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Post-Earthquake PTSD: Identifying Key Risk Factors Eleven Months After the February 2023 Turkey Earthquakes

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ABSTRACT

Objective
Earthquakes are one of the most significant natural disasters, causing physical damage and psychological stress among victims. One of the major mental health issues that can arise after earthquakes is Posttraumatic Stress Disorder (PTSD). Our study aimed to investigate the prevalence of PTSD and PTSD risk factors in the eleventh month following the February 6, 2023 earthquakes in Turkey.

Methods
Our study was conducted between Dec 19, 2023, and Jan 2, 2024. All participants were given the Personal Information Form and, PTSD Checklist for DSM-5 (PCL-5). The Personal Information Form consists of three parts: survivors' characteristics, the characteristics of the trauma, and the post-trauma characteristics of the survivors.

Results
The study involved a total of 886 participants, aged between 18 and 65 years. Among the participants, 55.4% (n=491) were considered to have PTSD. The likelihood of receiving a diagnosis of PTSD is 2.95 times higher for male individuals, 2.07 times higher for injured individuals, 2.30 times higher for those who feel unable to escape their situation, and 2.03 times higher for individuals experiencing excessive fear or panic. Additionally, it is 1.65 times higher for individuals whose family member or close friend is injured, 1.82 times higher for individuals who lose their job after the earthquake, and 1.67 times higher for individuals experiencing economic problems after the earthquake.

Conclusion
Male gender, feeling trapped, experiencing extreme fear or panic, witnessing the injury of a family member or close friend, losing one's job after the earthquake, and facing economic problems after the earthquake are risk factors for PTSD.

Keywords: Earthquakes, posttraumatic stress disorder, risk factors

Deprem Sonrası Travma Sonrası Stres Bozukluğu (TSSB): 6 Şubat 2023 Türkiye Depremlerinden On Bir Ay Sonra Temel Risk Faktörlerinin Belirlenmesi

Araştırma Makalesi

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ÖZET

Amaç
Depremler, fiziksel hasara ve hayatta kalanlar arasında psikolojik strese neden olan en önemli doğal afetlerden biridir. Depremler sonrasında ortaya çıkabilecek en önemli ruh sağlığı sorunlarından biri Travma Sonrası Stres Bozukluğu'dur (TSSB). Bu çalışmada, 6 Şubat 2023 Türkiye depremlerinden on bir ay sonra TSSB yaygınlığı ve TSSB risk faktörlerinin incelenmesi amaçlanmıştır.

Yöntem
Çalışma, 19 Aralık 2023 ile 2 Ocak 2024 tarihleri arasında gerçekleştirilmiştir. Tüm katılımcılara Kişisel Bilgi Formu **ve** DSM-5 Travma Sonrası Stres Bozukluğu Kontrol Listesi (PCL-5) uygulanmıştır. Kişisel Bilgi Formu üç bölümden oluşmaktadır: hayatta kalanların demografik özellikleri, travmanın özellikleri ve travma sonrası dönem özellikleri**.**

Bulgular
Çalışmaya 18-65 yaş aralığında toplam 886 katılımcı dahil edilmiştir. Katılımcıların %55,4'ü (n=491) TSSB tanı kriterlerini karşılamaktadır. TSSB tanısı alma olasılığı erkek bireylerde 2,95 kat, yaralanan bireylerde 2,07 kat, kaçamayacağını hisseden bireylerde 2,30 kat ve aşırı korku veya panik yaşayan bireylerde 2,03 kat daha yüksek bulunmuştur. Ayrıca, aile üyesi veya yakın bir arkadaşı yaralanan bireylerde bu olasılık 1,65 kat, deprem sonrası işini kaybeden bireylerde 1,82 kat ve ekonomik sorunlar yaşayan bireylerde 1,67 kat daha fazladır.

Sonuç
Erkek cinsiyet, kaçışın imkansız olduğu algısı, aşırı korku veya panik yaşama, bir aile üyesi ya da yakın arkadaşın yaralanmasına tanıklık etme, deprem sonrası iş kaybı ve ekonomik sorunlarla karşı karşıya kalma**,** TSSB için önemli risk faktörleri olarak belirlenmiştir.

