



Shattered ground, resilient souls: examining coping strategies, social support, and earthquake exposure's effects on post-traumatic stress disorder symptoms among adolescent and young adults survivors of the 2023 earthquake in Türkiye

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Abstract

Given the profound impact of natural disasters on mental health, particularly in vulnerable groups such as adolescent and young adult, understanding their psychological results is crucial for providing necessary support and designing effective interventions. The aim of this study was to investigate the relationships between earthquake exposure, posttraumatic stress symptoms, coping mechanisms, and social support in adolescents and young adults who survived the 2023 earthquake in Turkey. The research was conducted in Kırıkhan district of Hatay province, which was severely damaged after the earthquake that occurred in Turkey in 2023. The sample for the descriptive and cross-sectional study consisted of 204 participants. Convenience sampling method was used for data collection. Data were collected using the Personal Information Form (PIF), Impact of Events Scale (IES), Stress Coping Strategies Inventory (CSSI), and Multidimensional Perceived Social Support Scale (MPSSS). Hierarchical multiple regression analysis was used to determine the factors associated with IES-R scores. Three models were tested to understand the factors predicting levels of posttraumatic stress (IES-R scores). The findings suggest that exposure to earthquake, problem-focused coping and seeking support play an important role in understanding posttraumatic stress levels. This study provides valuable insights into the psychological impact of the earthquake on adolescents and young adults, as well as the development of effective intervention strategies and support programs for young earthquake survivors.

Keywords Coping strategies · Earthquake · Post-traumatic stress disorder · Social support · Türkiye

Introduction

On February 6, 2023, Türkiye experienced two extremely destructive earthquakes measuring 7.7 and 7.6 in magnitude, centered in Kahramanmaraş. These earthquakes, centered in Kahramanmaraş, caused at least 50,783 people to die, more than 122,000 people to be injured, and 5,000,000 people to migrate to different regions, according to official figures. In Hatay, the province with the highest number of casualties, 55,589 buildings suffered severe damage or were

completely destroyed (Şafak, 2023; Turkish Statistical Institute [TUIK], 2024; Wikipedia, 2023).

It is known that the earthquake causes various psychological consequences in all age groups, beyond physical and material damage in the affected areas (Rubens et al., 2018; Tang et al., 2017). Due to their ongoing development and susceptibility to stressors, adolescent and young adult are particularly at risk among affected groups (Rubens et al., 2018). Understanding the impact of such events and the development of post-traumatic stress disorder (PTSD) symptoms in adolescent and young adult is critical for effective intervention and support.

Most traumatic events, such as unexpected disasters, cause rapid resource depletion and high levels of stress, as they affect individuals' most precious resources and hinder their ability to cope with available resources. In this context, the Conservation of Resources Theory (COR theory)

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provides a valuable framework for understanding the deterioration in mental health during crisis. According to this theory, individuals strive to acquire, maintain or protect their resources. When these resources (object resources, circumstances, personal characteristics, energy) are threatened or lost, they experience psychological distress (Hobfoll, 1989; Hobfoll et al., 1990; Hobfoll & Schumm, 2009).

Many studies have been conducted to investigate the psychological effects of natural disasters on individuals and to understand their specific effects on adolescent and young adult. Research shows that exposure to traumatic events, such as earthquakes, can cause a range of negative psychological consequences, including symptoms of PTSD (Silwal et al., 2021; Wahab et al., 2021). PTSD is a multifaceted condition characterized by a range of symptoms, including intrusive memories, increased arousal and reactivity, avoidance of triggers related to the traumatic event, and negative changes in mood and thoughts (DSM-5 American Psychiatric Association, 2013). There is evidence that chronic PTSD can lead to negative consequences, such as substance abuse, social isolation, and an increased risk of suicide (Guo et al., 2017). Therefore, it is very important to consider the factors affecting PTSD in order to protect and improve the physical and mental health of individuals after the earthquake.

The COR stress theory emphasizes that increasing psychosocial resources is crucial to increase adaptation to new situations. Social resources such as social support, interactions, and relationships are important for stress resilience. In the COR theory, social support can expand an individual's resource pool and substitute for other resources to cope with stress (Hobfoll, 1989). Through social support, individuals can rely on others to provide the resources they lack, reinforce their diminished resources, or remove themselves from stressful situations, thereby regaining resources or the ability to utilize them (Hobfoll et al., 1990). Many observational studies related to PTSD suggest that social support also has the potential to buffer the effects of psychological trauma (Evans et al., 2013; Hébert et al., 2014). A meta-analysis examining the impact of social support on post-traumatic stress symptoms in children and adolescent and young adult reports that social support is a significant negative predictor of PTSD (Xiong et al., 2022).

