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How did the 2023 Türkiye earthquake affect the mental health of emergency professionals?

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Summary

Background: *After major disasters, both disaster victims and rescue teams may experience significant mental as well as physical challenges. The studies in the literature mostly focus on disaster victims, while our study was conducted with emergency professionals working in the aftermath of disasters. Our study aims to investigate the psychological effects on emergency professionals, such as depression, post-traumatic stress disorder (PTSD), and sleep disturbances, one year after the disaster.*

Subjects and Methods: *Our study was conducted with 500 volunteer participants who were involved in patient care in emergency departments or pre-hospital emergency health services units after the earthquake. Between May 1 and 30, 2024, participants were reached via an online questionnaire method. The questionnaire included questions on demographic data, earthquake awareness assessment questions, and questions related to participants' sleep quality index (Pittsburgh Sleep Quality Index-PSQI), depression assessment score (CES-D scale), and post-traumatic stress disorder score (CAPS-DSM 5).*

Results: *Of the 500 participants, 431 (86.2%) had high PSQI scores, 263 (52.6%) had high CES-D scores, and 108 (21.6%) had high CAPS scores. A positive, moderately statistically significant relationship was found between the PSQI score and CES-D score ($r=0.487$, $p<0.0001$). A positive, moderately statistically significant relationship was also found between the PSQI score and CAPS score ($r=0.595$, $p<0.0001$). Additionally, a positive, moderately statistically significant relationship was observed between CAPS score and CES-D score ($r=0.625$, $p<0.0001$).*

Conclusion: *Our study revealed that after the physically devastating earthquake in Türkiye, emergency professionals were also significantly affected in terms of mental health. Sleep disturbances, depressive symptoms, and post-traumatic stress disorder symptoms were highly prevalent among the participants, even though more than a year had passed since the earthquake.*

Keywords: *Depression, Earthquake, Emergency department, Post-traumatic stress disorder, Sleep disorder*

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INTRODUCTION

Disasters such as earthquakes affect society physically, sociologically, economically, and psychologically, and these effects may persist for a long time. After an earthquake, psychological issues such as anxiety disorders, depression, and sleep disturbances can be observed in individuals who have experienced the disaster closely. Post-traumatic stress disorder (PTSD), characterized by reactions to traumatic memories, hyperarousal, avoidance of trauma-related stimuli, and negative changes in thoughts/mood after traumatic events, is one of the most common psychiatric disorders (Wang et al., 2021). Another significant issue that may accompany PTSD is sleep disturbance. Studies have shown that sleep disorders are an important risk factor in the development of PTSD (Sinha, 2016).

Some studies in the literature report that people involved in rescue and initial care activities after disasters such as earthquakes or mass casualties, including wars, may experience lower levels of burnout and secondary trauma due to the satisfaction derived from their duties (Musa et al., 2008; Chang et al., 2011). During the February 6 earthquake, physicians and healthcare personnel who were involved in emergency departments and patient care were directly engaged in the care of earthquake victims, becoming some of the closest witnesses to this immense trauma. Our study aims to investigate the psychological effects, such as depression, post-traumatic stress disorder, and sleep disturbances, on healthcare professionals who participated in patient care one year after the earthquake.

SUBJECTS AND METHODS

Inclusion criteria

1. Being a healthcare professional working in emergency departments or pre-hospital emergency health service units, providing care to patients affected by the earthquake that occurred in Kahramanmaraş on February 6, 2023.
2. Being a Turkish healthcare professional officially assigned to emergency departments or pre-hospital emergency healthcare units.
3. Completion of the questionnaire data.

The study included 500 volunteers who fully completed the questionnaire between 1 May 2024 and 30 May 2024. Incomplete questionnaires were not included in the study. Healthcare professionals, such as general practitioners, research assistants, specialists, academicians, nurses, and technicians/paramedics who agreed to participate in the study, were reached via an online questionnaire shared through social media using Google Forms. Healthcare professionals or doctors assigned from other departments to support the emergency department have not been included in the study. The questionnaire included questions assessing earthquake awareness, sleep quality (Pittsburgh Sleep Quality Index – PSQI), depression (CES-D scale), and post-traumatic stress disorder (CAPS – DSM-5).

