

# Prevalence of probable post-traumatic stress disorder among survivors of the 2023 earthquakes in Türkiye

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## Abstract

**Background:** Post-traumatic stress disorder (PTSD) is one of the most prevalent conditions following a devastating earthquake or disaster.

**Aim:** To explore the prevalence of probable PTSD and its risk factors among earthquake survivors in Türkiye.

**Methods:** This cross-sectional study examined 1100 survivors, aged  $\geq 18$  years, in 11 provinces of Türkiye affected by the 2 June 2023 earthquakes. We collected the data 5 months after the earthquakes and measured PTSD using the PTSD checklist for the diagnostic and statistical manual of mental disorders fifth edition (DSM-5), the Connor-Davidson resilience scale, and multidimensional scale of perceived social support. We analysed the data using SPSS version 28.

**Results:** The earthquake survivors were aged 18–89 years, mean age 35.59 years, and more than half of them were female (58.8%). Prevalence of probable PTSD was 55.2%. Multiple logistic regression analysis revealed that prevalence of probable PTSD was predicted by female gender, current smoking, sleep disturbance, chronic disease, being trapped under the rubble, loss of a first-degree relative, post-earthquake sheltering in a tent or container or someone else's house, high post-earthquake anxiety, and low socioeconomic status. Survivors with high psychological resilience had lower probable PTSD prevalence.

**Conclusion:** Prevalence of PTSD was high among our participants and psychological resilience seemed to be a mitigating factor for PTSD. There is therefore a need to focus on improving psychological resilience among earthquake survivors to prevent or minimise PTSD.

Keywords: Türkiye, earthquake, post-traumatic stress disorder, psychological resilience, perceived social support

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## Introduction

Disasters are major public health emergencies with detrimental physical, sociological, ecological, psychological and financial consequences, and earthquakes are among the most serious types of disasters. On 6 February 2023, Türkiye faced a devastating earthquake centered in Pazarçık and Elbistan (Kahramanmaraş), with magnitudes of Mw7.7 and Mw7.6. It affected 11 provinces over 108 812 km<sup>2</sup>, resulting in > 50 000 deaths, > 100 000 injuries and collapse of > 37 000 buildings (1).

Post-traumatic stress disorder (PTSD) is a common psychological disorder after earthquakes (2). Risk factors for PTSD include loss of life and property, injury, female gender, low socioeconomic status, being trapped, and fear (2,3). Protective factors are psychological resilience and strong social support (4). The American Psychological Association defines resilience as the process and outcome of adapting to demands through mental, emotional, and behavioural flexibility (5). Psychological resilience is defined as a protective mechanism against traumatic life events (6). Therefore, improved psychological resilience can alleviate severity of PTSD (5).

PTSD prevalence was high among Turkish earthquake survivors due to the extensive area affected. With

survivors sheltering in tents or containers, studying the impact of psychological resilience and social support on PTSD is essential. These factors need to be viewed in a broader context. Understanding the underlying causes, such as factors influencing individual responses to earthquakes, is crucial. Elements such as sociodemographic factors, social resilience, coping skills and economic development indirectly protect against PTSD by affecting community preparedness, response and resilience (7,8). This study examined the prevalence of probable PTSD, associated sociodemographic risk factors, and the effects of psychological resilience and perceived social support on PTSD among earthquake survivors in Türkiye.

## Methods

### Study design

This cross-sectional study involved voluntary participants aged  $\geq 18$  years who were affected by the earthquakes. We used purposive sampling. The minimum sample size was calculated to be 768 at a frequency of 50%, 5% margin of error and design effect of 2. WHO recommends that the design effect should be > 1.50 for studies conducted with complex sampling designs. Setting the design effect at 2

reflected a cautious approach to account for the increased variance arising from complex sampling designs and to ensure the reliability and validity of the survey results (9). We included data from individuals affected by the earthquakes residing in 11 different provinces, and this increased the complexity of the sampling design. A design effect of 2 aimed to maximize the accuracy of estimates and consider the increased variance introduced by complex sampling designs.

### **Inclusion and exclusion criteria**

Inclusion criteria were age  $\geq 18$  years and being exposed to earthquakes on 2 June 2023 in 11 provinces of Türkiye. Exclusion criteria were age  $< 18$  years and being incapable of expressing oneself in writing or orally.