Personal resources are also vital in resisting stress. The COR theory explains how the coping strategies individuals use to deal with stressful situations affect their capacity to maintain or increase their resources. In this context, it is argued that active coping strategies are generally associated with more positive outcomes, whereas avoidant coping strategies are associated with negative outcomes (Hobfoll, 1989). A study of 2008 Wenchuan (China) earthquake survivors found that passive strategies such as avoidance or self-blame were associated with worse mental health (Xu

& He, 2012). Similarly, research conducted among earthquake survivors shows that individuals who employ passive coping strategies have a higher likelihood of experiencing PTSD compared to those who utilize active coping strategies (Cofini et al., 2015; Löw et al., 2023). In this context, it is crucial to understand the interplay between earthquake exposure, coping mechanisms, social support, and PTSD symptoms, identify potential protective factors, and guide interventions aimed at facilitating the recovery of this vulnerable population.

This study is pioneering as it is the first research conducted specifically for the 2023 Hatay earthquake. The current study has both theoretical and practical significance. Theoretically, it contributes to the existing literature on understanding the complex interplay between earthquake exposure, coping, social support, and PTSD symptoms. Practically, it is intended to guide the development of interventions and support programs that promote positive coping strategies and social support networks among earthquake-affected adolescent and young adult. Taking all this into account, the study has several objectives. Firstly, the study carried out to evaluate individuals' post-traumatic stress symptoms, earthquake exposure, coping mechanisms, and perceived social support; secondly, to evaluate the effect of exposure to earthquake, coping mechanisms and perceived social support on posttraumatic stress symptoms.

Methods

Study design

This cross-sectional study was carried out using the correlation method to investigate the relationships between earthquake exposure, post-traumatic stress symptoms, coping mechanisms, and social support among adolescent and young adult survivors of the Türkiye earthquake.

Sample

This study was conducted in Kırıkhan district of Hatay province 4 months after the earthquakes that occurred in Türkiye on February 6, 2023. The population of the study consists of adolescents and young adults in Kırıkhan district of Hatay province. Convenience sampling, which facilitates accessibility and participation willingness, was utilized throughout the data collection period.

G*Power 3.1.9.7 was used to calculate the sample size. Based on the regression analysis, the sample size of the study was determined as 89 in G*Power analysis (power=0.95, significance level=0.05, and effect size=0.15). Researcher calculated the sample size to be 112 based on a 25%

withdrawal rate. A total of 229 number of individuals were approached and invited to participate in the study. Adolescent and young adult who met the following criteria were included in the study: (1) Adolescent and young adult aged between 10 and 22 years (WHO refers to the 10–24 age range as adolescents and young adults) (World Health Organization [WHO], 2024), (2) Residing in areas affected by earthquakes, (3) Directly exposed to at least one earthquake event, (4) Sufficient proficiency in understanding and expressing themselves in the Turkish language, and (5) Volunteer to participate in the study. Participants were excluded if their health or mental health was so severely affected that they were unable to participate in such a study. Out of the individuals approached, a final sample of 204 adolescents and young adults consented and enrolled in the study (participation rate of 89%).

At the end of the study, a post-hoc power analysis was conducted to calculate the sample size for the mediation analysis. Calculation was performed based on Model 3, which demonstrates how the effect of earthquake exposure on post-traumatic stress symptoms changes through coping mechanisms. The effect size was calculated $[(f^2) = R^2 / (1 - R^2) = 0.23 / (1 - 0.23) \approx 0.30]$. According to the power analysis based on linear multiple regression (Fixed model, R2 deviation from zero), considering the obtained effect size, it was calculated that a minimum of 201 participants should be included in the study (power=1.00, confidence interval = 95%, effect size = 0.30, and significance level = 0.05).

Data collection

In this study, sampling was conducted in earthquake-affected areas in Hatay province, Türkiye, including Kırıkhan district and its surroundings. Data was collected between July 1 and August 15, 2023. The researcher used various methods (online and paper-based surveys) to collect data from adolescents and young adults residing in earthquake-affected areas. Online surveys were prepared using Google Form. The obtained link was sent to the participants via social media platforms (WhatsApp, Facebook and Instagram). In addition, paper-based questionnaires were used for data collection. These questionnaires were distributed to accessible people in this region by the researcher. This approach was used to include individuals who did not have online access or preferred the traditional survey method. Data obtained from both online and paper-based surveys were pooled and analyzed. This approach accommodated the diverse participation preferences of adolescents and young adults in this region.

