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The Relationship Between Post-Earthquake Trauma Levels and Sleep Quality in Adolescents: A Cross-Sectional Study

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Ethics Committee Statement: Permission to use Post-Earthquake Trauma Level Assessment Scale was obtained via e-mail from Tanhan and Kayri (2013) and PSQI was obtained via e-mail from Ağargün et.al (1996) and for research permission Ethics Committee of Cyprus Aydın University (Date: 25.06.2025 –IRB 2025.003). Identity information was not obtained or shared in any way by the parents. In order not to cause ethical violations within the scope of the research, informed consent was obtained from the parents.

Conflict of Interest
The authors have no relevant financial or non-financial interests to disclose.

Author Contributions

Conceptualization: ÇMH, SC, MZA; Data collection ÇMH, SC, MZA; Formal analysis ÇMH, SC, MZA; Fund Acquisition: ÇMH, SC, MZA; Research: ÇMH; Methodology: ÇMH; Project

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ÖZ

GİRİŞ ve AMAÇ: Bu çalışma, deprem sonrası travma düzeyleri ile ergenlerdeki uyku kalitesi arasındaki ilişkiyi incelemek amacıyla kesitsel bir çalışma olarak gerçekleştirilmiştir.

YÖNTEM ve GEREÇLER: Kesitsel nitelikteki bu çalışmanın örneklemini depremden etkilenen ergenler oluşturmuştur. Veriler, 26 Haziran 2025 ile 26 Eylül 2025 tarihleri arasında çevrimiçi anket aracılığıyla toplanmıştır. Veriler, Sosyo-Demografik Veri Toplama Formu, Deprem Sonrası Travma Düzeyi Değerlendirme Ölçeği ve Pittsburgh Uyku Kalitesi İndeksi (PUKİ) kullanılarak toplanmıştır. Verilerin analizinde frekans, yüzde dağılımı ve aritmetik ortalamalar hesaplanmış, ölçekler arasındaki ilişkinin Pearson momentler çarpımı çoklu korelasyon analizi kullanılarak incelenmesi için SPSS 27.0 istatistik programı kullanılmıştır.

BULGULAR: Araştırmaya dahil edilen ergenlerin %55,2'si 12-14 yaş aralığında olup, %52,7'si kızdır. Deprem Sonrası Travma Düzeyi Değerlendirme Ölçeği alt ölçeğinde en yüksek puan heyecan kısıtlamaları için, PSQI alt ölçeğinde ise en yüksek puan gündüz uyku bozukluğu için bulunmuştur. Ergen Deprem Sonrası Travma Düzeyi Değerlendirme Ölçeği ile Pittsburgh Uyku Kalitesi arasında zayıf pozitif bir korelasyon (r=0,474, p<0,001) bulunmuştur.

TARŞMA ve SONUÇ: Bu çalışma, deprem sonrası travma düzeyleri ile uyku kalitesi arasında bir ilişki olduğu sonucuna varmıştır. Ergenlere bu konuda psikolojik destek sağlanmalı ve deprem sonrası travma düzeyleri ile uyku kalitesinin değerlendirilmesi için araştırma ve planlama yapılması önerilmektedir.

Anahtar Sözcükler: *Ergenler, Deprem, Uyku, Kalite, Kesitsel Çalışma.*

ABSTRACT

INTRODUCTION: This study was conducted as a cross-sectional study to examine the relationship between levels of post-earthquake trauma and sleep quality in adolescents.

METHODS: In this cross-sectional study, the sample consisted of adolescents affected by the earthquake. The study sample consisted of adolescents, with the majority of participants being in the 12-14 age range (55.2%). Data were collected via an online survey between June 26, 2025, and September 26, 2025. Data were collected using the Socio-Demographic Data Collection Form, the Post-Earthquake Trauma Level Assessment Scale and the Pittsburgh Sleep Quality Index (PSQI). Frequency, percentage distribution, and arithmetic means were calculated for data analysis, and SPSS 27.0 statistical software was used to examine the relationship between the scales using Pearson product-moment multiple correlation analysis.