Ethical approval for the study was obtained from the Mersin University Clinical Research Ethics Committee, dated 22/05/2024 and numbered 2024/483.

Questionnaire Form

At the beginning of the questionnaire, participants were informed and obtained their consent regarding their participation in the study and the use of the data collected in the completed questionnaire.

In the first section, demographic information of the participants was collected, including age, gender, education level, work position, years of service, professional title, institution, and academic title.

The second section consists of earthquake awareness assessment questions. The questions in this section were as follows:

- Have you had any painful experiences (such as severe injury, severe illness, or the death of a close friend or family member) before the earthquake?
- Did you or your family members suffer any physical injuries as a result of the earthquake?
- Did you have to work more than usual due to the earthquake?
- Did you volunteer during the earthquake?
- Did you feel the tremor of earthquake in the building you were in at the time?
- Did you have to live alone after the earthquake?
- Did you have a colleague working in your unit who was physically injured in the earthquake?

The third section consisted of questions evaluating the participants' PSQI (Pittsburgh Sleep Quality Index) scores. A score was calculated by summing the scores of 7 components, including subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. The total score ranges from 0 to 21, with higher scores indicating poorer sleep quality. A score of ≥5 is considered the cut-off value for poor sleep quality (Buysse et al., 1989).

The fourth section consisted of questions assessing the participants' depressive symptoms using the CES-D (Center for Epidemiologic Studies Depression Scale) score. The CES-D scale is one of the most commonly used tools for measuring depressive symptoms. It is a 20-question questionnaire with four main components: depressive affect, somatic complaints and reduced activity, positive affect, and interpersonal problems. Each of the 20 questions is scored between 0 and 3, with a total score ranging from 0 to 60. In the literature, a score of 16 or higher is typically used as the cut-off for indicating depressive symptoms (Vilagut et al., 2016; Radloff, 1977).

The fifth section consisted of questions using the CAPS (Clinician-Administered PTSD Scale) score to assess post-earthquake PTSD symptoms in the participants. The CAPS questionnaire contains 20 questions, each scored between 0 and 4, with a maximum total score of 80. PTSD symptoms are evaluated using the CAPS score, with different cut-off values depending on the context (e.g., screening, differential diagnosis, severity). These cut-off values typically range between 30 and 60 (Blevins et al., 2015). In our study, we used the cut-off value of 47 from a study comparing the psychometric properties of CAPS-5 in clinical samples with healthy controls (Boysan et al., 2017).

Statistical Analysis

For continuous variables, descriptive statistics (median [interquartile range]) are provided, while for categorical variables, frequency and percentage values are given. The relationships between score groups and categorical

variables were examined using the chi-square test. Additionally, two-proportion comparisons were conducted. The correlation coefficient was used to analyze the relationships between scale scores. Bonferroni correction was applied. Subgroup analyses were performed and added to the tables. A p-value < 0.05 was considered statistically significant.

RESULTS

The median PUKI score for participants included in the study was 9 [6-11], the median CES-D score was 16 [10-25], and the median CAPS score was 23 [8-43]. According to the cut-off values determined for the scores, 431 (86.2%) of the 500 participants had high PSQI scores, 263 (52.6%) had high CES-D scores, and 108 (21.6%) had high CAPS scores.

Table 1. The relationship between participants' demographic, occupational, medical characteristics and earthquake experiences and PSQI score

