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Predictors of post-traumatic stress in earthquake survivors: The roles of trauma exposure, dissociation, resilience, and coping

Mahmut Selcuk[1], Meltem Derya Sahin[1], Gunes Devrim Kicali[2], Ecem Saracoglu Erciyes[3], Oyku Ozcelik[4], Tuna Eker[5], Ezgi Ozdemir[6], Sinem Alti Keles[7]

[1]Muğla Sıtkı Koçman University, Faculty of Medicine, Department of Psychiatry, Muğla, Türkiye
[2]Muğla Training and Research Hospital, Department of Psychiatry, Muğla, Türkiye
[3]Marmaris State Hospital, Department of Psychiatry, Muğla, Türkiye
[4]Menteşe State Hospital, Department of Psychiatry, Muğla, Türkiye
[5]Soma State Hospital, Department of Psychiatry, Muğla, Türkiye
[6]Şile State Hospital, Department of Psychiatry, İstanbul, Türkiye
[7]Erzurum City Hospital, Department of Psychiatry, Erzurum, Türkiye

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Abstract

On February 6, 2023, two devastating earthquakes measuring 7.7 and 7.6 struck southeastern Türkiye, resulting in catastrophic destruction, over 50,000 deaths, and more than 115,000 injuries. Hatay province was among the most severely affected regions, and many survivors were displaced to other areas, including Muğla. This study aimed to examine sociodemographic, clinical, trauma-related, and psychosocial predictors of post-traumatic stress disorder (PTSD) among displaced survivors. A total of 290 adults (55% women) were assessed after relocation. PTSD diagnoses were determined using the Structured Clinical Interview for DSM-5 Disorders–Clinician Version (SCID-5/CV), based on the DSM-5 criteria, conducted between 1 and 6 months after the earthquake. Participants also completed standardized self-report instruments, including the PTSD Checklist-Civilian Version, the Depression, Anxiety, and Stress Scales (DASS-21), the Peritraumatic Dissociative Experiences Questionnaire (PDEQ), the Brief COPE, and the Brief Resilience Scale (BRS). Overall, 112 participants (38.6%) were diagnosed with PTSD. PTSD was more prevalent among women, unmarried individuals, those with lower levels of education, and participants with a psychiatric history or severe trauma exposure (e.g., injury, entrapment, bereavement, or forced displacement). Psychosocial correlates included elevated anxiety symptoms, dysfunctional coping, and higher peritraumatic dissociation, whereas resilience appeared protective. Multivariate analyses identified prior psychiatric history, permanent injury, bereavement, elevated PDEQ and anxiety scores, and dysfunctional coping strategies as independent predictors of PTSD. Notably, whether survivors were relocated by state assignment or voluntary choice did not affect prevalence. These findings underscore key psychological risk factors following large-scale disasters and may inform the development of early psychosocial interventions for displaced populations.

Keywords: Post-traumatic stress disorder, earthquake survivors, peritraumatic dissociation, coping strategies, psychological resilience

Introduction

Natural disasters such as earthquakes can lead to a wide range of psychiatric consequences, including acute stress reactions, depression, anxiety, bereavement-related distress, and post-traumatic symptoms [1,2]. The suddenness, unpredictability, and large-scale destruction associated with major earthquakes often result in a significant psychological burden for survivors, particularly when displacement, loss of loved ones, or severe material damage is involved. Prior studies have consistently documented elevated levels of psychiatric morbidity following major earthquakes, highlighting the complex interplay between the severity of trauma exposure, sociodemographic vulnerability, and environmental stressors [1,3,4].

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Corresponding Author: Mahmut Selcuk, Muğla Sıtkı Koçman University, Faculty of Medicine, Department of Psychiatry, Muğla, Türkiye
Email: mahmutselcuk@gmail.com

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The earthquakes that struck southeastern Türkiye in February 2023, with magnitudes of 7.7 and 7.6, caused widespread devastation across the region. Hatay province was among the most severely affected areas, with the disaster resulting in at least 50,783 deaths, over 115.000 injuries, and extensive destruction [5,6]. In the months following the disaster, preliminary investigations reported high levels of psychiatric morbidity among survivors, including symptoms of depression, anxiety, and posttraumatic stress [4,7]. These findings are consistent with prior research indicating that trauma exposure during natural disasters has long-term psychological effects. These effects are particularly pronounced in settings of displacement, bereavement, and material loss [2,8]. Certain demographic and psychosocial characteristics have been consistently linked to a heightened risk of post-traumatic stress disorder (PTSD). Female gender, younger age, low education level, and lack of social support are among the most replicated risk factors [1,9]. Moreover, pre-existing psychiatric conditions, dissociative responses during trauma, and lower levels of psychological resilience may further increase vulnerability [10,11]. Recent findings also emphasize the contribution of dysfunctional coping mechanisms and peritraumatic dissociation as predictors of PTSD in disaster settings [12-14]. Taken together, these factors illustrate the multidimensional nature of PTSD risk following large-scale earthquakes.