Anahtar Kelimeler: Deprem, travma sonrası stres bozukluğu, risk faktörleri

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Introduction

In the last few decades, earthquakes, which frequently occur and cause significant destruction, have been one of the major natural disasters that cause physical damage and psychological stress among the victims.[1,2] On Feb 6, 2023, Turkey was shaken by the largest earthquake disaster in the country's history. The earthquakes occurred in the province of Kahramanmaraş, located in the south of the country, and affected more than ten cities. The first earthquake occurred at 04:17 local time with a magnitude of 7.7 recorded instrumentally. The second earthquake occurred on the same day at 13:24 local time, with a magnitude of 7.6.[3] These earthquakes affected 14 million people, constituting 16% of Turkey's population. More than 35,000 buildings were ruined, over 50,000 people lost their lives, and more than 100,000 people were injured.4 Following a catastrophic natural disaster of this magnitude, which impacted millions of individuals, a substantial proportion of the affected population is at heightened risk of developing severe mental health conditions. Among these, PTSD emerges as a critical psychological consequence that warrants thorough investigation.

PTSD is any traumatic event followed by specific symptoms such as re-experiencing, hyperarousal, avoidance, and alienation lasting more than a month, causing impairment in social and occupational functioning.[5] There are significant differences reported in PTSD rates following earthquakes.[6,7] A meta-analysis indicated that the prevalence of PTSD after earthquakes in adults ranged from 4.10% to 67.07%.[8] Similarly, the study noted variations in predictors of PTSD following earthquakes. While some studies suggest that older age is a risk factor for developing PTSD after earthquakes, others have found contradictory results. The same applies to being injured during the earthquake and marital status (8). The variability in PTSD rates and predictors has been associated with several factors, including the severity of the earthquake, the degree of trauma experienced by the victims, the timing of PTSD assessment, the amount of property loss, and the mourning process.[9,10]

The absence of a single dominant predictor for post-earthquake PTSD emphasizes the importance of examining risk factors. These risk factors can be classified into the survivors' characteristics, the trauma's characteristics, and the survivors' post-trauma characteristics. The basic characteristics of survivors include age, gender, education level, income level, and trauma history. Accordingly, older age, female gender, and a history of traumatic events increase the risk of developing PTSD.[8,11] Studies on education levels yield conflicting results, with some indicating that a lower education level is a risk factor while others suggest that a higher education level poses a risk.[8,11] Regarding the characteristics of the trauma, factors such as injury, facing death, witnessing death or injury, being buried or trapped during a natural disaster, experiencing fear and anxiety during the earthquake, and feelings of guilt are all risk factors for PTSD.[8,11] In terms of post-trauma characteristics of survivors, factors such as damage or collapse of the home, loss of employment, lack of social support, participation in rescue efforts, and experiencing traumatic events during the post-earthquake period are risk factors for PTSD.[8,11]

In this study, we examine the factors that increase the risk of developing PTSD among individuals affected by the 2023 Turkey earthquakes. It is hypothesized that the prevalence of PTSD will be significantly higher in individuals who experienced severe trauma during the earthquake, such as injury, loss of loved ones, or being trapped under rubble. Additionally, it is predicted that women, older individuals, and those with lower education or income levels will be at greater risk of developing PTSD. Furthermore, factors such as the extent of property loss, lack of social support, and participation in post-earthquake rescue efforts are expected to increase the likelihood of PTSD. The study also anticipates that the combination of multiple risk factors will further elevate the probability of developing PTSD.

Materials and Methods

Procedure and participants

Our study was conducted between Dec 19, 2023, and Jan 2, 2024. All participants were given the Personal Information Form and PCL-5. Surveys were created using Google Documents. An introductory note explaining the purpose of the study in detail and an assurance that the data would be kept confidential was sent to the individuals. A consent tab stating that participation in the survey was based on voluntariness was added, and online consent was received from those who accepted to participate voluntarily. After obtaining informed consent, those who agreed to participate in the study could continue filling out the scales. This survey was sent to all participants using WhatsApp Messenger, a free American software owned by Facebook Inc., a cross-platform messaging service. All stages of this study were carried out in accordance with the rules of the Helsinki Declaration. Inclusion criteria for the research were being literate, volunteering to participate in the study, having personally experienced the earthquake, and being over 18 years old. Exclusion criteria for the research were diagnosis of schizophrenia, bipolar affective disorder, intellectual disability, and autism spectrum disorder.