### **Ethics approval**

The Clinical Research Ethics Committee of the Faculty of Medicine of Suleyman Demirel University granted ethics approval.

### **Data collection**

We began data collection 5 months after the earthquakes after obtaining permission from the corresponding authors to use their instruments adapted for the Turkish context and informed consent from the participants. Survey and scale questions were administered via a Google Forms link distributed through mobile phones, email and social media to participants in earthquake-affected areas and those who relocated to other provinces. Residents from the 11 affected provinces staying in student dormitories were approached in person and provided with the link to complete the survey on their phones. They were also asked to share the link with other earthquake survivors. To ensure unbiased responses, participants completed the survey themselves. Thus, a mixed-method approach combining snowball sampling and face-to-face interviews was used to reach a broader participant spectrum. We used the original scoring systems of the instruments in this study. We collected the data using: a form covering questions about the participants' sociodemographic, health-related and earthquake-related characteristics; PTSD Checklist for the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) (PCL-5); Connor-Davidson Resilience Scale (CD-RISC); and Multidimensional Scale of Perceived Social Support (MSPSS). We analysed the data using SPSS software.

### **PTSD Checklist for the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition**

The 20-item PCL-5 was designed by Weathers et al. (10) and adapted for the Turkish context by Boysan et al. (11). Respondents were asked to rate the severity of each symptom from 0 (not at all) to 4 (extremely), and the total symptom severity score (0–80) was obtained by summing the scores for each item. A tentative diagnosis of PTSD was confirmed, with each item rated  $\geq 2$  (moderately). A

PCL-5 cutoff score of 31–33 indicates PTSD, which may vary by population (10). Boysan et al. recommend a cutoff of  $\geq 47$  for diagnosis of PTSD with a sensitivity of 0.76 and specificity of 0.69 (11).

### **Connor-Davidson resilience scale**

The 25-item CD-RISC was developed by Connor and Davidson (12) and adapted into Turkish by Karairmak. In the adaptation study, the internal consistency coefficient of the scale was reported as 0.92. Items in CD-RISC were rated on a 5-point Likert-type scale, with scores ranging from 0 to 100. Higher scores indicate increased resilience (13).

### **Multidimensional Scale of Perceived Social Support**

Zimet et al. (14) designed the 12-item MSPSS, and Eker and Arkar adapted it into Turkish (15). Eker et al. revised the Turkish version in 2001. One may obtain a score of 12–84 points on the 7-point Likert-type scale. The internal consistency reliability of the scale was previously reported to be 0.80–0.95. Higher scores imply higher PSS (16).

### **Statistical analysis**

Nominal and ordinal data were reported as frequencies and percentages, and numerical variables were presented as means and standard deviations. We determined the prevalence of probable PTSD in relation to the cutoff of 47. A  $\chi^2$  test was performed to analyse the effects of nominal and ordinal independent variables on the dependent variable. The Kolmogorov–Smirnov test confirmed that the data were normally distributed. We performed an independent samples t test to explore our dependent variable using the numerical independent variables. Binary logistic regression was performed to reveal the combined effect of all factors on the dependent variable. We performed all analyses on SPSS version 28.0 and considered  $P \leq 0.05$  statistically significant.

## **Results**

This study included 1100 participants (58.8% female, mean age 35.59 years, range 18–89 years) in 11 earthquake-affected provinces in Türkiye (Table 1). About 70% had completed high school or higher education, and 47.7% were married. Only 33.0% were employed and 35% reported their socioeconomic status as low or very low. The prevalence of smoking and alcohol consumption was 35.1% and 16.7%, respectively. We discovered a chronic disease in 21.9%, disability in 3.3%, and mostly irregular sleep in 31.8%. The prevalence of probable PTSD was 55.2%. Univariate analyses showed higher probable PTSD among females, smokers and alcohol consumers, those suffering chronic disease and sleep disturbances, and those with low socioeconomic status. We also discovered higher probable PTSD among participants living in Hatay, Malatya and Kahramanmaraş during the earthquakes.