Although previous studies have identified these risk factors, many are limited by their focus on PTSD prevalence alone, without directly comparing survivors with and without PTSD within the same exposed population. Additionally, few studies have simultaneously examined related psychological constructs, such as emotion regulation, dissociative experiences, and resilience, all of which may modulate PTSD development or severity. Furthermore, most previous research has focused on populations that remained in the disaster zone; little is known about the mental health outcomes of individuals who relocated—whether through official government placement or voluntary migration—to secondary settlement regions.

To address these gaps, the present study was conducted among earthquake survivors who had migrated from Hatay to Muğla following the 2023 earthquakes in Türkiye. The sample included both government-assigned and voluntarily relocated individuals. This design allowed us to assess the combined psychological impact of trauma exposure and displacement. Using validated self-report instruments, we explored multiple psychological domains, including depressive and anxious symptoms, dissociative tendencies, coping styles, and resilience. By identifying sociodemographic, clinical, and trauma-related variables that differentiate individuals with PTSD from those without, we aim to offer a multidimensional understanding of both vulnerability and protective factors in the context of high-impact disasters. This approach may guide future screening and intervention strategies for trauma-exposed populations in Türkiye and similar settings globally.

Material and Methods

Study Procedure

Individuals who experienced the disaster and subsequently relocated to Muğla Province were invited to participate in the study following the devastating earthquakes that struck southeastern Türkiye on February 6, 2023. Eligible participants were adult earthquake survivors who presented to the psychiatry outpatient clinic or were referred for psychiatric consultation during their medical treatment at the Training and Research Hospital. Participants were recruited using convenience sampling, and all eligible individuals who presented consecutively during the study period were invited to participate.

All participants underwent a standardized clinical evaluation using the DSM-5 diagnostic criteria (SCID-5) conducted by experienced psychiatrists. To ensure the validity of the PTSD diagnosis, only individuals who were assessed at least one month after the earthquake were included in the study. The participants completed a battery of standardized self-report measures under supervision. Assessments were conducted in a single session, either during outpatient visits or inpatient consultations.

Participants

Inclusion and Exclusion Criteria

Participants were eligible if they met the following criteria:

1. Were directly affected by the February 6, 2023, earthquake in southeastern Türkiye and were subsequently relocated to Muğla through government resettlement or voluntary migration,
2. Patients were referred to or presented to the psychiatry outpatient clinic at the Training and Research Hospital for evaluation of their symptoms,
3. Were aged≥18 years,
4. Participants had at least a primary school education and sufficient cognitive capacity to complete self-report measures,
5. The patients spoke Turkish fluently enough to provide informed consent and complete the study instruments,
6. A psychiatrist evaluated the patients using the Structured Clinical Interview for DSM-5 (SCID-5/CV) to confirm the diagnosis of PTSD or other psychiatric disorders,
7. Participants were assessed between 1 and 6 months post-earthquake, in line with DSM-5 criteria, to reduce acute stress and recall bias.

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Participants were excluded if they met any of the following criteria:

1. They experienced another major trauma after the earthquake,
2. Participants with cognitive impairments that prevented valid participation in the assessment were excluded,
3. Acute psychiatric symptoms (e.g., psychosis and delirium) interfered with judgment,
4. Had developmental or neurocognitive disorders (e.g., autism or intellectual disability),
5. History of schizophrenia, schizoaffective disorder, or bipolar I disorder,
6. Active substance use disorders can impair cognitive function,
7. They had major sensory impairments that limited their independent participation,
8. Participants were receiving psychiatric treatment before the earthquake for a condition that could confound the PTSD assessment.

Ethical Approval

All procedures were performed in accordance with the ethical principles of the Declaration of Helsinki. Ethical approval for this study was obtained from the Muğla Sıtkı Koçman University Medical and Health Sciences Ethics Committee (No: 230032/53, Date: 15 May 2023). Written informed consent was obtained from all participants before data collection.