Before starting both the paper-based questionnaires and the online questionnaires, individuals were given detailed information about the purpose and methodology of the

study. It was also made clear that the researcher was ready to provide psychological assistance if requested or needed.

Considering that the participants might have difficulty reading the questionnaires due to their earthquake survivor status, the content of the questionnaires was carefully examined beforehand to prevent this situation. The content of the questionnaires was organized in a clear and understandable way. In addition, guidance notes were added to support the participants in completing the questionnaire and a contact number for the researcher was provided. These measures aimed to minimize any difficulties earthquake survivors might have while reading the questionnaires.

Considering that participants under 18 years of age should obtain the consent of their parents, prior consent was obtained from their parents or legal guardians for these participants who completed the questionnaire both online and face-to-face interviews. Participants were asked to obtain permission from their parents or legal guardians before completing the survey. An informed consent form was attached to the front of both the online and paper-based questionnaire. Participants whose permission was obtained had the right to complete the questionnaire. This approach was adopted to ensure that the study complied with ethical standards.

Data were collected using the Personal Information Form (PIF), Earthquake Exposure Form (EEF), Impact of Events Scale (IES), Coping Strategies for Stress Inventory (CSSI) and Multidimensional Perceived Social Support Scale (MPSSS).

Data collection tools

The personal information form

Personal information form (PIF) was prepared by the researcher in line with the literature (Tian et al., 2014; Silwal et al., 2021). It is used to determine the gender, age and with whom the participants live.

Earthquake exposure

In addition to demographic data, the degree of earthquake exposure was measured using nine items. These items assess various aspects of earthquake exposure. The items are as follows:

- (1) Physical injury: Respondents were asked whether they had personally experienced any physical injury as a result of the earthquake.
- (2) Injury to a family member/acquaintance: Participants were asked whether any of their family members or acquaintances were injured as a result of the earthquake.

- (3) Death of a family member/acquaintance: Participants were asked if any of their family members or acquaintances had died as a result of the earthquake.
- (4) Witnessing someone's death or seeing a dead body: Participants were asked if they witnessed someone dying or saw a dead body during or after the earthquake.
- (5) Witnessing buildings collapse: Respondents were asked if they witnessed any building collapse during the earthquake.
- (6) Staying in a tent or container: Respondents were asked whether they had to stay in a temporary shelter such as a tent or container after the earthquake due to damage to their homes.
- (7) Migrating to another place after the earthquake: Respondents were asked whether they had to move or relocate to another place after the earthquake because their houses were destroyed or the area became uninhabitable.
- (8) Being buried or buried under collapsed buildings during the earthquake: Respondents were asked whether they had been buried under buildings that collapsed during the earthquake.
- (9) Home damage: Respondents were asked about any damage to their homes or residences due to the earthquake.

Each item was rated using a two-point scale (no=1 and yes=2). The scores of these items were summed to calculate an overall earthquake exposure score. These survey questions used in the study were adapted from the Trauma Exposure Scale developed by Elal and Slade (2005). This scale was designed for the Turkish population living in this region after the Marmara earthquake in Türkiye. The questions have been used in various studies in different languages and were originally developed and validated in Turkish. Therefore, the questionnaire was administered in Turkish to ensure cultural and grammatical appropriateness for the target population. Prior to the main data collection, the questionnaire was administered to a small group of participants to assess the clarity, comprehensibility and cultural appropriateness of the questions. This measurement approach has been widely used in previous studies examining earthquake exposure (Andrighetto et al., 2016; Forresi et al., 2020; Liang et al., 2019; Wang et al., 2021a, b). In this sample, Cronbach's α for the Earthquake Exposure Form total scales were found to be 0.72.

Post-traumatic stress disorder

Impact of Events Scale-Revised (IES-R) was developed by Weiss and Marmar (1997). It was adapted into Turkish by Çorapçioğlu et al. (2006). The purpose of this scale is to assess the impact of difficulties experienced after a stressful and traumatic event on the lives of adolescent and young

adult who have experienced any trauma. The IES-R is a 22-item scale that captures the main features of PTSD, including intrusion, avoidance, and hyperarousal in individuals exposed to a specific trauma. The scale utilizes a 5-point Likert scale, with scores ranging from 0 (lowest impact) to 88 (highest impact). A higher score indicates a greater impact of the traumatic event on the individual. The Turkish version of the IES-R has shown validity in diagnosing PTSD, with good diagnostic performance between cutoff values of 24 and 33, and high internal consistency (Corapçioğlu et al., 2006). The original scale has demonstrated high internal consistency, with a Cronbach's alpha coefficient of 0.96 (Weiss & Marmar, 1997). The Cronbach's alpha coefficient obtained from the Turkish version of the scale is 0.94 (Corapçioğlu et al., 2006). The Cronbach's alpha coefficient for the IES-R in this study is 0.92.