RESULTS: Of the adolescents included in the study, 55.2% were between the ages of 12 and 14, and 52.7% were female. The highest score on the Post-Earthquake Trauma Level Assessment Scale subscale was found for excitement-limitations, and the highest score on the PSQI subscale was found for daytime sleep dysfunction. A weak positive correlation (r=0.474, p<0.001) was found between the Adolescent Post-Earthquake Trauma Level Assessment Scale and Pittsburgh Sleep Quality.

DISCUSSION AND CONCLUSION: This study concluded that there is a relationship between post-earthquake trauma levels and sleep quality. Adolescents should be provided with psychological support for this issue, and research and planning to assess post-earthquake trauma levels and sleep quality are recommended.

Keywords: *Adolescents, Earthquake, Sleep, Quality, Cross-sectional Study.*

INTRODUCTION

Turkey is located on the Alp-Himalaya belt, one of the world's most significant earthquake zones. Consequently, it has experienced numerous earthquakes throughout its history, causing significant loss of life and property (Öztürk, 2018). Although the largest earthquake in Turkey's history was the 1939 Erzincan earthquake with a magnitude of 7.9, and it affected several provinces at the time (Haçin, 2014), it was not as destructive as the 2023 Kahramanmaraş earthquakes. The reason why the 7.8 and 7.6 magnitude earthquakes that occurred 9 hours apart on February 6, 2023, with their epicenter in Kahramanmaraş, were more destructive is attributed to the vastness of the affected area and the short interval between the two earthquakes (Hussain et.al., 2013). Twenty-one days after the two major earthquakes, a 5.6-magnitude earthquake with its epicenter in Malatya was also felt in Kahramanmaraş, Gaziantep, Adıyaman, and Şanlıurfa, causing collapses in damaged buildings (Hussain et.al., 2013). The earthquake caused major environmental destruction, social burden, and economic damage in 11 provinces (Hussain et.al., 2013). This situation caused the current destruction, social burden, and economic damage to increase 11-fold. Indeed, as a result of these earthquakes, thousands of people lost their lives and hundreds of thousands were injured. It also caused the destruction of many buildings and forced many people to live in temporary shelters such as tent cities and container cities (Türkmen et.al., 2023). The study by Telli and Altun (2023) also emphasized that after the earthquake, some people lived in single-story houses in villages with 3-4 families, while others went to live with relatives in areas unaffected by the earthquake. During this process, students living alone or with their families in tents, containers, or together with multiple families, while also experiencing the stress of aftershocks, have been negatively affected physically, mentally, and socially. Furthermore, these difficult conditions have reduced the quality of students' study environments and led to a decrease in productivity (Telli and Altun, 2023). Therefore, earthquakes are among the natural disasters that most affect our country, causing mental health problems on an individual and societal level in addition to their destructive effects (Aker et.al., 2014).

Three years after the Yushu earthquake, a study found that 24.4% of adolescents had possible post-traumatic stress disorder (PTSD) (Xiao et.al., 2019). The prevalence of PTSD among high school and university students who experienced the Van earthquake was found to be 39.3% (Omaç et.al., 2017). On the other hand, it has been found that individuals experience difficulty initiating and maintaining sleep and have recurring nightmares after an earthquake (Thordardottir et.al., 2016). Indeed, a study conducted after the Wenchuan earthquake found that sleep problems, particularly among adolescents, increased between 18 and 30 months after the earthquake (Geng et.al., 2013). However, it should be noted that the relationship between sleep disorders and PTSD is complex and cyclical, and is also common among adolescents. In other words, a traumatic event such as an earthquake affects sleep, and the melatonin hormone released by the pineal gland, which initiates sleep, has an effect on homeostasis (Tamer et.al. 2023).

Studies examining the relationship between adolescents' post-earthquake trauma levels and sleep quality are limited. There is no original study in the literature that investigates post-earthquake trauma levels and the components of sleep and sleep quality in a multi-centered manner. Therefore, it is thought that examining a traumatic event such as an earthquake in a study that addresses the components of sleep in detail will contribute to a better understanding of the cycle proposed in the literature.

METHOD

Research Type

It is a type of cross-sectional study.