Measures

Structured Clinical Interview for DSM-5 Disorders-Clinician Version (SCID-5/CV)

All psychiatric diagnoses, including PTSD, were confirmed using the SCID-5/CV, a structured diagnostic interview widely used in clinical and research settings to assess DSM-5 psychiatric disorders. The Turkish version has been validated and shown to be reliable [15], ensuring cultural and linguistic appropriateness for the study population. Trained psychiatrists conducted the interviews to ensure diagnostic accuracy.

Sociodemographic and Trauma-Related Information

The researchers developed a structured form to collect participants' basic demographic and clinical characteristics. The form included questions regarding sex, age, marital status, education level, employment status, and previous psychiatric diagnoses or treatments. It also included questions about participants' earthquake-related experiences, such as whether they were physically injured, trapped under rubble, lost a relative, witnessed death or destruction, experienced damage to their homes, or suffered financial losses. Information on the severity of exposure, current living situation (e.g., temporary housing), and relocation to Muğla Province was also recorded.

PTSD Checklist - Civilian Version (PCL-C)

Developed by Weathers et al. [16], the PCL-C is a 17-item self-report questionnaire based on DSM-IV criteria for PTSD. It includes three symptom clusters: re-experiencing (five items), avoidance (seven items), and hyperarousal (five items). Items are rated on a 5-point Likert scale (1=Not at all, 5=Extremely) based on distress experienced over the past month. A total score of 50 or higher is typically considered indicative of PTSD. The Turkish validation was conducted by Kocabaşoğlu et al. [17].

Depression Anxiety Stress Scales (DASS-21)

The original 42-item DASS was developed by Lovibond and Lovibond to assess depression, anxiety, and stress symptoms. The DASS-21 is a validated short version with 21 items across three subscales (seven items each): depression, anxiety, and stress. Items were rated on a four-point Likert scale from 0 (did not apply to me at all) to 3 (applied to me very much or most of the time), referring to the previous week. Higher scores indicate more severe symptoms. The Turkish validation was conducted by Yılmaz et al. [18].

Brief COPE Inventory (Brief COPE)

The Brief COPE, originally developed by Carver et al., is a 28-item self-report scale that evaluates the coping strategies individuals use in response to stress. It includes 14 subscales, each with two items, scored on a four-point Likert scale ranging from 1 (I have not been doing this at all) to 4 (I have been doing this a lot). The subscales are grouped into problem-focused coping (e.g., planning, active coping), emotion-focused coping (e.g., seeking emotional support, positive reframing), and dysfunctional coping (e.g., denial, substance use). Higher scores reflect a more frequent use of the strategy. The Turkish validation was conducted by Bacanlı et al. [19].

Brief Psychological Resilience Scale (BRS)

Developed by Smith et al., the BRS is a 6-item self-report instrument designed to assess an individual's ability to recover from stress or adversity. Items were rated on a 5-point Likert scale (1=strongly disagree to 5=strongly agree), with items 2, 4, and 6 being reverse-coded. Higher average scores indicate greater psychological resilience. The Turkish adaptation was conducted by Doğan [20].

Peritraumatic Dissociative Experiences Questionnaire (PDEQ)

The PDEQ is a 10-item self-report measure that assesses dissociative experiences occurring during or immediately after a traumatic event. It evaluates domains such as altered time perception, depersonalization, confusion, and out-of-body experiences (OOBEs). Items are rated on a 4-point Likert scale ranging from 1 (not at all true) to 4 (extremely true). It was developed by Marmar et al., and the Turkish validation was conducted by Geyran et al. [21].

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Statistical Analyses

All statistical analyses were performed using IBM SPSS Statistics for Windows, version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics are presented as frequencies and percentages, means ± standard deviation (SD), or medians (interquartile ranges), depending on the data distribution. Normality of continuous variables was assessed visually (histograms, Q-Q plots) and analytically (Shapiro-Wilk test). Group comparisons for categorical variables were conducted using Pearson's chi-square or Fisher's exact tests, as appropriate. For continuous variables, independent-samples t-tests or Mann-Whitney U tests were used depending on the distributional assumptions. Effect sizes were calculated using Cohen's h for categorical variables and Cohen's d for continuous variables.

Correlational analyses were performed using Spearman's rank correlation coefficient (rho) to explore the associations between PTSD symptom severity and continuous demographic, clinical, and psychosocial variables. To identify independent predictors of PTSD status, a binary logistic regression analysis was conducted. Variables that were statistically significant in univariate comparisons or theoretically relevant based on prior literature were included in the model. In the multivariate logistic regression model, PTSD diagnosis (present/absent) served as the dependent variable. The independent variables included sociodemographic factors (age, sex, and education), clinical history (past psychiatric illness), trauma exposure indicators (injury, bereavement, and entrapment), and psychosocial measures (DASS-21 anxiety and depression scores, PDEQ total score, Brief COPE dysfunctional coping score, and BRS resilience score). Age, sex, and education were included as covariates to control for potential confounding effects.

