factors for PTSD development after 10 different disasters found that witnessing death or injury post-disaster facilitated the development of PTSD.<sup>31</sup> Exposure to traumatic images has been considered a risk factor for PTSD by researchers.<sup>32</sup> Witnessing death or injury, especially following an earthquake, could intensify the traumatic impact. Our study's high depression rates could be linked to the strong association between anxiety, PTSD, and depressive responses, as highlighted in other research.<sup>33</sup>

We observed higher ASBS and HADS-Anxiety scores in participants with a history of psychiatric illness, consistent with previous studies.<sup>34</sup> Research indicates that individuals with high resilience cope better when faced with stress and challenges.<sup>35</sup> Previous traumatic experiences could reduce psychological resilience in subsequent traumas, facilitating the development of depression and anxiety. This could suggest that individuals with a history of psychiatric illness are less resilient and more prone to psychiatric disorders. It is foreseeable that individuals with prior psychiatric conditions might be more susceptible to anxiety. Post-earthquake, intolerance to uncertainty, future anxieties, and ongoing aftershocks could trigger anxiety symptoms. The development of anxiety disorders post-earthquake has often been discussed in conjunction with PTSD and depression. A study in Nepal 14 months after an earthquake found significant anxiety symptoms in 20% of 198 earthquake survivors.<sup>36</sup> Early symptoms of depression and anxiety have been shown to correlate with higher rates of PTSD.<sup>37</sup> A study conducted 37 years after the Tangshan earthquake found higher rates of depression in survivors who lost relatives compared to those who did not experience the earthquake.<sup>38</sup> Some studies indicate that stress and anxiety levels are high immediately after disasters,<sup>39</sup> and depression levels tend to increase over a longer period post-disaster.<sup>40</sup> In our study, high levels of acute stress and anxiety were observed in the acute phase, suggesting that these individuals might exhibit higher levels of depression if followed over a longer period. Psychiatric close monitoring of these patients is recommended.

### Limitations

This study has several limitations. It included individuals who presented to our hospital during the early post-earthquake period and voluntarily agreed to participate; however, a

control group could not be established during this process. This limitation restricted the ability to strengthen the findings through comparative analyses and limited the broader contextual interpretation of the results. Moreover, the fact that the sample was composed solely of disaster survivors, along with the limited number of participants, significantly reduced the generalizability and statistical power of the findings.

## CONCLUSIONS

Our findings emphasize the nuanced interplay between the immediate psychological impacts of disasters and their longer-term mental health consequences. The elevated stress and anxiety observed in individuals alone in the debris or those with a prior psychiatric history underline the need for targeted mental health interventions in disaster response strategies. Moreover, the gender differences in depression scores post-disaster highlight the importance of considering gender-specific needs in psychological support services. As we move forward, integrating these insights into our emergency preparedness and response plans will be crucial in mitigating the psychological aftermath of such catastrophic events and fostering resilience in affected populations. Beyond their academic significance, these findings also offer actionable guidance for public health planning. Community-based psychosocial support programs that incorporate early screenings, mental health education, and accessible therapeutic services should be prioritized. Embedding mental health support into disaster preparedness frameworks can enhance individual coping capacity and accelerate community recovery.

**Ethics Committee Approval:** The Erciyes University Clinical Research Ethics Committee granted approval for this study (date: 09.08.2023, number: 2023/492).

**Informed Consent:** Written informed consent was obtained from patients who participated in this study.

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