		PSQI n(%)			
		<5	**≥5**	**Total**	**P**
Age	<35	44 (63.8)	268 (62.2)	312 (62.4)	
	35-45	9 (13)	123 (28.5)[a]	132 (26.4)	**0.0012**
	>45	16 (23.2)	40 (9.3)[a]	56 (11.2)	
Gender	Male	35 (50.7)	228 (52.9)	263 (52.6)	1.0
	Female	34 (49.3)	203 (47.1)	237 (47.4)	
Level of Education	High School	3(4.3)	13(3)	16 (3.2)	
	Associate degree	4(5.8)	39(9)	43 (8.6)	1.0
	Bachelor's degree	36(52.2)	207(48)	243 (48.6)	
	Master's degree	26(37.7)	172(39.9)	198 (39.6)	
Number of years in practice	0-5	27(39.1)	142 (32.9)	169 (33.8)	
	5-10	11 (15.9)	113 (26.2)	124 (24.8)	1.0
	10-20	17 (24.6)	120 (27.8)	137 (27.4)	
	>20	14 (20.3)	56 (13)	70 (14)	
Professional title	Physician	44 (63.8)	239 (55.5)	283 (56.6)	
	Nurse	11 (15.9)	117 (27.1)	128 (25.6)	1.0
	Technician	14 (20.3)	75 (17.4)	89 (17.8)	
Academic title	Absent	51 (73.9)	365 (84.7)	416 (83.2)	1.0
	Present	18 (26.1)	66 (15.3)	84 (16.8)	
Family history of psychiatric disorders	Absent	63 (91.3)	371 (86.1)	434 (86.8)	1.0
	Present	6 (8.9)	60 (13.9)	66 (13.2)	
History of psychiatric diagnosis	Absent	65 (94.2)	391 (90.7)	456 (91.2)	1.0
	Present	4 (5.8)	40 (9.3)	44 (8.8)	
Painful experience before the earthquake	Absent	49 (71)	281 (65.2)	330 (66)	1.0
	Present	20 (29)	150 (34.8)	170 (34)	
Physical injury to self or family in the earthquake	Absent	66 (95.7)	362 (84)	428 (85.6)	**0.010**
	Present	3 (4.3)	69 (16)	72 (14.4)	
Colleague physically affected by the earthquake in the same unit	Absent	46 (66.7)	218 (50.6)[a]	264 (52.8)	**0.014**
	Present	23 (33.3)	213 (49.4)[a]	236 (47.2)	
Feeling the tremor of earthquake in the building you are in	Yes	50 (72.5)	378(87.7)[a]	428(85.6)	**0.036**
	No	19 (27.5)	53 (12.3)[a]	72 (14.4)	

a: It shows a difference compared to the group with PSQI<5.

The PSQI score was significantly higher in the 35-45 and over-45 age groups (p=0.010). Participants who experienced physical injury to themselves or their family members during the earthquake had higher PSQI scores, and this was statistically significant (p=0.010). Similarly, participants whose colleagues in the same unit were physically injured during the earthquake had higher PSQI scores, which was also statistically significant (p=0.014). Additionally, participants who felt the shaking in the building they were in during the earthquake had higher PSQI scores, a difference that was statistically significant (p=0.036) (Table 1).

Female participants had significantly higher CES-D scores compared to male participants (p=0.007). CES-D scores were also higher among participants with a family history of psychiatric illness and among those with a personal history of psychiatric illness, both of which were statistically significant (p=0.0012 and p=0.007, respectively). Participants who sustained physical injuries themselves or had family members who were injured had higher CES-D

Table 2. The relationship between participants' demographic, occupational, medical characteristics and earthquake experiences and CES-D score