A priori power analysis was conducted using G*Power version 3.1 (Heinrich Heine University, Düsseldorf, Germany) to determine the minimum sample size required to detect a medium effect size (Cohen's h=0.5) with a power of 0.80 at an alpha level of 0.05 in the chi-square group comparison. The analysis indicated that 194 participants (approximately 97 per group) would suffice. The final sample size of 290 participants (178 without PTSD and 112 with PTSD) exceeded this requirement, ensuring adequate statistical power to detect meaningful differences between groups.

Results

Of the 290 assessed survivors, 112 (38.6%) met the DSM-5 criteria for PTSD. Psychiatric evaluations were conducted an average of 3.4 ± 1.9 months after the earthquake. Sociodemographic comparisons (Table 1) showed that PTSD was significantly more common among women (p=.011), unmarried individuals (p=.022), and those with lower educational attainment (p=.007). A history of psychiatric illness, physical injury or permanent disability, bereavement, and temporary housing were also strongly associated with PTSD (all p<.001). In contrast, relocation type (state-assigned vs. voluntary) did not differ between the groups.

Table 1. Sociodemographic and earthquake-related characteristics by PTSD status

Variable	Non-PTSD n (%)	PTSD n (%)	p-value	Cohen's h
Gender				
Male	79 (44.4)	33 (29.5)	**0.011**	0.29
Female	99 (55.6)	79 (70.5)		
Marital status				
Married	112 (62.9)	52 (46.4)	**0.022**	0.33
Single/divorced	66 (37.1)	60 (53.6)		
Education level				
High school or above	107 (60.1)	57 (50.9)	**0.007**	0.24
Secondary school or below	71 (39.9)	55 (49.1)		
Employment status				
Employed	94 (52.8)	61 (54.5)	0.084	0.46
Unemployed	68 (38.2)	22 (19.6)		
Student	16 (9.0)	29 (25.9)		
Living arrangement				
Living alone	26 (14.6)	29 (25.9)	0.112	0.29
Not living alone	152 (85.4)	83 (74.1)		

PTSD: Post-traumatic stress disorder. Group comparisons were performed using Pearson's χ^2 test or Fisher's exact test, as appropriate. Cohen's h indicates effect size (0.2=small, 0.5=medium, 0.8=large). Bolded p-values represent statistical significance (p<.05)

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Table 1. Sociodemographic and earthquake-related characteristics by PTSD status

Variable	Non-PTSD n (%)	PTSD n (%)	p-value	Cohen's h
Current residence				
Temporary shelter	163 (91.6)	85 (75.9)	**<0.001**	0.49
Own home	15 (8.4)	27 (24.1)		
Past psychiatric history				
Yes	88 (49.4)	86 (76.8)	**<0.001**	0.59
No	90 (50.6)	26 (23.2)		
Trapped under rubble				
Yes	2 (1.1)	15 (13.4)	**<0.001**	0.52
No	176 (98.9)	97 (86.6)		
Injured during the earthquake				
Yes	3 (1.7)	22 (19.6)	**<0.001**	0.55
No	175 (97.2)	90 (80.4)		
Permanent physical injury				
Yes	0	12 (10.7)	**<0.001**	0.75
No	178 (100)	100 (89.3)		
Injured family member(s)				
Yes	20 (11.2)	40 (35.7)	**0.025**	0.60
No	158 (88.8)	72 (64.3)		
Damage to house				
Undamaged	8 (4.5)	19 (17.0)	0.070	0.37
Damaged	170 (95.5)	93 (83.0)		
Property loss				
No	5 (2.8)	14 (12.5)	0.090	0.41
Yes	173 (97.2)	98 (87.5)		
Death of close ones				
Yes	30 (16.9)	40 (35.7)	**<0.001**	0.46
No	148 (83.1)	72 (64.3)		
Received news of death				
No	138 (77.5)	62 (55.4)	**<0.001**	0.47
Yes	40 (22.5)	50 (44.6)		
Type of relocation				
Voluntary	72 (40.4)	55 (49.1)	0.308	0.12
State-assigned	106 (59.6)	57 (50.9)		

PTSD: Post-traumatic stress disorder. Group comparisons were performed using Pearson's χ^2 test or Fisher's exact test, as appropriate. Cohen's h indicates effect size (0.2=small, 0.5=medium, 0.8=large). Bolded p-values represent statistical significance (p<.05)

Psychosocial and clinical characteristics also varied significantly between the groups (Table 2). Participants with PTSD reported higher levels of depression, anxiety, and stress (all p<.001), as well as greater peritraumatic dissociation (p<.001). They also used more dysfunctional coping strategies (p<.001) and slightly more emotion-focused coping (p=.019), whereas problem-focused coping was lower in the PTSD group (p=.015). Resilience scores were lower among those with PTSD (p=.003), although the effect size was small.