Measures

Personal Information Form

It is a standardized questionnaire created by the researchers, in which survivors' characteristics (such as age, gender, marital status, income level), the trauma's characteristics (such as injury, witnessing someone else's death or injury, being buried during a natural disaster, experiencing a feeling of being trapped) and the survivors' post-trauma characteristics (such as damage or destruction of the house, loss of employment, experiencing economic problems) are questioned.

Posttraumatic Stress Disorder Checklist for DSM-5

It was developed by Weathers et al.[12] to measure PTSD symptoms. It consists of 20 items. It contains four factors. These factors are re-experiencing, avoidance, negative changes in cognition and mood, and hyperarousal. The Turkish adaptation of the scale was carried out by Boysan et al.[13] The internal consistency coefficient of the scale was

found to be in the range of .64-.78. Boysan et al. suggested a cut-off score ≥47 for PTSD diagnosis with PCL-5.

Statistical Analysis

SPSS 26.0 package programs were used in the analysis of the data. Frequency analysis was used for person and percentage distribution, Chi-Square analysis was used to examine the differences in diagnostic status according to cities, and Logistic Regression analysis was used to examine the predictive relationships between variables. Statistical significance was accepted as $p < 0.05$.

Results

The study involved a total of 886 participants, with 611 (69%) females aged between 18 and 65 years (mean age = 27.72 ± 8.61) and 275 (31%) males aged between 18 and 70 years (mean age = 34.04 ± 12.40). Among the participants, 55.4% (n=491) were considered to have PTSD. Of the participants, 56% (n=496) were married, and 80.5% (n=713) had a college or university degree. About 24.3% (n=215) of the participants reported having experienced a similar event in the past, while 10.2% (n=90) indicated a history of psychiatric treatment. The percentage of participants injured in the earthquake was 7.8% (n=69), and 42.3% (n=375) witnessed someone's death. About 47.5% (n=421) of the participants reported minor damage to their homes, while 51.6% (n=457) had lost a family member or close friend. The characteristics of the participants, the characteristics of the trauma, and the post-trauma characteristics of the survivors are summarized in Table 1.

Table 1. *Sociodemographic characteristics of the survivors. the characteristics of the trauma. and the post-trauma characteristics of the survivors*

Variable	Category	n	%
Gender	Female	611	69.0
	Male	275	31.0
	Total	**886**	**100.0**
Marital status	Single	348	39.3
	Married	496	56.0
	Divorced or Widow	42	4.7
	Total	**886**	**100.0**
Educational level	Primary school	15	1.7
	High School	158	17.8
	College/University	713	80.5
	Total	**886**	**100.0**
Employment	Student	243	27.4
	Not working	192	21.7
	Works at own workplace	37	4.2
	Public employee	237	26.7
	Private sector employee	177	20.0
	Total	**886**	**100.0**
Income*	Minimum wage and below	489	55.2
	Up to twice the minimum wage	223	25.2
	More than twice the minimum wage	174	19.6
	Total	**886**	**100.0**
Did you undergo any psychiatric treatment in the period before the earthquake?	Yes	90	10.2
	No	796	89.8
	Total	**886**	**100.0**
Have you experienced a traumatic event like this before?	Yes	215	24.3
	No	671	75.7
	Total	**886**	**100.0**
Did you get injured?	Yes	69	7.8
	No	817	92.2
	Total	**886**	**100.0**
Did you get trapped or stuck under the rubble?	Yes	30	3.4
	No	856	96.6
	Total	**886**	**100.0**
Did you feel like you cannot escape the situation you are in?	Yes	761	85.9
	No	125	14.1
	Total	**886**	**100.0**
Did you experience extreme fear or panic?	Yes	772	87.1
	No	114	12.9
	Total	**886**	**100.0**
	Yes	730	82.4