Coping strategies

The Stress Coping Strategies Inventory (CSI), developed by Folkman and Lazarus based on the Psychological Stress Model (Folkman & Lazarus, 1980), was adapted into Turkish through validity and reliability studies conducted by Türküm (Türküm, 2002). The scale consists of 23 items and is divided into 3 subscales. It is rated according to a 5-point Likert scale. The subscales are named as follows: seeking social support (4, 10, 13, 17, 18, 20, 23), problem-focused coping (2, 5, 6, 7, 8, 9, 12, 16) and avoidance coping (1, 3, 11, 14, 15, 19, 21, 22). Items 10, 17, and 20 of the scale are reverse scored. The total score and subscale scores obtained from the scale provide information about individuals' coping strategies with stress. The scale gives scores ranging from 23 to 115 reflecting the general level of coping strategies used by individuals to cope with stress. Higher scores on the scale and its subscales indicate an increased tendency to use relevant coping mechanisms. The Cronbach's alpha coefficient obtained from the Turkish version of the scale is 0.78. The Cronbach's alpha coefficient for the CSI in this study is 0.82.

Perceived social support

The Multidimensional Perceived Social Support Scale (MPSS), developed by Zimet, Dahlem, and Farley (Zimet et al., 1988), is a scale that assesses the adequacy of support received from family, friends, and a significant other. The Turkish validation and reliability study of the scale was conducted by Eker, Arkan, and Yıldız (Eker et al., 2001). The scale consists of 12 questions and is self-administered by the participants. There are 4 questions for each subscale: family, friends, and significant other. A 7-point Likert scale ranging from "definitely no" to "definitely yes" is used to rate

each item. The subscale scores are obtained by summing the scores of the 4 items belonging to each subscale, and the total score of the scale is obtained by summing all subscale scores. High scores obtained from the scale indicate high perceived social support. The reliability of the original scale was 0.88 (Zimet et al., 1988). According to the reliability studies of the Turkish version, the Cronbach's alpha coefficient of the scale is calculated as 0.89. The Cronbach's alpha coefficient for the MPSSS in this study is 0.89.

Data analysis

The data were analyzed using IBM SPSS version 23. In descriptive statistics, frequencies, percentages, mean and standard deviations were calculated. To assess the normality assumptions, the skewness and kurtosis values of each variable were examined. Skewness and kurtosis values falling between ± 2 were considered as indicators of a relatively normal distribution (Bachman, 2004). To assess the impact of sociodemographic characteristics and earthquake-related experiences on IES-R scores, independent t-tests and one-way ANOVA were employed. A bivariate correlation analysis was conducted to examine the relationships between the variables. Hierarchical multiple regression was performed as follows in order to identify factors associated with IES-R. The regression coefficients (B) and standardised regression coefficients (β) were calculated for each predictor variable at each step of the regression model. In Model 1, only the predictor variable of earthquake exposure was included in the analysis. In Model 2, two additional predictor variables, namely problem-focused coping and social support seeking, were added to the analysis. Finally, in Model 3, all three predictor variables (earthquake exposure, problem-focused coping, and social support seeking) were included simultaneously in the analysis. The significance level is set as $p < 0.05$.

Ethical considerations

In accordance with the Helsinki Declaration, ethics approval was obtained from the Ethics Committee of the Faculty of Medicine at Pamukkale University (Ethics approval number: E-60116787-020-399975). Before starting the study, the participants were informed about the purpose of the study and procedures. Informed consent was obtained from all participants. For participants under 18 years of age, prior consent was obtained from their parents or legal guardians. Participants were assured that their personal information would be kept confidential. They were reminded that they could withdraw from the study if they wished. All participants voluntarily participated in the study and no payment was made to them.

Results

Socio-demographic findings and mean scores of scales

The mean age of the participants was 17.06 ± 3.75 years. It was determined that 73.5% of the participants were female and 81.9% lived with their parents. The data show that there are significant differences in IES-R scores in terms of all variables specified in the table ($p < 0.05$) (Table 1).