Before the earthquakes, 25.9% of the participants experienced a deeply affecting event (Table 2). During

**Table 1. Participants' characteristics and their effects on prevalence of probable post-traumatic stress disorder**

|                               | Frequency | %    | Prevalence of probable post-traumatic stress disorder (%) | P      |
|-------------------------------|-----------|------|---|--------|
| <b>Gender</b>                 |           |      |   |        |
| Female                        | 647       | 58.8 | 386 (59.7)  | <0.001 |
| Male                          | 453       | 41.2 | 221 (48.8)  |        |
| <b>Educational attainment</b> |           |      |   |        |
| Primary school and below      | 223       | 20.3 | 129 (57.8)  | 0.818  |
| Middle school                 | 99        | 9.0  | 54 (54.5)   |        |
| High school                   | 388       | 35.3 | 209 (53.9)  |        |
| Higher education              | 390       | 35.5 | 215 (55.1)  |        |
| <b>Marital status</b>         |           |      |   |        |
| Single                        | 507       | 46.1 | 261 (51.5)  | 0.070  |
| Married                       | 525       | 47.7 | 305 (58.1)  |        |
| Divorced-widowed              | 68        | 6.2  | 41 (60.3)   |        |
| <b>Place of residence</b>     |           |      |   |        |
| Hatay                         | 487       | 44.3 | 309 (63.4)  | <0.001 |
| Kahramanmaras                 | 171       | 15.5 | 91 (53.2)   |        |
| Malatya                       | 129       | 11.7 | 77 (59.7)   |        |
| Adana                         | 104       | 9.5  | 39 (37.5)   |        |
| Gaziantep                     | 69        | 6.3  | 31 (44.9)   |        |
| Other                         | 140       | 12.7 | 60 (42.9)   |        |
| <b>Employment status</b>      |           |      |   |        |
| Employed                      | 363       | 33.0 | 186 (51.2)  | 0.060  |
| Unemployed                    | 619       | 56.3 | 361 (58.3)  |        |
| Retired                       | 118       | 10.7 | 60 (50.8)   |        |
| <b>Socioeconomic status</b>   |           |      |   |        |
| Very low                      | 146       | 13.3 | 113 (77.4)  | <0.001 |
| Low                           | 239       | 21.7 | 160 (66.9)  |        |
| Middle                        | 605       | 55.0 | 287 (47.4)  |        |
| High/very high                | 110       | 10.0 | 47 (42.7)   |        |
| <b>Smoking</b>                |           |      |   |        |
| Yes                           | 386       | 35.1 | 243 (63.0)  | <0.001 |
| Quitted                       | 137       | 12.5 | 83 (60.6)   |        |
| Never                         | 577       | 52.5 | 281 (48.7)  |        |
| <b>Alcohol use</b>            |           |      |   |        |
| Yes                           | 184       | 16.7 | 116 (63.0)  | 0.019  |
| No                            | 916       | 83.3 | 491 (53.6)  |        |
| <b>Sleep status</b>           |           |      |   |        |
| Regular                       | 206       | 18.7 | 70 (34.0)   | <0.001 |
| Sometimes irregular           | 544       | 49.5 | 296 (54.4)  |        |
| Mostly irregular              | 350       | 31.8 | 241 (68.9)  |        |
| <b>Chronic disease</b>        |           |      |   |        |
| Yes                           | 241       | 21.9 | 162 (67.2)  | <0.001 |
| No                            | 859       | 78.1 | 445 (51.8)  |        |
| <b>Disability</b>             |           |      |   |        |
| Yes                           | 36        | 3.3  | 20 (55.6)   | 0.963  |
| No                            | 1064      | 96.7 | 587 (55.2)  |        |