Did you ever feel that your life or the life of a family member was in danger?	No	156	17.6
	Total	**886**	**100.0**
Did you directly witness someone else being injured?	Yes	375	42.3
	No	511	57.7
	Total	**886**	**100.0**
Did you witness someone else's death directly?	Yes	279	31.5
	No	607	68.5
	Total	**886**	**100.0**
Did you witness someone else being trapped or stuck under rubble?	Yes	287	32.4
	No	599	67.6
	Total	**886**	**100.0**
House damage	Undamaged	252	28.4
	Slightly damaged	421	47.5
	Heavily damaged	178	20.1
	Ruined	35	4.0
	Total	**886**	**100.0**
Did you lose your job after the earthquake?	Yes	107	12.1
	No	779	87.9
	Total	**886**	**100.0**
Did you have economic problems after the earthquake?	Yes	568	64.1
	No	318	35.9
	Total	**886**	**100.0**
Did a family member or close friend get injured?	Yes	460	51.9
	No	426	48.1
	Total	**886**	**100.0**
Did a family member or close friend die?	Yes	457	51.6
	No	429	48.4
	Total	**886**	**100.0**
Did you need surgery?	Yes	6	0.7
	No	880	99.3
	Total	**886**	**100.0**
Which city were you in at the time of the earthquake?	Kahramanmaraş	183	20.7
	Hatay	128	14.4
	Malatya	191	21.6
	Adıyaman	60	6.8
	Gaziantep	29	3.3
	Diyarbakır	53	6.0
	Osmaniye	12	1.4
	Adana	39	4.4
	Kilis	1	.1
	Şanlıurfa	30	3.4
	Other cities	160	18.1
	Total	**886**	**100.0**
Diagnosis of PTSD	Yes	491	55.4
	No	395	44.6
	Total	**886**	**100.0**

* The level of income was determined by the minimum wage value on the date of the study.
PTSD: Posttraumatic Disorder

In the conducted regression analysis, those without a diagnosis of PTSD were coded as 0, while those with a diagnosis of PTSD were coded as 1, and stepwise logistic regression analysis was performed. According to the results of the Hosmer and Lemeshow Test, it was observed that the model fit was good ($X^2_{(8)}$=8,116; p>0,05). In the block model, the prediction percentage was 55.4%, while in the model, including independent variables, the prediction rate was calculated as 68.3%. As a result of the analysis, gender (Wald=42.314; p<0.001), loss of employment (Wald=5.616; p<0.05), economic problems (Wald=10.207; p<0.05), injury status (Wald=5.128; p<0.05), injury to a family member or close friend (Wald=10.476; p<0.01), feeling unable to escape (Wald=11.715; p<0.01), and feelings of fear/panic (Wald=7.810; p<0.01) were found to be significant parameters. These variables explain 21% of the occurrence of PTSD diagnosis. Holding other variables constant, the likelihood of receiving a diagnosis of PTSD is 2.95 times higher for male individuals, 2.07 times higher for injured individuals, 2.30 times higher for those who feel unable to escape their situation, and 2.03 times higher for individuals experiencing excessive fear or panic. Additionally, it is 1.65 times higher for

individuals whose family member or close friend is injured, 1.82 times higher for individuals who lose their job after the earthquake, and 1.67 times higher for individuals experiencing economic problems after the earthquake. Logistic regression analysis findings for PTSD diagnosis are summarized in Table 2.