The mean scores of the participants from the scales are given in Table 2. The mean IES-R scores of the participants were found to be 45.32 ± 18.75 , the mean MPSSS scores were 51.32 ± 17.66 , and the mean scores for problem-focused coping, social support seeking coping, and avoidance coping were 27.66 ± 6.70 , 21.98 ± 5.57 , and 26.88 ± 5.88 , respectively.

In addition to, according to the cutoff point indicated in the literature for the IES-R scale, it was determined that the percentage of individuals scoring 33 or above was 72.5%.

Bivariate Spearman's correlations between dependent and predictor variables

The bivariate correlations demonstrated that IES-R scores are positively and significantly correlated with earthquake exposure ($r = 0.43$, $p < 0.01$). On the other hand, IES-R scores show negative and significant correlations with problem-focused coping ($r = -0.21$, $p < 0.01$) and social support seeking coping ($r = -0.26$, $p < 0.01$). Finally, no significant relationship was observed between IES-R and avoidance coping ($r = -0.04$, $p > 0.05$) or social support ($r = -0.04$, $p > 0.05$) (Table 2).

Hierarchical regressions

A hierarchical multiple regression analysis was conducted to examine the hypothesis that trauma exposure, perceived social support, and coping style could explain a significant proportion of variance in PTSD symptoms. Prior to the analysis, the data were carefully checked to ensure that the assumptions of normality, multicollinearity, linearity, homogeneity of variance, and homoscedasticity of residuals were met. As none of these assumptions were violated, the hierarchical regression analysis was carried out. According to the Bivariate correlation analysis, there is no significant relationship between social support systems and avoidant coping mechanisms with IES-R scores. Therefore, these two variables were not included in the model.

IES-R was entered as a dependent variable in the regression analysis. Three models were tested to understand the factors contributing to post-traumatic stress levels (IES-R

Table 1 Differences in IES-R score according to the characteristics of the individuals regarding sociodemographic and the earthquake exposure ($n=204$)

Variables <i>n</i> (%)	IES				Bonferroni
	<i>M</i> ± <i>SD</i>	<i>t</i> / <i>F</i>	<i>p</i>		
Gender					
Female	150 (73.5)	46.98 ± 18.63	<i>t</i> = 2.129	0.034	
Male	54 (26.5)	40.70 ± 18.49			
Who do you live with?					
With parents (1)	167 (81.9)	43.46 ± 18.82	<i>F</i> = 6.390	0.002	1 > 2
With relatives (2)	19 (9.3)	59.00 ± 17.51			
Alone in a dorm/home (3)	18 (8.8)	48.11 ± 12.86			
Age (years)					
11–14 (1)	67 (32.8)	39.29 ± 18.89	<i>F</i> = 5.600	0.004	2 > 1
15–19 (2)	66 (32.4)	49.34 ± 17.37			3 > 1
20–22 (3)	71 (34.8)	47.26 ± 18.68			
Physical injury					
No	171 (83.8)	43.68 ± 18.87	<i>t</i> = -2.893	0.004	
Yes	33 (16.2)	53.81 ± 15.81			
Injury to a family member/acquaintance					
No	78 (38.2)	40.60 ± 19.31	<i>t</i> = -2.879	0.004	
Yes	126 (61.8)	48.24 ± 17.86			
Death of a family member/acquaintance					
No	50 (24.5)	35.96 ± 18.31	<i>t</i> = -4.228	0.000	
Yes	154 (75.5)	48.36 ± 17.92			
Witnessing someone's death or seeing a corpse					
No	105 (51.5)	39.57 ± 18.56	<i>t</i> = -4.744	0.000	
Yes	99 (48.5)	51.42 ± 17.03			
Witnessing buildings collapse					
No	78 (38.2)	40.74 ± 19.40	<i>t</i> = -2.789	0.006	
Yes	126 (61.8)	48.15 ± 17.84			
Stay in a tent or container					
No	71 (34.8)	39.80 ± 20.26	<i>t</i> = -3.138	0.002	
Yes	133 (65.2)	48.27 ± 17.26			
Migrate to another place after the earthquake					
No	105 (51.5)	42.33 ± 18.47	<i>t</i> = -2.371	0.019	
Yes	99 (48.5)	48.49 ± 18.62			
Collapsed during the earthquake					
No	194 (95.1)	44.80 ± 18.92	<i>t</i> = -1.751	0.019	
Yes	10 (4.9)	55.44 ± 11.52			
House damage					
No	30 (14.7)	35.80 ± 20.57	<i>t</i> = -3.073	0.002	
Yes	174 (85.3)	46.96 ± 17.98			