Study Place and Design

Research data was collected using an online survey form (Google Form) between 26 Haziran 2025- 26 Eylül 2025, with support from the parents of adolescents who voluntarily participated and gave their consent.

Research Questions

Is there a relationship between post-earthquake trauma levels and sleep quality in adolescents?

Population

The study's population consisted of adolescents. However, because it consisted of adolescents living in Hakkari province and experiencing the earthquake, the study was conducted online. The sample size for the study was calculated based on the number of variables used in multivariate data analyses. In this context, the study sample was selected from adolescents living in Hakkari province and experiencing the earthquake using convenience sampling, a non-probability sampling method. The study was conducted with 325 adolescents who met the participation criteria and whose parents provided informed consent.

Research Inclusion/Exclusion Criteria:

Inclusion

Adolescents who voluntarily agreed to participate in the study and completed the informed consent form and experienced an earthquake.

- Adolescents with parental consent.

Study Exclusion Criteria

Adolescents who agreed to participate in the study voluntarily, did not complete the informed consent form, and did not experience an earthquake.

- Adolescents without parental consent.

Variables of the Study

Independent Variable

-Age, gender, class status, family income level, were there anyone with you at the time of the earthquake, what was the condition of your home after the earthquake, were there any first-degree relatives trapped under the rubble during the earthquake, did you have any first-degree relatives who died during the earthquake?

Dependent Variable

- Post-Earthquake Trauma Levels and Sleep Quality

Questionnaire

The forms listed below will be used to collect research data. The data collection forms to be used in the research are included in the appendix.

- Socio-demographic data collection form
- Post-earthquake trauma level assessment scale
- Pittsburgh sleep quality index (PSQI)

Socio-Demographic Data Collection Form: This form consists of 8 questions in total, such as age, gender, class status, your family's income level, were there anyone with you at the time of the earthquake, what was the condition of your house after the earthquake, did you have a first-degree relative trapped under the rubble during the earthquake, did you have a first-degree relative who died during the earthquake.

***Post-Earthquake Trauma Level Assessment Scale*:** Developed by Tanhan and Kayri (2013), its internal consistency coefficient (Cronbach's alpha) was found to be 0.87. The scale is a five-point Likert type with response options of “Not at all applicable to me,” “Somewhat applicable to me,” “Moderately applicable to me,” “Very applicable to me,” and “Completely applicable to me.” All items on the scale are positive items. There are no reverse items on the scale, and the score obtained from the scale ranges from 20 to 100. Higher scores on the scale indicate that individuals are more affected by the earthquake. The scale also consists of five subscales. The sub-dimension related to “Sleep Problems” consists of 3 questions (1-3), the sub-dimension related to “Behavioral Problems” consists of 4 questions (4, 7, 9, 10), the sub-dimension related to “Cognitive Structure” consists of 4 questions (5, 6, 13, 17), the subscale related to “Emotional Structure” consists of 4 questions (11, 14, 15, 16), and the subscale related to “Emotional Limitations” consists of 5 questions (8, 12, 18, 19, 20) (Tanhan and Kayri

2013). A score between 52.385±5.051 on the scale corresponds to a threshold value indicating that individuals are traumatized. A score above or below this value indicates a high or low level of post-earthquake traumatic symptoms. In this research sample, the Cronbach's alpha coefficient was found to be 0.82, and according to the results of the two-stage cluster analysis, 49.80±15.18 was taken as the threshold value.

Pittsburgh Sleep Quality Index (PSQI): Developed by Buysse and et.al. (1989), it has been shown to have adequate internal consistency (Cronbach's alpha=0.80), test-retest reliability, and validity. In our country, the validity and reliability study of the PSQI was conducted by Ağargün and et. (1996) (Cronbach's alpha = 0.80). The PSQI consists of 7 components: subjective sleep quality (component 1), sleep latency (component 2), sleep duration (component 3), habitual sleep efficiency (component 4), sleep disturbance (component 5), sleep medication use (component 6), and daytime dysfunction (component 7). The sum of the seven component scores gives the total PSQI score. Each response is scored on a scale of 0-3 based on symptom frequency. The total scale score ranges from 0 to 21. A total scale score of 0-4 indicates good sleep quality, while a score of 5-21 indicates poor sleep quality. In this study, the Cronbach's alpha coefficient for the PSQI was found to be 0.80.