**Table 2. Earthquake-related variables and their effects on prevalence of probable post-traumatic stress disorder**

|  | Frequency   | %            | Prevalence of probable PTSD (%) | P      |
|--|-------------|--------------|---------------------------------|--------|
| <b>Pre-earthquake deeply-affecting event</b>                     |             |              |                                 |        |
| Yes  | 285         | 25.9         | 184 (64.6)                      | <0.001 |
| No   | 815         | 74.1         | 423 (51.9)                      |        |
| <b>Were you trapped under rubble in any of the earthquakes?</b>  |             |              |                                 |        |
| Yes  | 53          | 4.8          | 44 (83.0)                       | <0.001 |
| No   | 1047        | 95.2         | 563 (53.8)                      |        |
| <b>Loss of a first-degree relative in any of the earthquakes</b> |             |              |                                 |        |
| Yes  | 91          | 8.3          | 70 (76.9)                       | <0.001 |
| No   | 1009        | 91.7         | 537 (53.2)                      |        |
| <b>What did you do during any of the earthquakes?earthquakes</b> |             |              |                                 |        |
| Drop, cover, and hold on   | 471         | 42.8         | 246 (52.2)                      | 0.194  |
| I froze  | 135         | 12.3         | 74 (54.8)                       |        |
| I tried to push myself out                                       | 484         | 44.0         | 283 (58.5)                      |        |
| I was outside  | 10          | 0.9          | 4 (40.0)                        |        |
| <b>Property damage</b>   |             |              |                                 |        |
| Heavily damaged  | 339         | 30.8         | 251 (74.0)                      | <0.001 |
| Moderately damaged   | 191         | 17.4         | 92 (48.2)                       |        |
| Slightly damaged   | 395         | 35.9         | 190 (48.1)                      |        |
| Undamaged  | 175         | 15.9         | 74 (42.3)                       |        |
| <b>Current shelter</b>   |             |              |                                 |        |
| Tent/container   | 186         | 16.9         | 152 (81.7)                      | <0.001 |
| Dormitory  | 355         | 32.3         | 194 (54.6)                      |        |
| Someone else's house   | 130         | 11.8         | 80 (61.5)                       |        |
| Own house  | 429         | 39.0         | 181 (42.2)                      |        |
| <b>Health-related conditions in the current shelter</b>          |             |              |                                 |        |
| Very bad   | 63          | 5.7          | 52 (82.5)                       | <0.001 |
| Bad  | 102         | 9.3          | 76 (74.5)                       |        |
| Moderate   | 458         | 41.6         | 250 (54.6)                      |        |
| Good   | 364         | 33.1         | 179 (49.2)                      |        |
| Very good  | 113         | 10.3         | 50 (44.2)                       |        |
| <b>Pre-earthquake anxiety</b>                                    |             |              |                                 |        |
| Yes  | 697         | 63.4         | 395 (56.7)                      | 0.191  |
| No   | 403         | 36.6         | 212 (52.6)                      |        |
| <b>Post-earthquake anxiety</b>                                   |             |              |                                 |        |
| Yes  | 958         | 87.1         | 571 (59.6)                      | <0.001 |
| No   | 142         | 12.9         | 36 (25.4)                       |        |
| <b>Total</b>   | <b>1100</b> | <b>100.0</b> | <b>607 (55.2)</b>               |        |

the earthquakes, 4.9% of participants were trapped under rubble and 8.3% lost at least 1 first-degree relative. The siblings of 43 participants, mothers of 18, fathers of 18, spouses of 17 and children of 11 lost their lives. The residential properties of 30.8% of earthquake survivors were heavily damaged. When asked, "What did you do during any of the earthquakes?", 42.8% responded "drop, cover, and hold on". Before the earthquakes, anxiety was 63.4% and this increased to 87.1% after the earthquakes. Participants sheltered in their own home (39.0%), tent/container (16.9%), student dormitory (32.3%), or someone

else's home with rent or assistance (11.8%), and 15.0% described their post-earthquake shelter as bad or very bad.

The univariate analyses revealed that losing a first-degree relative, being trapped under rubble, sheltering in a bad/very bad post-earthquake environment or a tent/ container, experiencing a deeply affecting event before the earthquakes, and post-earthquake anxiety contributed to the prevalence of probable PTSD.

Age was similar between the participants with and without probable PTSD, and psychological resilience and

perceived social support were significantly lower in the former group ( $P < 0.05$ ) (Table 3).

Multiple logistic regression analysis showed that the prevalence of probable PTSD was predicted by female gender; current smoking; sleep disturbance; chronic disease; being trapped under rubble; loss of a first-degree relative; post-earthquake sheltering in a tent/container or someone else's house; high post-earthquake anxiety; and low socioeconomic status (Table 4). An increase in psychological resilience decreased the prevalence of probable PTSD.