F indicates 1-way analysis of variance

IES-R = Impact of Events Scale-Revised

* $p < 0.05$

scores) in the study population. In Model 1, earthquake exposure was added as an independent variable, and it significantly contributed to the explanation of the variance in IES-R scores ($\beta = 0.435, p = 0.000$). The R^2 value increased to 0.18, indicating that trauma exposure accounted for 18% of the variance in IES-R scores ($\Delta R^2 = 0.18, F = 47.091, p = 0.000$). In Model 2, problem-focused coping and social support seeking coping variables were added as additional

independent variables. Both problem-focused coping ($\beta = -0.145, p = 0.042$) and social support seeking coping ($\beta = -0.220, p = 0.002$) significantly explained the IES-R scores. The R^2 value for Model 2 increased to 0.08, indicating that problem-focused coping and social support seeking coping accounted for an additional 8% of the total variance in IES-R scores ($\Delta R^2 = 0.08, F = 9.777, p = 0.000$). In Model 3, all three variables—earthquake exposure,

Table 2 Descriptive statistics and bivariate spearman's correlations between dependent and predictor variables

Variables	Mean \pm SD	Skewness	Kurtosis	1.	2.	3.	4.	5.	6.
1. IES-R	45.32 \pm 18.75	-0.03	-0.64	1	0.43**	-0.04	-0.21**	-0.26**	-0.11
2. Earthquake exposure	13.68 \pm 1.96	-0.34	-0.18		1	-0.15*	-0.10	-0.17*	-0.01
3. Social support	51.32 \pm 17.66	-0.05	-0.73			1	0.32**	0.44**	0.26**
4. Problem-focused coping	27.66 \pm 6.70	-0.02	-0.75				1	0.30**	0.65**
5. Social support seeking coping	21.98 \pm 5.57	-0.25	0.32					1	0.18**
6. Avoidance coping	26.88 \pm 5.88	0.25	-0.47						1

IES-R = Impact of Events Scale-Revised

* $p < 0.05$, ** $p < 0.01$ **Table 3** Unstandardised (B) and standardised (β) regression coefficients for each predictor variable on each step of hierarchical regression predicting IES-R score ($N = 204$)

Model	R	R ²	ΔR^2	F	p	B	SE	Beta (β)	t(p)
Model 1	0.43	0.18	0.18	47.091	0.000				
Earthquake exposure						4.155	0.605	0.435	6.862 (0.000)
Model 2	0.29	0.08	0.08	9.777	0.000				
Problem-focused coping						-0.405	0.198	-0.145	-2.049 (0.042)
Social support seeking						-0.741	0.238	-0.220	-3.117 (0.002)
Model 3	0.48	0.23	0.22	20.949	0.000				
Earthquake exposure						3.770	0.599	0.395	6.288 (0.000)
Problem-focused coping						-0.345	0.181	-0.123	-1.902 (0.05)
Social support seeking						-0.530	0.220	-0.157	-2.404 (0.017)

* $p < 0.05$

problem-focused coping, and social support seeking coping—were included as independent variables. It was found that earthquake exposure ($\beta = 0.395$, $p = 0.000$), problem-focused coping ($\beta = -0.123$, $p = 0.05$), and social support seeking coping ($\beta = -0.157$, $p = 0.017$) significantly explained the IES-R scores. The R^2 value for Model 3 increased to 0.23, indicating that earthquake exposure, problem-focused coping, and social support seeking coping together accounted for 23% of the total variance in IES-R scores ($\Delta R^2 = 0.22$, $F = 20.949$, $p = 0.000$). Overall, the results suggest that earthquake exposure, problem-focused coping, and social support seeking coping play important roles in understanding the post-traumatic stress levels in the study population (Table 3).

Discussion

Earthquakes can significantly affect the mental health of survivors, often leading to negative health outcomes such as post-traumatic stress disorder. It is important to understand the psychological effects of earthquakes and to develop appropriate support and intervention strategies to cope with these effects. This study was conducted to evaluate the traumatic impact of the earthquake in terms of earthquake exposure, coping mechanisms, and perceived social support.