***Table 2**. Logistic Regression Analysis Results for Diagnosis of Posttraumatic Stress Disorder.*

Variables	B	SH	Wald	p	Exp(B)	Confidence Interval	
						Low	High
Constant (a)	-2.563	0.295	75.355	0.000	0.077		
Gender	1.083	0.166	42.314	0.000	2.953	2.131	4.093
Did you get injured?	0.727	0.321	5.128	0.024	2.070	1.103	3.885
Did you feel like you cannot escape the situation you are in?	0.833	0.243	11.715	0.001	2.300	1.427	3.705
Did you experience extreme fear or panic?	0.707	0.253	7.810	0.005	2.028	1.235	3.330
Did you lose your job after the earthquake?	0.596	0.252	5.616	0.018	1.815	1.109	2.972
Did you have economic problems after the earthquake?	0.514	0.161	10.207	0.001	1.672	1.220	2.292
Did a family member or close friend get injured?	0.498	0.154	10.476	0.001	1.646	1.217	2.226

***Table 3.** Examination of the Difference Between the Distribution of Place of Residence According to Diagnosis of Posttraumatic Stress Disorder.*

			Diagnosis of PTSD		$X^2_{(4)}$	p
			No	Yes		
City	Kahramanmaraş	n	90	93	11.678	0.020
		Line percentage	49.2%	50.8%		
	Hatay	n	42	86		
		Line percentage	32.8%	67.2%		
	Malatya	n	79	112		
		Line percentage	41.4%	58.6%		
	Adıyaman	n	31	29		
		Line percentage	51.7%	48.3%		
	Other Cities	n	153	171		
		Line percentage	47.2%	52.8%		

PTSD: Posttraumatic Disorder

It was observed that the distributions of participants diagnosed with PTSD and those without PTSD were statistically significant based on their places of residence (X2(4)=11,678; p<0,05). When examining the table overall, it is seen that 67.2% of the participants residing in Hatay have a diagnosis of posttraumatic stress disorder. Following Hatay, this rate is followed by Malatya, other cities, Kahramanmaraş, and Adıyaman, respectively (Table 3).

Discussion

The study was conducted in the eleventh month following the February 6th Turkey earthquake. The rate of participants diagnosed with PTSD was 55.4% (n=491). The likelihood of receiving a diagnosis of PTSD was significantly higher in males, injured individuals, individuals whose family member or close friend was injured, those who felt unable to escape their situation, and those experiencing excessive fear or panic. Furthermore, it was higher among individuals who lost their jobs after the earthquake and those experiencing economic problems following it.

The lifetime prevalence of PTSD can vary between 0.5% and 14.5%, and this variability may differ across different regions of the world depending on factors such as the type of trauma, the intensity of exposure, and the level of posttraumatic social support.[14] Studies provide

different results regarding the prevalence of PTSD in the post-earthquake period. A meta-analysis reported that the prevalence of PTSD after earthquakes ranged from 4.10% to 67.07% in adults and from 2.50% to 60.00% in children.[8] In a meta-analysis examining the prevalence of PTSD after earthquakes in Iran and Pakistan, the overall prevalence of PTSD was found to be 55.6%. This rate was 60.2% among Iranian participants and 49.2% among Pakistani participants.[15] The same study also indicated a decrease in the prevalence of PTSD over time. However, another meta-analysis showed a global prevalence of PTSD after earthquakes to be 23.66%, which is considerably lower than the rate found in our study.[16] Significant differences in the prevalence rates of PTSD have been attributed to individual vulnerability factors such as age and gender, exposure factors such as damage or collapse of the home, and factors related to the posttraumatic period such as the death of family members or friends.[17] Furthermore, the timing and method of assessment of PTSD can also lead to differences in prevalence rates. Symptoms of the disorder may diminish or disappear over time, so the time elapsed between the occurrence of the earthquake and the assessment may affect the prevalence of PTSD. A systematic review found that the prevalence of PTSD decreased from 28.8% at one month to 17.0% at 12 months post-earthquake.[18] Additionally, different methods used for assessing PTSD, such as questionnaires or clinical interviews, can yield different results. It has been observed that the deviation in results obtained from clinical interviews is lower compared to self-report scales. This finding suggests clinical interviews may provide more accurate diagnoses than self-report scales. However, it is important to note that both methods can yield either higher or lower results when compared to each other, as seen in the literature.[19]