		CES-D n(%)			
		<16	**≥16**	**Total**	**P**
Age	<35	150 (63.3)	162 (61.6)	312 (62.4)	
	35-45	56 (23.6)	76 (28.9)	132 (26.4)	1.0
	>45	31(13.1)	25 (9.5)	56 (11.2)	
Gender	Male	140 (59.1)	123 (46.8)[a]	263 (52.6)	**0.007**
	Female	97 (40.9)	140 (53.2)[a]	237 (47.4)	
Level of Education	High School	12 (5.1)	4 (1.5)	16 (3.2)	
	Associate degree	19 (8)	24 (9.1)	43 (8.6)	1.0
	Bachelor's degree	113 (47.7)	130 (49.4)	243 (48.6)	
	Master's degree	93 (39.2)	105 (39.9)	198 (39.6)	
Number of years in practice	0-5	75 (31.6)	94 (35.7)	169 (33.8)	
	5-10	52 (21.9)	72 (27.4)	124 (24.8)	1.0
	10-20	73(30.8)	64 (24.3)	137 (27.4)	
	>20	37 (15.6)	33 (12.5)	70 (14)	
Professional title	Physician	126 (53.2)	157 (59.7)	283 (56.6)	
	Nurse	68 (28.7)	60 (22.8)	128 (25.6)	1.0
	Technician	43 (18.2)	46 (17.5)	89 (17.8)	
Academic title	Absent	193 (81.4)	223 (84.8)	416 (83.2)	1.0
	Present	44 (18.6)	40 (15.2)	84 (16.8)	
Family history of psychiatric disorders	Absent	220 (92.8)	214 (81.4)[a]	434 (86.8)	**0.0012**
	Present	17 (7.2)	49 (18.6)[a]	66 (13.2)	
History of psychiatric diagnosis	Absent	225 (94.9)	231 (87.8)[a]	456 (91.2)	**0.007**
	Present	12 (5.1)	32 (12.2)[a]	44 (8.8)	
Painful experience before the earthquake	Absent	163 (68.8)	167 (63.5)	330 (66)	1.0
	Present	74 (31.2)	96 (36.5)	170 (34)	
Physical injury to self or family in the earthquake	Absent	219 (92.4)	209 (79.5)[a]	428 (85.6)	**0.0012**
	Present	18 (7.6)	54 (20.5)[a]	72 (14.4)	
Colleague physically affected by the earthquake in the same unit	Absent	132 (55.7)	132 (50.2)	264 (52.8)	1.0
	Present	105 (44.3)	131 (49.8)	236 (47.2)	
Feeling the tremor of earthquake in the building you are in	Yes	200 (84.4)	228 (86.7)	428 (85.6)	1.0
	No	37 (15.6)	35 (13.3)	72 (14.4)	

a: It shows a difference compared to the group with CES-D<16.

Table 3. The relationship between demographic, occupational, medical characteristics and earthquake experiences of the participants and CAPS score

		CAPS n (%)			
		<47	**≥47**	**Total**	**P**
Age	<35	243 (62)	69 (63.9)	312 (62.4)	1.0
	35-45	102 (26)	30 (27.8)	132 (26.4)	
	>45	47 (12)	9 (8.3)	56 (11.2)	
Gender	Male	213 (54.3)	50 (46.3)	263 (52.6)	1.0
	Female	179 (45.7)	58 (53.7)	237 (47.4)	
Level of Education	High School	15 (3.8)	1 (0.9)a	16 (3.2)	0.06
	Associate degree	28 (7.1)	15 (13.9)a	43 (8.6)	
	Bachelor's degree	182 (46.4)	61 (56.5)	243 (48.6)	
	Master's degree	167 (42.6)	31 (28.7)	198 (39.6)	
Number of years in practice	0-5	135 (34.4)	34 (31.5)	169 (33.8)	1.0
	5-10	96 (24.5)	28 (25.9)	124 (24.8)	
	10-20	110 (28.1)	27 (25)	137 (27.4)	
	>20	51 (13)	19 (17.6)	70 (14)	
Professional title	Physician	229 (58.4)	54 (50)[a]	283 (56.6)	**0.043**
	Nurse	102 (26)	26 (24.1)[a]	28 (25.6)	
	Technician	61 (15.6)	28 (25.9)[a]	89 (17.8)	
Academic title	Absent	321 (81.9)	95 (88)	416 (83.2)	1.0
	Present	71 (18.1)	13 (12)	84 (16.8)	
Family history of psychiatric disorders	Absent	342 (87.2)	92 (85.2)	434 (86.8)	1.0
	Present	50 (12.8)	16 (14.8)	66 (13.2)	
History of psychiatric diagnosis	Absent	359 (91.6)	97 (89.8)	456 (91.2)	1.0
	Present	33 (8.4)	11 (10.2)	44 (8.8)	
Painful experience before the earthquake	Absent	265 (67.6)	65 (60.2)	330 (66)	1.0
	Present	127 (32.4)	43 (39.8)	170 (34)	
Physical injury to self or family in the earthquake	Absent	346 (88.3)	82 (75.9)[a]	428 (85.6)	**0.0012**
	Present	46 (11.7)	26 (24.1)[a]	72 (14.4)	
Colleague physically affected by the earthquake in the same unit	Absent	224 (57.1)	40 (37)[a]	264 (52.8)	**0.0012**
	Present	168 (42.9)	68 (63)[a]	236 (47.2)	
Feeling the tremor of earthquake in the building you are in	Yes	327 (83.4)	101 (93.5)[a]	428 (85.6)	**0.008**
	No	65 (16.6)	7 (6.5)[a]	72 (14.4)	

a: It shows a difference compared to the group with CAPS<47.