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Table 2. Psychosocial and clinical variables in participants with and without PTSD

Variable	Median (Min-Max) (Non-PTSD)	Median (Min-Max) (PTSD)	p-value	Cohen's d
Age	40 (20-65)	38 (18-72)	**0.009**	0.31
Number of children	1.69 (-0.95-4.99)	1.47 (-2.77-5.90)	0.213	-0.18
Years of education	12 (3-16)	10 (0-16)	**0.004**	0.28
PTSD total score	36.92 (21.74-51.01)	58.32 (37.62-76.79)	**<0.001**	3.06
PTSD re-experiencing	11.04 (6.75-16.93)	18.45 (8.51-28.77)	**<0.001**	2.04
PTSD avoidance	14.22 (6.41-22.52)	23.01 (13.67-32.88)	**<0.001**	2.14
PTSD hyperarousal	11.32 (5.88-17.90)	18.60 (10.84-25.57)	**<0.001**	2.53
Brief COPE total score	64.78 (34.88-92.46)	66.85 (50.23-84.90)	0.061	0.12
Brief COPE emotion-focused	26.02 (18.48-34.89)	27.10 (18.50-35.50)	**0.019**	0.70
Brief COPE problem-focused	19.50 (9.92-28.13)	17.85 (10.65-24.60)	**0.015**	0.80
Brief COPE dysfunctional	19.25 (8.99-31.73)	22.45 (14.79-34.11)	**<0.001**	0.85
DASS-21 depression	8.05 (1.43-13.98)	12.21 (2.17-23.91)	**<0.001**	1.11
DASS-21 anxiety	4.65 (0.34-10.86)	9.91 (2.25-21.54)	**<0.001**	1.29
DASS-21 stress	7.67 (-0.06-14.56)	10.94 (6.49-21.82)	**<0.001**	1.19
PDEQ total score	19.19 (10.00-30.98)	24.71 (12.35-38.65)	**<0.001**	1.16
BRS total score	18 (10-28)	18 (13-30)	**0.003**	-0.29

PTSD: Post-traumatic stress disorder, DASS-21: Depression Anxiety Stress Scales-21, PDEQ: Peritraumatic Dissociative Experiences Questionnaire, BRS: Brief Resilience Scale, COPE: Brief COPE Inventory. Data are presented as medians (minimum-maximum). Group comparisons were conducted using the Mann-Whitney U test because of the non-normal distribution. Cohen's d represents effect size (0.2=small, 0.5=medium, 0.8=large). Bolded p-values represent statistical significance (p<.05)

The detailed correlation coefficients are listed in Table 3. Correlation analyses supported these group differences, revealing strong positive associations between PTSD severity and anxiety, depression, dissociation, and dysfunctional coping (all p<.001) and negative associations with age, educational attainment, and resilience (all p≤.01).

Table 3. Spearman correlations among demographic, clinical, and psychosocial variables

Variable	Age	Children	Educ.	PTSD Total	Avoid.	Hyper.	COPE-Dysf.	Depress.	Anxiety	Stress	PDEQ	BRS total
Age		.648***	-.286***	-.211***	-.320***		-.177**				-.205***	
Children	.648***		-.333***	-.125*	-.213***		-.211***				-.194**	
Educ.	-.286***	-.333***		.139*			.175**				.152**	-.205***
PTSD total	-.211***	-.125*	.139*		.823***	.885***	.368***	.535***	.638***	.574***		-.201**
PTSD Re-exp.			.139*	.823***		.595***	.385***	.576***	.442***			-.257***
PTSD Avoid.	-.320***	-.213***		.885***	.595***		.366***	.445***	.520***	.490***	.626***	
PTSD Hyper.				.849***	.692***	.657***	.184**	.524***	.580***	.601***	.433***	-.227***
COPE-Dysf.	-.177**	.211***	.163*	.368***	.342***	.366***		.136*	.221***		.423***	
Depress.				.535***	.385***	.445***	.524***		-.184**		.390***	-.243***
Anxiety				.638***	.576***	.520***	.580***	.200***			.546***	-.186**
Stress				.574***	.442***	.490***	.601***		-.144**		.286***	-.268***
PDEQ	-.205***	-.194**	.152**	.621***	.414***	.626**	.433***	.442***	.221***	.298**	.423**	
BRS total			-.205***	-.201**	-.257**		-.227**	.176**	.235**	.122*	-.073**	-.243**