In line with this purpose, the results of Model 1 in the regression analysis in this study showed that exposure

to earthquake contributed significantly to the explanation of the variance in IES-R scores. The analysis showed that approximately 18% of the variance in IES-R scores could be attributed to earthquake exposure. While this percentage may seem modest, it is consistent with findings from other studies examining the impact of specific traumatic events on post-traumatic stress symptomatology (Ehring et al., 2011; Forresi et al., 2020; Tian et al., 2014). The role of exposure variables was observed in two studies with long-term assessment points as well: Tian et al. (2014) found that three years after an earthquake in China, home and property loss, injury, death of family members, and witnessing deaths were risk factors for PTSD. Similarly, Jin and Li (2015) found that 24 months after the 2010 Yushu earthquake in China, mourning, being trapped under debris, and personal injury were the most significant risk factors for PTSD development in children. In current study, particularly, it is observed that experiencing injury or witnessing such situations, witnessing the death of a family member or acquaintance, witnessing the collapse of buildings, being trapped under debris, staying in tents or containers after the earthquake, and relocating or having their homes damaged are associated with higher post-earthquake stress levels. Indeed, witnessing the death/injury of a family member or acquaintance, or witnessing a dead body, can trigger stress responses by making people direct witnesses of a traumatic event (Forresi et al., 2020). In the context of COR theory, the positive relationship between the severity of earthquake

exposure and PTSD may be associated with the threat to individuals' resources. The earthquake may affect individuals' psychological and social resources, which may increase their stress levels (Hobfoll, 1989; Hobfoll et al., 1990; Hobfoll & Schumm, 2009). This study found that the post-traumatic stress level among earthquake-affected adolescent and young adult who survived a devastating earthquake was 72.5% four months after the event. When looking at the literature, a study conducted nine months after the Van-Erciş earthquake reported a PTSD rate of 35.5% among affected individuals (Boztaş et al., 2019). Similarly, a study on surviving children eleven months after the Bingöl earthquake revealed that 90.2% of them were at risk of a PTSD diagnosis (Bulut, 2009). Furthermore, a research conducted 30 months after the 2010 Haiti earthquake reported a prevalence rate of 36.75% for PTSD (Cénat & Derivois, 2014). In general, in the studies conducted, while some have observed a decrease in the prevalence of PTSD after earthquakes over time (Galea et al., 2005), others have reported an increase in PTSD prevalence over time (Salcioglu et al., 2007). The results of the current study appear to be higher than those of other studies. This difference may be associated with factors such as family loss, property damage, gender, coping ability, type of exposure to traumatic events, and the time period after the earthquake. Therefore, the increase in post-traumatic stress levels due to such traumatic experiences underscores the importance of post-disaster intervention and support programs. Providing psychological support and therapeutic interventions to people affected by such events can help recovery by increasing their ability to cope with stress (Acharya Pandey et al., 2023). Therefore, post-disaster response and support programs should focus on supporting living conditions and increasing resources to minimize the psychological impacts of disasters.

In Model 2, problem-focused coping and seeking social support coping variables are negatively related to IES-R scores. This indicates that higher scores in problem-focused coping and seeking social support coping are associated with lower IES-R scores. One possible interpretation of this finding could be that adolescent and young adult, despite being affected by the earthquake, actively engage in changing their circumstances, engaging in problem-solving activities, and increasing their social interactions, thus adopting positive coping strategies more frequently than before (Tang, 2006). Problem-focused coping refers to individuals' attempts to effectively deal with events by trying to solve problems, while seeking social support coping refers to individuals seeking emotional and practical support during challenging times (Lazarus & Folkman, 1984). Many studies have shown that problem-focused coping and seeking social support have positive effects on stress reactions and post-traumatic stress levels following traumatic events

(Cofini et al., 2015; Ehring et al., 2011). The COR theory suggests that individuals tend to acquire, maintain and protect their resources. In this case, a negative and significant relationship may help to reduce individuals' IES-R levels because active coping styles may increase the capacity to cope with stress and promote resource acquisition. This may reflect the resource conservation mechanism predicted by COR theory (Hobfoll, 1989). However, these two coping strategies have only accounted for a small percentage of the total variance, approximately 8%. This means that a significant portion of post-traumatic stress levels is explained by other factors, and the impact of problem-focused coping and seeking social support coping is limited. Therefore, it should be noted that in coping with traumatic stress, other coping strategies and personal characteristics also play a significant role. Researchers can use more comprehensive models in future studies to assess the influence of other factors and conduct more detailed analyses to understand the complex interactions of coping strategies.