## Discussion

We showed a 55.2% prevalence of probable PTSD among survivors of the 2023 earthquakes in Türkiye. A previous meta-analysis of earthquake survivors reported that the point effect estimate of PTSD was 15% in Asia, Europe and America (17), 28.4% of survivors in Haiti exhibited PTSD (18), and the pooled prevalence of PTSD was 55.6% in the Islamic Republic of Iran and Pakistan (19). Other studies

on post-earthquake PTSD have revealed a prevalence of 15.0–62.8% (20–28). A study conducted 3 years after the 1999 earthquake in Türkiye estimated PTSD prevalence of 40.0% (27), and the estimated prevalence of PTSD among survivors after the 2011 Van earthquake in Türkiye was 21.6% (28). The probable prevalence of PTSD identified in our study is higher than in other studies. This higher prevalence may be due to the extensive destruction and broad impact of the earthquakes, which affected multiple regions. Variations in PTSD prevalence among studies is likely due to the different measurement techniques, disaster exposure levels, sampling methods, timing, and community support systems. This highlights the importance of methodological considerations in post-disaster evaluations.

Major disasters disrupt normal living conditions and challenge community adaptation (21). Regional disaster perception, social cohesion, support systems, societal transformation, cultural beliefs, and rituals have a significant impact on mental health. Community responses and adaptation may influence PTSD

**Table 3. Age, psychological resilience and perceived social support in earthquake survivors with or without post-traumatic stress disorder**

|                          | Mean (SD)     | Probable PTSD Mean (SD) | No probable PTSD Mean (SD) | P      |
|--------------------------|---------------|-------------------------|----------------------------|--------|
| Age                      | 35.59 (16.26) | 35.78 (16.16)           | 35.36 (16.40)              | 0.669  |
| Psychological resilience | 54.51 (20.96) | 50.76 (23.35)           | 59.12 (16.46)              | <0.001 |
| Perceived social support | 50.21 (21.48) | 48.17 (23.04)           | 52.73 (19.11)              | <0.001 |

**Table 4. Multiple binary logistic analysis of variables predicting post-traumatic stress disorder (backward logistic regression analysis)**

|                                 | OR    | 95% CI for EXP(B) |       | P      |
|---------------------------------|-------|-------------------|-------|--------|
|                                 |       | Lower             | Upper |        |
| Psychological resilience ↑      | 0.985 | 0.978             | 0.992 | <0.001 |
| Gender (male: ref, female)      | 2.247 | 1.655             | 3.050 | <0.001 |
| <b>Smoking</b>                  |       |                   |       |        |
| Never (ref)                     | –     | –                 | –     | –      |
| Quitted                         | 1.504 | 0.936             | 2.417 | 0.092  |
| Currently smoking               | 1.711 | 1.248             | 2.346 | <0.001 |
| Sleep disturbances ↑            | 1.588 | 1.295             | 1.947 | <0.001 |
| Chronic disease                 | 1.920 | 1.361             | 2.708 | <0.001 |
| Being trapped under rubble      | 2.111 | 0.928             | 4.804 | 0.075  |
| Loss of a first-degree relative | 1.916 | 1.066             | 3.446 | 0.030  |
| <b>Current shelter</b>          |       |                   |       |        |
| Own house (ref)                 | –     | –                 | –     | –      |
| Tent/container                  | 4.623 | 2.895             | 7.385 | <0.001 |
| Dormitory                       | 1.208 | 0.873             | 1.671 | 0.255  |
| Someone else's house            | 1.922 | 1.242             | 2.975 | 0.003  |
| Post-earthquake future anxiety  | 2.648 | 1.712             | 4.097 | <0.001 |
| Socioeconomic status ↓          | 1.392 | 1.166             | 1.662 | <0.001 |

Model analysis of variance  $P < 0.001$ ;  $\chi^2$  log-likelihood: 1227.137; Cox & Snell  $R^2 = 0.229$ ; Nagelkerke  $R^2 = 0.306$ ; Hosmer and Lemeshow test:  $P = 0.964$  ( $\chi^2 = 2.448$ ); CI = confidence interval; OR = odds ratio

prevalence. Understanding these factors can deepen insights into sociocultural dynamics and PTSD rates after disasters (29). In our study, participants were asked whether they experienced a deeply affecting event before the earthquakes, but it did not have a significant effect on the prevalence of probable PTSD.