Table 4. Correlation analysis demonstrating the relationship between the scores

Score	**PSQI**	**CES-D**	**CAPS**
PSQI	-	r=0.487, p< 0.0001	r=0.595, p< 0.0001
CES-D	r=0.487, p< 0.0001	-	r=0.625, p< 0.0001
CAPS	r=0.595, p< 0.0001	r=0.625, p< 0.0001	-

scores compared to those who did not, and this difference was statistically significant (p=0.0012) (Table 2).

Technicians had lower CAPS scores compared to nurses and physicians, and this was statistically significant (p=0.043). Participants who experienced physical injuries to themselves or their family members had higher CAPS scores, which was statistically significant (p=0.0012) (Table 3).

There was a positive, moderately statistically significant relationship between the PSQI score and CES-D score (r=0.487, p<0.0001), the PSQI score and CAPS score (r=0.595, p<0.0001), and the CAPS score and CES-D score (r=0.625, p<0.0001) (Table 4).

DISCUSSION

In our study, PSQI, CES-D, and CAPS scores were found to be positively and moderately correlated with each other. It can be concluded that 86.2% of healthcare professionals who experienced a disaster such as an earthquake and participated in the care of disaster victims had impaired sleep quality, about half exhibited depressive symptoms, and approximately 1/4 had symptoms of post-traumatic stress disorder (PTSD).

Major disasters can lead to long-lasting psychiatric problems and sleep disturbances, persisting even years after the event. Studies investigating sleep disturbances after earthquakes have reported decreases in both sleep quality and duration among affected individuals (Tang et al., 2018; Iwadare et al., 2014). In the literature, the prevalence of sleep disturbances after major disasters has been reported to range between 35-50% (Shannon et al., 1994; Brown et al., 2011). However, in our study, the overall rate of sleep disturbance was found to be 86.2%. We believe this higher rate may be due to the fact that our study focused on healthcare professionals who were directly involved in the earthquake response and witnessed the trauma up close

In a study conducted with victims residing in temporary shelters after the Wenchuan earthquake in China, it was reported that 83.2% of the participants experienced sleep problems, with 79.33% identifying insomnia as the most significant issue. This study found that the rate of sleep disorders was higher among participants aged 26-50 years compared to those aged 19-25 years (Jiang et al., 2016). In line with this literature, our study also found that the PSQI score was higher in the older age group.

Concrete experiences of disaster can increase the risk of psychological effects in individuals. A study utilizing nine-year data from elderly survivors of the Great Japan earthquake and tsunami reported that participants with tangible losses-such as major housing damage, loss of relatives, economic loss, and job loss-had a higher prevalence of sleep disorders and PTSD (Yazawa et al., 2023). In our study, higher PTSD and PSQI scores were observed in participants who had physical injuries among their family or relatives, who witnessed colleagues being physically affected, and who felt the tremor.

In a study investigating sleep disorders and stress levels of people after the earthquake, it was reported that stress levels were positively correlated with sleep disorders. This result is important because stress can trigger many negative metabolic and psychological events in the body (Lugovic-Mihic et al., 2021). However, sleep disturbances are symptoms of PTSD and epiphenomena of anxiety disorders and depression. In other words, sleep disturbances can predict the onset and treatment response of depression and PTSD (Betts et al. 2013). In our study, a positive correlation was found between PSQI scores and both CAPS and CES-D scores. This suggests that the rate of depressive symptoms and PTSD also increases in individuals experiencing sleep disturbances. We believe this finding may be significant for the early detection of more serious psychiatric issues, such as depression and PTSD, in individuals following a disaster.

In the literature, the prevalence of depressive symptoms among healthcare professionals after an earthquake has been reported to range from 16.7% to 27.1% (Matsuoka et al., 2012; Zhen et al., 2012). In a study evaluating depressive symptoms in medical students following the earthquake in Zagreb, 65.2% of the participants were reported to have depressive symptoms at varying levels (mild, moderate, severe) (Romic et al., 2021). In a study conducted among rescue workers following a plane accident, the incidence of depressive symptoms was found to be 16.4% in the 7th month and 21.7% in the 13th month, indicating an increase over time. In our study, however, the rate was significantly higher at 52.6%. This elevated rate of depressive symptoms may be related to the magnitude of the disaster. Additionally, since our study was conducted one year after the disaster, the high prevalence may reflect the extent of mental health issues caused by the event.