Educ.: Education, Depress.: Depression, Avoid.: Avoidance, Hyper.: Hyperarousal, COPE-Dysf.: Dysfunctional coping, PDEQ: Peritraumatic Dissociative Experiences Questionnaire, BRS: Brief Resilience Scale. Only statistically significant Spearman correlation coefficients are presented (p<.05). Blank cells indicate nonsignificant correlations. r=Spearman's correlation coefficient. *:p<.05, **:p<.01, ***:p<.001

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The significant independent predictors identified using logistic regression are summarized in Table 4. Binary logistic regression analysis indicated that prior psychiatric history (p=.001), physical injury (p=.023), bereavement (p=.015), elevated anxiety symptoms (p<.001), peritraumatic dissociation (p<.001), and dysfunctional coping (p=.038) were significant and independent predictors of PTSD. Sex, educational level, and entrapment under debris were not significant in the multivariate model.

Table 4. Logistic regression predicting PTSD following earthquake exposure

Predictor	B	SE	Wald	OR (95% CI)	p-value
Past psychiatric history	1.07	0.32	11.16	2.91 (1.52-5.54)	**.001**
Permanent physical injury	1.42	0.62	4.95	4.12 (1.21-13.95)	**.023**
Loss of a close one	0.85	0.35	5.91	2.33 (1.18-4.59)	**.015**
DASS-21 Anxiety	0.17	0.05	12.47	1.18 (1.08-1.29)	**<.001**
PDEQ Total	0.23	0.06	14.92	1.26 (1.14-1.38)	**<.001**
COPE Dysfunctional	0.10	0.05	4.30	1.11 (1.01-1.23)	**.038**
BRS Total	-0.12	0.05	5.69	0.89 (0.81-0.98)	**.017**
Gender (Female)	0.41	0.29	2.01	1.51 (0.86-2.67)	.156
Education (Low)	0.36	0.27	1.78	1.44 (0.84-2.46)	.182
Trapped under rubble	0.58	0.49	1.41	1.79 (0.68-4.72)	.235
DASS-21 Depression	0.09	0.06	2.32	1.09 (0.98-1.21)	.128

PTSD: Post-traumatic stress disorder, OR: Odds ratio, CI: Confidence interval, PDEQ: Peritraumatic Dissociative Experiences Questionnaire, BRS: Brief Resilience Scale, DASS-21: Depression Anxiety Stress Scales-21. Logistic regression analysis was performed with PTSD (yes/no) as the dependent variable in the model. Statistically significant predictors are in bold (p<.05)

Discussion

This study provides a comprehensive, multidimensional evaluation of PTSD risk following a major natural disaster, focusing specifically on a large cohort of earthquake survivors who migrated from Hatay to Muğla, Türkiye. By integrating sociodemographic, clinical, trauma-related, and psychosocial variables, including coping strategies, peritraumatic dissociation, and resilience, this study offers a nuanced profile of the factors that independently and interactively contribute to PTSD vulnerability. The key findings indicate that prior psychiatric history, permanent physical injury, bereavement, dysfunctional coping, peritraumatic dissociation, and anxiety levels were significant predictors of PTSD.

While many studies have examined these variables in isolation, this study contributes to the literature by simultaneously assessing these domains within a multivariate framework and examining a displaced survivor population in a secondary settlement region. To our knowledge, this is one of the first studies to incorporate both group comparisons and correlational insights across a wide range of psychological constructs, including the Brief COPE subdimensions and the PDEQ, in a post-earthquake context. These findings deepen our understanding of PTSD development and highlight specific targets for early psychological intervention.

Regarding sociodemographic characteristics, female sex, unmarried status, and lower educational attainment were more prevalent among individuals with PTSD. This pattern is consistent with previous research showing that women may be at elevated risk due to hormonal factors and greater reliance on emotion-focused coping [1,22], and that the absence of stable interpersonal support increases vulnerability [11,23]. Lower education similarly heightened risk, potentially reflecting limited access to psychological or informational resources [1]. Although employment status did not reach significance, a tendency toward higher PTSD rates among students and unemployed individuals aligns with literature linking economic insecurity to increased psychological vulnerability [24,25]. Current living conditions also contributed meaningfully: survivors residing in temporary shelters were more likely to exhibit PTSD symptoms than those in private housing, supporting evidence that displacement-related stress compounds trauma burden [23,26]. Taken together, these interrelated sociodemographic factors—rather than acting as isolated predictors—appear to form a cumulative vulnerability profile that may amplify the earthquake's psychological impact.