Gender is considered an individual vulnerability factor for the development of PTSD. Female gender is identified as a significant predictor of PTSD development in adults. Study results consistently show that the prevalence of PTSD among women is higher than among men. [8,11,15,16] Sociocultural and cognitive factors play an important role in explaining gender differences. Especially in developing countries, sociocultural factors that affect a woman's vulnerability are of great importance. In such societies, limited access for women to decision-making processes and prominent values and traditions can make women more vulnerable to the effects of disasters.[20,21] In our study, contrary to the literature, we found that the risk of developing PTSD in men was 2.95 times higher. We believe that one possible reason for this could be the predominant involvement of men in rescue efforts during the post-earthquake period, leading to increased exposure to traumatic stimuli among men. The fact that the frequency of PTSD is shown to increase among those involved in search and rescue operations during the post-trauma period also supports our findings.[22] Beyond the direct exposure to trauma during rescue efforts, other factors may also explain the higher PTSD rates among men in our study. For instance, traditional gender roles in many societies often discourage men from seeking emotional support or expressing vulnerability, which may hinder their ability to cope effectively with traumatic experiences. Additionally, men may face societal pressures to remain resilient in the face of disaster, potentially leading to the internalization of stress and trauma. These factors, combined with their active role in post-disaster recovery, could collectively contribute to the elevated PTSD risk observed among men in our sample. While our findings challenge the general consensus in the literature, they underscore the importance of considering contextual and cultural factors when examining PTSD risk. Future studies should further explore the interplay between gender roles, societal expectations, and trauma exposure in shaping PTSD outcomes, particularly in disaster-affected populations.

It is known that trauma-related characteristics such as being injured, confronting death, witnessing death or injury, being buried during a natural disaster, feeling trapped, experiencing fear during the earthquake, anxiety levels and feelings of guilt are risk factors for PTSD.[8,11] In our study, factors such as being injured, feeling unable to escape from the situation, and experiencing excessive fear or panic, as well as having a family member or close friend injured, were found to increase the risk of developing PTSD. A study conducted 17 years after the Bam earthquake in Iran found that a significant portion of participants still exhibited symptoms of PTSD, and physical injury, being trapped under debris, and the death of a family member were identified as risk factors for PTSD.[23] The connection between injury and PTSD is likely related to the severity of injuries; severe injuries can lead to amputation and disability after the earthquake.[24] Disability results in a significant decrease in the quality of life for these individuals and can lead to PTSD. Additionally, injured individuals are always at high risk stemming from experiencing a life-threatening trauma. The rehabilitation process after injury can also be a constant reminder and an additional source of stress.[25] Similarly, Abolhadi et al. found significant positive associations between injury and the development of PTSD, particularly emphasizing that this relationship is more pronounced in individuals showing moderate to high levels of PTSD symptoms.[23] Consistently, the relationship between injury and the development of PTSD has been demonstrated in numerous studies.[26-30] Considering that PTSD is a fear-based disorder, the fear experienced during the earthquake can be a strong determinant of PTSD. There are studies supporting this notion, showing a relationship between the initial level of fear experienced during the earthquake and PTSD.[31,32] Similarly, the feeling of being unable to escape and fear have been associated with the development of PTSD.[33,34] Consistent with our study findings, having a close family member or friend injured has also been identified as a risk factor for the development of PTSD.[34-37]

Regarding post-trauma characteristics, factors such as the destruction or damage of a home, loss of employment, and low social support are associated with

the development of PTSD.[8-11] In our study, an increased risk of developing PTSD was found among those who lost their jobs and experienced economic problems after the earthquake. Unemployment caused by the earthquake may reflect the severity of the trauma to some extent. Additionally, unemployment may prevent individuals from providing for their families as they did before the disaster. It is crucial to support employment and income-generating activities as soon as possible. Low social support is known to be a risk factor for the development of PTSD.[31,32] In this regard, social and financial support from family, friends, or official authorities can mitigate the negative effects of trauma. Measures taken by governments and aid organizations in this regard are crucial.