We discovered that increased psychological resilience alleviated probable PTSD among our participants. A previous longitudinal study also suggested a negative relationship between PTSD symptoms and resilience after natural disasters (30). After the 2007 earthquake in Peru, lower PTSD symptoms were reported among people with higher levels of resilience (24). Differences in disaster responses, stress-coping attitudes and emotional regulation among individuals are key factors that affect disaster outcomes. Coping with and psychological resilience against stressors are important factors that mediate disaster outcomes (31). People with adaptive and positive coping mechanisms against detrimental events are thought to be more resilient to PTSD.

The prevalence of probable PTSD decreased as perceived social support increased in our univariate analysis, but we could not confirm this in the multiple regression analysis. A previous meta-analysis linked poor perceived social support with increased PTSD (32), but another longitudinal study found an inverse association between PTSD and perceived social support after natural disasters (30). One study concluded that the protective effect of perceived social support on the mental health of survivors of the Wenchuan earthquake was no longer present 10 years after the disaster (33). This implies that while the protective effect of perceived social support is visible during the early stages post-earthquake, it may diminish in the long term. Perceived social support among survivors of the 2017 Jiuzhaigou earthquake was positively associated with PTSD, indicating that coming together of survivors could remind them of earthquake-related traumatic events (20). The differences between these findings may be attributed to the sociocultural characteristics of the communities experiencing disasters and the data collection periods.

We found that the prevalence of probable PTSD was twice as high among female earthquake survivors. Similarly, a meta-analysis after the Iranian and Pakistani earthquakes detected a higher rate of PTSD among women (19), and an Ethiopian meta-analysis suggested female gender as a risk factor for PTSD (32). In another meta-analysis, the prevalence of PTSD was higher among females after the 2010 Haitian earthquake (18). Therefore, our findings agree with previous results. In general, women are considered a vulnerable group in disasters because their natural emotional responses to stress, hormonal activities and low stress tolerance may increase their susceptibility to PTSD (32). Sociocultural variables and women's social status are also factors that affect their vulnerability to probable PTSD.

Our results indicated an increased prevalence of probable PTSD among earthquake survivors with low socioeconomic status. In a meta-analysis, poor

socioeconomic status was linked with permanent psychological problems (17). In another study, high socioeconomic status was associated with fewer PTSD symptoms after natural disasters (30). The literature has several studies indicating a higher prevalence of PTSD among unemployed and low-income individuals (22–24,33). Thus, our results seem consistent with previous findings. Maybe people with poor economic conditions do not experience rapid post-earthquake physical and psychological recovery because they may have suffered more earthquake-related harm and had more adverse post-earthquake living conditions and difficulties accessing basic needs.

Our findings showed that the prevalence of probable PTSD was higher among current smokers. A previous study reported that smoking increased the prevalence of PTSD among survivors of the 2007 Peruvian earthquake (24). A meta-analysis also indicated that people with PTSD often have high levels of nicotine intake, which contributes to a negative outcome (34). Another meta-analysis noted that individuals with PTSD are more likely to be current smokers compared to those without PTSD (35). Thus, our findings agree with previous research. Smoking may be considered in 2 ways as pre- and post-traumatic smoking, and, like many unhealthy behaviours, smokers may believe the fallacy that they will feel better after smoking following a traumatic event (35). Although we did not inquire about the onset of smoking, our study showed that current smoking was a risk factor for probable PTSD.

In this study, we found that the prevalence of probable PTSD increased among earthquake survivors as sleep patterns were disturbed. Research conducted after the 2007 Peruvian earthquake showed that severe insomnia contributed to the prevalence of PTSD (24). In Türkiye, most survivors were asleep when the first earthquake occurred at 04:17 hours. The magnitude of the earthquakes and the many aftershocks was high. These factors may have led to concerns that another major earthquake may occur, which may have affected sleep quality and been more intensely felt by those with probable PTSD.

Our findings showed that the prevalence of probable PTSD was higher among participants with a chronic disease. A case-control study reported a significant correlation between having a chronic disease and long-term PTSD after the Wenchuan earthquake in China (33). We consider that people with a chronic disease may have difficulty managing their condition and accessing healthcare services, and they are likely to become more emotionally susceptible, which puts them at risk for probable PTSD.