Previous research on post-disaster mental health has shown that women exhibit more depressive symptoms than men. Similarly, during the COVID-19 pandemic, studies reported a greater increase in mental health issues among women compared to men, which may be associated with higher stress sensitivity in women, among other factors (Czepiel et al., 2024; Penninx et al., 2022). In line with the literature, our study found that the rate of depressive symptoms was higher in women than in men.

Furthermore, it is well-known that a history of depression, particularly in first-degree relatives, is a risk factor

for depressive disorders (Chao, 2024). In our study, participants with a personal history of psychiatric diagnosis or a family history of psychiatric disorders exhibited a higher prevalence of post-disaster depressive symptoms.

According to a meta-analysis investigating the prevalence of PTSD in rescue workers after disasters, it was reported to be 30% among healthcare workers and 46% among volunteers (Mao et al., 2018). In a study conducted using a questionnaire for health professionals, the incidence of post-traumatic problems following the Nepal earthquake was reported to be 29%. These problems were found to be more common among social workers and psychotherapists, who have a closer relationship with victims, compared to physicians (Abdul-Hamid et al., 2021). Following the Yushu earthquake in China, the prevalence of PTSD in healthcare workers 8 months after the disaster was 21.8%, while our study found a similar rate of 21.6%. Additionally, in the same study, a higher rate of PTSD was observed in nurses compared to physicians (Kang et al., 2015). Our findings align with this, as we also found that the rate of PTSD symptoms was higher in doctors and nurses compared to technicians. This may be attributed to the closer involvement of doctors and nurses in patient care, as they witness the suffering of earthquake victims more directly.

The nature, severity, and repetition of traumatic events are also associated with the development of PTSD. Previous disaster experiences, high exposure to traumatic events, and involvement in rescue efforts have all been linked to the onset of PTSD (Berger et al., 2012). In our study, PTSD symptoms were more frequently observed in participants who experienced earthquake-related physical injuries to themselves, their families, or colleagues. Additionally, those who felt the tremor while in the building during the earthquake reported higher rates of PTSD symptoms. These findings suggest, in line with the literature, that the incidence of PTSD symptoms increases in individuals who experienced the disaster more severely, both physically and psychologically.

Studies in the literature indicate that as depressive symptoms increase in individuals, the rate of PTSD symptoms also rises. It has been reported that depressive symptoms are frequently observed in patients with PTSD, and a positive correlation exists between PTSD scores and depression scores (Ozen & Cerit, 2018). In a study conducted with ambulance personnel in Norway, a positive correlation was found between the severity of depression and anxiety and increasing PTSD scores (Reid et al., 2022). In our study, we also found a positive correlation between depression scores and PTSD scores, which is significant in confirming the relationship between mental health problems and PTSD.

CONCLUSION

The effects of disasters on mental health can persist for years. While much of the literature focuses on disaster victims, emergency professionals are among the groups most closely involved in post-disaster rescue and patient care. Our study revealed that after the physically devastating earthquake in Türkiye, emergency professionals were significantly affected in terms of mental health. Notably, sleep disturbances, depressive symptoms, and post-traumatic stress disorder symptoms were highly prevalent among participants, even more than a year after the earthquake.

LIMITATIONS

Our study was conducted using an online questionnaire, which raises the possibility of biased responses inherent in such studies. The participation of individuals who were more affected by the trauma or who were more sensitive to the trauma may have influenced the questionnaire results. As our study has a cross-sectional design, it cannot be expected to prove a causal relationship between the data. It is important to note that the scores examined in our study do not allow for a formal diagnosis; only score comparisons were made. Additionally, we could not compare the participants' scores for depression and sleep quality from the pre-earthquake period. Furthermore, since the study was conducted one year after the disaster, we must consider the potential influence of psychiatric support that participants may have received during that time.

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