In Model 3, it has been observed that with the inclusion of three variables, IES-R scores are significantly predicted. These three variables, earthquake exposure, problem-focused coping, and seeking social support coping, account for approximately 23% of the variance, indicating that they are significant factors that influence post-traumatic stress levels. The ΔR^2 value is 0.22, which means that the addition of these three variables explains an additional 22% of the IES-R scores beyond the model that only includes earthquake exposure (Model 1). This demonstrates that the inclusion of problem-focused coping and seeking social support coping variables contributes significantly to understanding post-traumatic stress. This situation indicates that adolescent and young adult who reported experiencing more severe levels of earthquake exposure also experienced fewer post-traumatic stress symptoms when they perceived higher levels of social support or used problem-focused coping styles (Haden et al., 2007). Furthermore, the high number of emergency demolition, heavily damaged, or collapsed houses (215.255) and the significant number of moderately damaged houses (25.957) in this region (T.C Cumhurbaşkanlığı, Strateji ve Bütçe Başkanlığı, 2023) indicate that adolescent and young adult may actively respond to a traumatic event due to their homes being affected and their lack of resources. Among these responses, they might make efforts to ensure their safety, seek support, and try to take steps to repair their homes (Löw et al., 2023). These findings highlight the importance of support perception and seeking for survivors of traumatic events.

Another significant finding in this study is the lack of a significant correlation between social support levels and IES-R scores. Therefore, it was not included in the model. While family support and social support are influential

factors on psychological well-being, there are also many other factors that can impact psychological adaptation (Alipour & Ahmadi, 2020). Indeed, other unaddressed or uncontrolled variables in our study, such as life events, personality traits, and socioeconomic status, could potentially impact the results. These unaccounted factors may contribute to the lack of a significant relationship between social support and IES-R scores. On the other hand, within the framework of the sociodemographic characteristics of the participants in the study, it was found that participants living with their parents had lower stress levels compared to other living arrangements. Although no significant relationship was found between social support and post-earthquake stress levels, it is thought that living within the family has potential benefits in terms of meeting the needs for security and attachment, especially in difficult situations.

The study has some limitations that should be acknowledged. The design of the study as a correlation method provides information only about associative relationships. Therefore, further experimental research may be needed to confirm causal relationships. The sampling used in the study, focusing only on the Kırıkhan district in Hatay, may limit the generalizability of the results. Conducting similar studies in different regions and other areas affected by earthquakes can enhance the applicability of the findings to a broader population. The study was conducted four months after the earthquake. However, the effects of the earthquake can change over time. Therefore, collecting data over a longer period may help to better understand the effects of the earthquake. External variables not considered or controlled in the study can influence the results and make the interpretation of the study's findings more complex. For instance, factors such as participants' prior traumatic experiences or socioeconomic status can affect the outcomes. We defined resource loss simply as a binary variable associated with residence building damage; we did not examine the degree or extent of other possible material effects on participants or their family members. Future studies should validate and expand our analyses with long-term follow-ups.

Conclusion

It was found that the participants had high levels of PTSD and that the level of exposure to earthquake, problem-focused coping and seeking social support affected post-traumatic stress symptoms, while the level of exposure to trauma was the most effective variable on PTSD. Participants who were exposed to high levels of earthquake exposure were also found to experience less posttraumatic stress symptoms when they used more social support seeking or problem-focused coping styles.

Traumatic events like earthquakes and natural disasters can cause long-term psychological effects on young individuals. The development of disaster management and intervention programs is of vital importance to support coping skills and preserve mental well-being for adolescent and young adult. These interventions should not be limited to addressing immediate needs in the first few months after the traumatic event but should also focus on at-risk populations.

Furthermore, more research is needed to better understand the psychopathological trajectories in children and adolescent and young adult after earthquakes and to determine the long-term effects. Studies conducted with a longitudinal approach can help track and comprehend the psychological impacts of earthquakes and disasters over time. Such studies can shed light on factors that are effective in coping with traumatic stress and elucidate long-term recovery processes. Additionally, creating awareness at the community level and implementing educational programs can be a significant step in reducing the impact of traumatic events. Providing various resources and educational materials can help the community be prepared for disasters and receive proper support in a healthy manner after traumatic events.

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Data availability The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Declaration

Ethical approval In accordance with the Helsinki Declaration, ethics approval was obtained from the Ethics Committee of the Faculty of Medicine at Pamukkale University (Ethics approval number: E-60116787-020-399975). Prior to beginning the study, participants were requested to sign the voluntary permission form.

Consent to participate All participants signed the written consent to participate in the study after being informed in detail about the study procedures. They were informed about the right to withdraw from the study at any stage of the study. The principle of "autonomy" was fulfilled by recruiting participants on a voluntary basis, and the principle of "privacy and protection of privacy" was met by assuring participants that any information obtained would be kept confidential.

Consent for publication Consent to publish based on de-identified data was obtained from all participants included in the study.

Conflicts of interest The author have no conflicts of interest to disclose.

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