We found that the prevalence of probable PTSD was higher among people who lost a first-degree relative during the earthquake, as reported after the 2008 Wenchuan earthquake in China (26,33), and 2011 Van earthquake in Türkiye (28). After these disasters, many people lost their immediate relatives and were deprived of all their support systems, which may have made them physically, emotionally and socially susceptible to PTSD.

Our univariate analysis showed that the prevalence of probable PTSD was significantly higher among people whose houses were heavily damaged, but this was not confirmed by multiple regression analysis. Sheltering in a tent or container or at someone else's house was identified as an important risk factor for probable PTSD. In a systematic review and meta-analysis, the level of exposure to a traumatic event was a significant predictor of PTSD (18). It is known that permanent post-disaster property damage contributes to the prevalence of PTSD (17); and relocation of survivors to other regions increases their susceptibility to psychological disorders. Temporary post-disaster sheltering, evacuation and disruption of service provision increase psychological problems, including PTSD (17). PTSD is likely to be lower among those who can continue to live in their own accommodation or maintain a relatively orderly life (e.g. living in a dormitory) after an earthquake and conveniently satisfy their basic needs. In contrast, living in an environment that makes it difficult to meet basic needs can cause feelings of hopelessness, unhappiness and anxiety, and increase the risk of PTSD.

In this study, we found that pre-earthquake anxiety did not affect PTSD but post-earthquake anxiety had a significant impact. The inability to resume normal life immediately after the earthquake, the need to relocate, loss of livelihood and relatives, and uncertainty, especially among psychologically vulnerable groups, all contribute to anxiety, which is also a risk factor for PTSD.

Our study had some limitations. The cross-sectional design prevented the establishment of causality. PTSD was assessed using the self-reporting PCL-5, leading to

probable rather than definitive diagnosis. This limitation may have introduced bias. Future research could use longitudinal designs and formal clinical diagnosis. We excluded participants aged < 18 years to avoid reactivating traumatic memories. This study excelled by combining snowball sampling with direct data collection in student dormitories and distributing the survey link via mobile phones, potentially enhancing representativeness. Higher participation in the most affected provinces, such as Hatay and Kahramanmaraş, improved this. This pioneering study evaluated PTSD prevalence and its risk factors among survivors of the Türkiye earthquakes of 2 June 2023, and compared them with previous events.

## Conclusion

The prevalence of probable PTSD was 55.2% among survivors of the earthquakes that affected 11 provinces in Türkiye in 2023. Predictors of probable PTSD were female gender, current smoking, sleep disorder, chronic disease, loss of a first-degree relative, post-earthquake sheltering in a tent/container or someone else's house, low socioeconomic status, post-earthquake anxiety, and low psychological resilience. Provision of counselling, enhancement of support networks and training in coping skills can help reduce PTSD risk and boost resilience among earthquake survivors. Additionally, addressing basic needs quickly, building permanent housing, supporting daily activities, and planning sociocultural events are crucial for readjustment to normal everyday life.

## Prévalence des troubles de stress post-traumatique probables chez les survivants des tremblements de terre de 2023 en Türkiye

### Résumé

**Contexte :** Les troubles de stress post-traumatique (TSPT) sont l'une des affections les plus répandues à la suite d'un tremblement de terre ou d'une catastrophe aux conséquences dévastatrices.

**Objectif :** Examiner la prévalence de TSPT probables et leurs facteurs de risque chez les survivants des tremblements de terre en Türkiye.

**Méthodes :** La présente étude transversale a porté sur 1100 survivants âgés de 18 ans et plus, résidant dans 11 provinces de Türkiye touchées par les tremblements de terre survenus le 2 juin 2023. Nous avons recueilli des données cinq mois après les tremblements de terre et évalué les TSPT à l'aide de la liste de contrôle relative à ces troubles parue dans le Manuel diagnostique et statistique des troubles mentaux, cinquième édition (DSM-5), ainsi que la Connor-Davidson Resilience scale [Échelle de résilience de Connor-Davidson] et l'Échelle multidimensionnelle de soutien social perçu. Les données ont été analysées à l'aide du logiciel SPSS version 28.