Earthquakes are natural disasters that can affect wide geographical areas. Therefore, as the distance from the earthquake's epicentre increases, the earthquake's impact decreases. In our study, we investigated whether there was a difference between being at the earthquake's epicentre and being in a different city by asking participants where they were during the earthquake. We examined whether there was a difference in the development of PTSD among participants who were in the epicentre of the earthquake (Kahramanmaraş) and those in other heavily affected cities (Hatay, Malatya, and Adıyaman), as well as participants from other cities affected by the earthquake. We found that the distribution of participants with and without PTSD varied significantly depending on where they lived. Specifically, participants living in Hatay had the highest percentage of PTSD development (67.2%), followed by Malatya, other cities, Kahramanmaraş, and Adıyaman, respectively. Proximity to the disaster area can significantly affect the impact of the disaster, but it is not sufficient to consider it alone. In addition, factors such as the severity of the disaster, personality traits, and effectiveness of social support systems should be considered. One possible reason for the high rate of PTSD among participants in Hatay, where the earthquake occurred, maybe the occurrence of another earthquake with a magnitude of 6.4 on Feb 20, 2023, which was also centered in Hatay. This earthquake may have increased the destruction in Hatay and caused individuals affected to be re-traumatized. Given the extensive area affected by the earthquake and the limited search and rescue capabilities, there may have been difficulties in assisting in such a wide area, with a particular focus on Kahramanmaraş due to being the earthquake's epicentre. This situation may explain why the percentage of PTSD development in Malatya and other cities is higher than in Kahramanmaraş despite being the epicentre of the earthquake.

In our study, unlike previous research, we found that variables such as age, marital status, education level, income level, extent of home damage, being trapped under debris, witnessing someone else's death or injury, and the death of a family member or close friend were not risk factors for the development of PTSD. This finding may be attributed to various factors such as sample selection and sample size, the majority being college or university graduates, and most of the sample having minimal damage to their homes.

Our study has several important limitations that should be acknowledged. Firstly, the cross-sectional design of the study may limit the accuracy of the findings compared to longitudinal studies, which can provide more reliable insights into the development and progression of PTSD over time. Secondly, the reliance on self-report scales for data collection may lead to discrepancies between the reported prevalence of PTSD and the actual prevalence, as self-reports can be influenced by response biases or subjective interpretations. More precise results could be obtained through face-to-face clinical interviews conducted by trained professionals. Thirdly, the majority of the sample consisted of individuals with a high level of education, which may limit the generalizability of the findings to populations with lower educational attainment or different socioeconomic backgrounds. Additionally, the recruitment of participants exclusively through WhatsApp may have excluded individuals who do not use this platform, further restricting the representativeness of the sample. This approach likely overlooked certain demographic groups, such as older adults or those with limited access to technology, who may have different experiences and vulnerabilities related to PTSD. Despite these limitations, the study has notable strengths, including a relatively large sample size, the inclusion of participants from multiple cities, and the analysis of data from cities both near and far from the earthquake's epicentre. This allowed us to explore the relationship between proximity to the epicentre, the severity of damage, and the development of PTSD, providing valuable insights into the broader impact of the disaster.

Conclusion and Recommendations

In conclusion, male gender, feeling trapped, experiencing extreme fear or panic, witnessing the injury of a family member or close friend, losing one's job after the earthquake, and facing economic problems after the earthquake are risk factors for PTSD.

To enhance post-disaster mental health support, several practical measures can be implemented. First, early screening programs should be established to identify individuals at high risk of PTSD immediately after the disaster, enabling timely access to evidence-based interventions such as trauma-focused cognitive behavioral therapy (CBT). Second, community-based mental health initiatives, including support groups and psychoeducation workshops, should be developed to provide accessible and culturally sensitive care. Third, first responders and volunteers should receive trauma-informed training to recognize signs of PTSD and offer psychological first aid, which can also help mitigate their own risk of trauma-related mental health issues. Additionally, economic and social support programs, such as financial assistance, job placement services, and housing support, should be prioritized to alleviate post-

disaster stressors and improve mental health outcomes. Long-term mental health monitoring systems should also be implemented to track survivors' well-being and identify delayed-onset PTSD, ensuring continuous support. Finally, public awareness campaigns can help normalize discussions about mental health, reduce stigma, and encourage help-seeking behavior among affected populations. These strategies, when integrated into disaster response plans, can significantly improve mental health outcomes for earthquake survivors.

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