Data Collection

A survey was used as a data collection technique in the research, and the online survey form (Google Forms) was disseminated through social networks and social media, and many people were tried to be reached. Within the scope of the research, data were collected online (Google form) from the parents of adolescents in Hakkari province. The principles of the Helsinki Declaration of Human Rights were adhered to at all stages of the study.

Statistical Analysis

All statistical analyses were performed using the IBM SPSS (Statistical Package For Social Sciences) Statistics for Windows software package (Version 27.0; IBM Corp., Armonk, NY, USA). Data were analyzed using the frequency, percentage distribution, and arithmetic means relationship between the scales using Pearson product-moment multiple correlation analysis.

FINDINGS

The demographic characteristics of the adolescents included in the study and their earthquake experiences are shown in **Table 1.** It was found that more than half of the adolescents were aged 12-14, and the majority were female adolescents. It was determined that 60% of those living with their families at the time of the earthquake had moderately damaged homes, and more than half had relatives trapped under the rubble during the earthquake.

Table 1.

Sosyo-demographic characteristics and earthquake experiences of adolescents (N=325)

Sociodemographic characteristics	n	%
Age		
Ages 12-14	202	55,2
Ages 15-17	83	32,1
18 Age	40	12,7
Gender		
Girl	163	52,7
Boy	162	47,3
What grade are you in?		
9. Class	80	22,7
10. Class	92	26,7
11. Class	129	38,5
12. Class	24	12,1
Your family's income level		
Good	32	20

Average	301	75
Bad	17	5
Was there anyone with you at the time of the earthquake?		
Alone	42	12,2
With friends	31	7,6
With family	252	80,2
What was the condition of your house after the earthquake?		
No damage	49	8
Mild damage	123	60
Moderate damage	91	20
Major damage	62	12
Did you have a first-degree relative trapped under the rubble during the earthquake?		
Yes	212	54,3
No	113	47,7
Did you have a first-degree relative who died during the earthquake?		
Yes	57	24
No	268	76

Students' Post-Earthquake Trauma Level Assessment Scale and PSQI total and subcomponent scores are presented in **Table 2**. Among the Post-Earthquake Trauma Level Assessment Scale subdimensions, the highest score was found to be related to excitement limitations, while the lowest score was related to behavioral problems. Among the PSQI subdimensions, the highest score was found to be related to daytime sleep dysfunction, while the lowest score was found to be related to sleep duration.

Table 2.

Adolescents' total and subscale scores of post-earthquake trauma level assessment scale and PSQI (N=325)

	Mean±SS
Post-earthquake trauma level assessment scale and its subdimensions	
Sleep problems	8,2±3,4
Behavioral problems	7,5±2,4
Cognitive structure	12,2±4,7
Affective structure	11,2±3,4
Emotional limitations	13,5±5,0
Total score	52,6±18
PSQI and its Subdimensions	
Subjective sleep quality	1,9±0,9
Sleep latency	1,8±0,8
Sleep duration	0,6±1,0
Habitual sleep efficiency	2,8±0,7
Sleep disturbance	1,5±0,6
Sleeping medication use	0,1±0,5
Daytime sleep dysfunction	2,9±0,7
Total score	11,6±5,2

Mean: Mean, SD: Standard Deviation, Post-Earthquake Trauma Level Assessment Scale, PSQI: Pittsburgh Sleep Quality Index

The results of the multiple correlation tests between PSQI and Post-Earthquake Trauma Level Assessment Scale scores are presented in **Table 3.** It was found that as the scores on the Post-Earthquake Trauma Level Assessment Scale subscales of sleep problems, behavioral problems, cognitive structure, affective structure, and emotional limitations increased, PSQI scores also increased, indicating a weak positive correlation between them. It was determined that as students' Post-Earthquake Trauma Level Assessment Scale total scores increased, their PSQI scores also increased (r=0.464, p=0.001). It was determined that as students' sleep problem scores increased, their Post-Earthquake Trauma Level Assessment Scale subdimension scores and total scores also increased.