Critically, individuals with a prior psychiatric history were substantially more likely to develop PTSD, supporting evidence that pre-existing mental health conditions significantly heighten susceptibility to trauma-related disorders [1]. Direct trauma exposure—including being trapped under rubble, physical injury, or permanent disability—was also strongly associated with PTSD, consistent with dose-response models of trauma severity [1,7].

Additionally, the PTSD group reported higher rates of bereavement, injury to family members, and receiving death-

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related news—all well-known contributors to PTSD and complicated grief in disaster survivors [1,27]. Although variables such as property loss, house damage, and living alone did not reach statistical significance, moderate effect sizes suggest that they may still play a meaningful role in PTSD risk, possibly by interacting with other psychosocial vulnerabilities.

Importantly, a subgroup comparison between voluntarily relocated survivors and those relocated by the state revealed no significant differences in PTSD prevalence. This suggests that the type of relocation did not primarily determine the psychological burden of the disaster and that the shared challenges of displacement and resettlement may have overshadowed the differences in relocation pathways.

In addition to demographic and exposure factors, psychosocial and clinical variables play significant roles. Participants with PTSD were generally younger and had lower levels of education than those without PTSD. This aligns with prior studies suggesting that younger individuals, with less life experience and underdeveloped coping mechanisms, are more vulnerable to trauma-related psychopathology [28]. Likewise, lower educational attainment may limit access to supportive information and resources, increasing susceptibility [13].

The PTSD group exhibited significantly higher levels of depression, anxiety, and stress, alongside elevated PTSD symptom clusters (re-experiencing, avoidance, hyperarousal), affirming the clinical validity of the groupings and the frequent comorbidity between PTSD and internalizing disorders [29].

The analysis of coping strategies showed that individuals with PTSD used emotion-focused and dysfunctional coping strategies more frequently. In contrast, problem-focused coping strategies were more common among those without PTSD. These findings support previous literature suggesting that maladaptive strategies, such as denial and avoidance, are linked to worse outcomes, whereas problem-focused strategies are generally protective [12,30].

Peritraumatic dissociation was also elevated in the PTSD group, consistent with evidence that acute dissociative responses during trauma significantly increase the risk of developing chronic PTSD [31]. Although the difference in resilience scores between the groups was statistically significant, the effect size was small. This could indicate that resilience is a modifiable factor influenced by context and support, rather than a fixed trait [10,32]. In the multivariate model, higher resilience (BRS) remained a significant protective factor (p=.017), consistent with the negative association with PTSD severity observed in the univariate analyses. From a clinical perspective, these mechanisms may represent practical intervention targets in post-disaster settings, such as psychoeducation to reduce dissociative responses or structured programs to strengthen adaptive coping skills.

These findings were further supported by correlation analyses, which highlighted the interplay between PTSD symptoms, coping strategies, and psychological distress. Age and number of children were negatively associated with PTSD severity and subdimensions, suggesting that younger individuals and those with fewer children may be more vulnerable to developing PTSD symptoms. This aligns with previous research indicating that younger age is a risk factor for PTSD due to reduced coping experience or life perspective [12,33]. Moreover, the observed negative correlation between years of education and PTSD severity complements the group-level finding that lower educational attainment was more common in the PTSD group. Prior studies suggest that education may confer resilience through enhanced cognitive flexibility and problem-solving [34].

The correlation patterns between coping strategies and PTSD symptoms largely mirrored those presented in Table 2. Specifically, dysfunctional coping was positively correlated with all PTSD dimensions and emotional distress (depression, anxiety, and stress), supporting its role as a maladaptive strategy that exacerbates symptom severity [13,35]. In contrast, emotion- and problem-focused coping strategies showed mixed associations. Emotion-focused coping, though higher in the PTSD group, correlated positively with PTSD re-experiencing and avoidance, consistent with findings suggesting that overreliance on emotional expression without problem resolution may maintain PTSD symptoms [35,36]. Problem-focused coping was inversely related to PTSD scores, aligning with its proposed protective role in trauma adaptation [37].