**Résultats :** Les survivants des tremblements de terre étaient âgés de 18 à 89 ans, l'âge moyen était de 35,59 ans, et plus de la moitié d'entre eux (58,8 %) étaient des femmes. La prévalence d'un état de stress post-traumatique probable était de 55,2 %. L'analyse de régression logistique multiple a révélé que la prévalence des TSPT était déterminée par le sexe féminin, le tabagisme au moment de l'étude, les troubles du sommeil, les maladies chroniques, le fait d'avoir été coincé sous les décombres, la perte d'un parent au premier degré, le fait d'avoir été abrité sous une tente ou dans un conteneur ou chez quelqu'un d'autre après les tremblements de terre, une forte anxiété après les séismes et un statut socio-économique faible. Les survivants ayant une forte résilience psychologique présentaient une prévalence plus faible de troubles de stress post-traumatique.

**Conclusion :** La prévalence desdits troubles était élevée parmi les participants et la résilience psychologique semblait être un facteur d'atténuation des TSPT. Il est donc nécessaire de mettre l'accent sur l'amélioration de la résilience psychologique des survivants des tremblements de terre afin de prévenir ou d'atténuer les troubles de stress post-traumatique.

## معدل انتشار اضطراب الكرب التالي للصدمة المرجح بين الناجين من زلازل عام 2023 في تركيا

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### الخلاصة

الخلفية: اضطراب الكرب التالي للصدمة (PTSD) واحد من أكثر الحالات انتشاراً عقب زلزال أو كارثة مدمرة.

الأهداف: هدفت هذه الدراسة إلى استقصاء مدى انتشار اضطراب الكرب التالي للصدمة المرجح وعوامل خطره بين الناجين من الزلازل في تركيا.

طرق البحث: تناولت هذه الدراسة المقطعية 1100 من الناجين البالغين من العمر 18 سنة أو أكثر، في 11 مقاطعة تركية تضررت من زلازل يوم 2 يونيو/ حزيران 2023. وقد جمعنا البيانات بعد مرور 5 أشهر على وقوع الزلازل، وقسنا اضطراب الكرب التالي للصدمة باستخدام "القائمة المرجعية لاضطراب الكرب التالي للصدمة" الواردة في الإصدار الخامس من الدليل التشخيصي والإحصائي للاضطرابات النفسية (DSM-5)، ومقياس كونور-ديفيدسون للقدرة على التحمل، والمقياس المتعدد الأبعاد للدعم المجتمعي للموس. وحللنا البيانات بالإصدار 28 من برنامج SPSS.

النتائج: تراوحت أعمار الناجين من الزلازل بين 18 و89 سنة، بعمُر وسطي بلغ 35.59 سنة، وكان أكثر من نصفهم من الإناث (58.8%). وقُدِّر معدل انتشار اضطراب الكرب التالي للصدمة المرجح بنسبة 55.2%. وكشف تحليل الانحدار اللوجستي المتعدد أن التنبؤ بمعدل انتشار اضطراب الكرب التالي للصدمة بُني على كون الحالة أنثى، أو مدخناً حالياً، أو مصاباً باضطرابات في النوم، أو مصاباً بأمراض مزمنة، أو علق تحت الأنقاض، أو فقد قريباً من الدرجة الأولى، أو لجأ بعد الزلزال إلى خيمة أو حاوية أو منزل شخص آخر، أو مصاباً بقلق مرتفع حيال المستقبل عقب الزلزال، أو من أصحاب المستوى الاجتماعي الاقتصادي المنخفض. ولوحظ أن الناجين ذوي قدرة التحمل النفسية العالية كان احتمال انتشار اضطراب الكرب التالي للصدمة بينهم أقل.

الاستنتاجات: كان معدل انتشار اضطراب الكرب التالي للصدمة مرتفعاً بين المشاركين في دراستنا، وتبين أن قدرة التحمل النفسية عامل مُخفِّف لاضطراب الكرب التالي للصدمة. ومن هنا تدعو الحاجة إلى التركيز على تحسين قدرة التحمل النفسية لدى الناجين من الزلازل للوقاية من اضطراب الكرب التالي للصدمة أو الحد من أثره قدر الإمكان.

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