Notably, peritraumatic dissociation (PDEQ scores) was robustly correlated with PTSD symptoms and psychological distress, reinforcing the dissociation-PTSD pathway emphasized in trauma literature [14,38]. This association suggests that acute dissociative responses during trauma may disrupt normal memory processing and increase the risk of developing chronic PTSD. Additionally, psychological resilience, as measured by the BRS, was inversely correlated with PTSD severity, depression, anxiety, and dissociation, consistent with resilience's buffering role reported in post-disaster studies [12,39].

Taken together, the converging results from group comparisons and correlational analyses provide a coherent narrative: lower age and education, dysfunctional coping, heightened peritraumatic dissociation, and reduced resilience appear to form a cumulative vulnerability profile for PTSD among earthquake survivors. These findings underscore the importance of multifactorial screening and intervention approaches targeting trauma exposure, individual psychosocial resources, and coping styles.

Multivariate logistic regression provided a more integrated view, identifying several significant predictors of PTSD. A prior psychiatric history significantly increased PTSD risk, consistent with evidence that pre-existing emotional vulnerability impairs post-trauma adaptation [1,7].

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Peritraumatic dissociation emerged as one of the strongest independent predictors (OR ≈ 1.3), supporting prior findings that acute dissociative responses during trauma disrupt memory processing and elevate PTSD risk [14].

Physical injury also conferred a marked increase in risk (OR>4), while bereavement was another significant contributor to vulnerability [40]. Elevated anxiety symptoms were closely associated with PTSD, in line with evidence highlighting anxiety as a core component of post-traumatic psychopathology [13], whereas depression did not retain significance after adjustment. Finally, dysfunctional coping styles independently predicted PTSD, consistent with their role in maladaptive emotional regulation [30,38], while emotion- and problem-focused coping showed no protective effect.

Interestingly, female sex, low education level, and entrapment under rubble, while showing trends toward higher PTSD risk, did not reach statistical significance in this study. These variables may act through mediators such as coping style, affective reactivity, or perceived threat, highlighting the complexity of PTSD risk and the importance of integrative models of PTSD.

Although nearly 40% of our sample met criteria for PTSD, this proportion is consistent with prevalence estimates reported in earthquake survivors, which typically range from 20% to 50% depending on exposure severity, assessment timing, and population characteristics [1,3]. Furthermore, recent research on the 2023 earthquakes in Türkiye also reported high PTSD rates in temporary camp settings [7], supporting the validity of our findings. It should also be noted that our participants were recruited from psychiatric outpatient referrals in a secondary settlement region rather than from a community-based sample, which likely increased the observed rate of PTSD compared to that in general population studies. Importantly, the aim of the study was not to estimate prevalence but to compare survivors with and without PTSD, for which the sample size provided adequate statistical power for the analysis.

In summary, our findings indicate that PTSD development among earthquake survivors is shaped by both trauma severity and psychosocial factors, underscoring the importance of early screening and intervention.

Limitations

Although this study has notable strengths, including its multidimensional design, the use of validated instruments, and the inclusion of both state-assigned and voluntarily relocated survivors, several limitations should be acknowledged. First, the cross-sectional design precludes conclusions about causality and the long-term course of PTSD. Second, reliance on self-reported measures may have introduced recall or social desirability bias. Third, the sample was drawn from a single province, which may limit the generalizability of the findings to other earthquake-affected regions or cultural contexts. In addition, some subgroup comparisons may have been underpowered, which reduced the ability to detect smaller effects. Future longitudinal research should examine whether dissociation and coping styles mediate the long-term course of PTSD and provide deeper insights into the mechanisms that shape post-disaster psychological outcomes.

Conclusion

This study underscores the multifactorial nature of post-traumatic stress disorder among earthquake survivors, demonstrating that PTSD is shaped not only by direct trauma exposure but also by psychological processes such as peritraumatic dissociation, anxiety, and maladaptive coping. Importantly, our findings highlight that the psychological burden of disaster transcends the type of relocation, as both state-assigned and voluntarily migrated individuals exhibited similar PTSD rates. The identification of dissociation, dysfunctional coping, and anxiety as independent predictors suggests that they are key targets for early intervention. These results highlight the need for community-based screening and resilience enhancement programs tailored to displaced survivors. Future studies should employ longitudinal designs, recruit broader community samples, and evaluate the effectiveness of early interventions targeting dissociation and maladaptive coping mechanisms.

Ethical Approval
Approved by the Muğla Sıtkı Koçman University Medical and Health Sciences Ethics Committee (No: 230032/53, Date: 15 May 2023).

Patient Consent
Written informed consent was obtained from all participants before data collection.

Conflict of Interest
The authors declare no conflict of interest.

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