Table 3.

Relationship between PSQI total score and post-earthquake trauma level assessment scale total and sub-dimension scores (N=325)

		SP	**BP**	**CS**	**AS**	**EL**	**Post-Earthquake Trauma Level Assessment Scale**
PSQI	r	0,401	0,440	0,373	0,310	0,395	0,474
	p	**0,001***	**0,001***	**0,001***	**0,001***	**0,001***	**0,001***
Sleep Problems (SP)	r		0,698	0,686	0,574	0,546	0,798
	p		**0,001***	**0,001***	**0,001***	**0,001***	**0,001***
Behavioral Problems (BP)	r			0,747	0,658	0,750	0,901
	p			**0,001**	**0,001**	**0,001**	**0,001**
Cognitive Structure (CS)	r				0,726	0,710	0,890
	p				**0,001***	**0,001***	**0,001***
Affective Structure (AS)	r					0,644	0.833
	p					**0,001***	**0,001***
Emotional Limitations (EL)	r						0,888
	p						**0,001***

Post-Earthquake Trauma Level Assessment Scale; PSQI: Pittsburgh Sleep Quality Index; r: Pearson correlation coefficient

DISCUSSION and CONCLUSION

Earthquakes are the most threatening, destructive, and unpredictable natural disasters. They can cause massive destruction and loss of life, and survivors may exhibit severe psychological symptoms. The aim of this study is to determine the relationship between post-earthquake trauma levels and sleep quality in adolescents in a cross-sectional manner.

Within the scope of the research, some studies based on the sociodemographic findings of adolescents show similarities. Tang and et.al. (2018) studied post-traumatic stress disorder, anxiety, and depression symptoms in adolescent earthquake survivors: accompanying illnesses and related sleep-disrupting factors, while Zhou and et.al. (2019) studied the course of sleep problems in adolescents after the Wenchuan earthquake: The role of post-traumatic stress disorder symptoms in relation to sociodemographic characteristics, and Fan and et. al. (2017)'s Cohort profile: Wenchuan earthquake adolescent health cohort study, and Rusmini and Hariawan (2020)'s Post-earthquake quality of life outcomes among students also show parallels.

According to the findings, adolescents' total PSQI scores indicate that they have poor sleep quality. This suggests that it is caused by post-traumatic stress following the earthquake. Koçak and et.al. (2024) studied post-traumatic symptoms and sleep problems in children and adolescents after two earthquakes in Turkey and found that more than half of the children experienced severe trauma and sleep disorders, with sleep disorders increasing more frequently in children who experienced earthquake trauma. Geng and et.al. (2013) found in their study of adolescents who experienced the Wenchuan earthquake that the prevalence of general sleep problems remained

consistently high from 18 months (29.22%) to 30 months (28.79%) after the earthquake. The difference between adolescents' total and subscale scores on the Post-Earthquake Trauma Level Assessment Scale was found to be statistically significant. This significant difference was attributed to adolescents being greatly affected by the earthquake and experiencing trauma as a result. In a study by Wang and et.al. (2020) on the relationships between exposure to trauma, post-traumatic stress disorder, and symptoms of depression in adolescents who survived the 2013 Lushan earthquake, it was concluded that the earthquake had an impact. Fan and et.al. (2015) found meaningful results related to trauma in their study of the longitudinal course of post-traumatic stress disorder symptoms in adolescents after the Wenchuan earthquake in China, as did Wang and You (2022) in their study of post-disaster trauma and cultural healing in children and adolescents: Evidence from the Wenchuan earthquake. Silwal and et.al. (2022) examined post-traumatic stress disorder and depressive symptoms in adolescents following the 2015 Nepal earthquake: A longitudinal study by Forresi and et.al. (2022) examined post-traumatic stress disorder, emotional, and behavioral difficulties in children and adolescents two years after the 2012 Italy earthquake: The results of an epidemiological cross-sectional study also indicated an indirect relationship with the impact of the trauma they experienced.

A weak positive correlation was found between adolescents' post-earthquake trauma levels (total and sub-components) and their total PSQI scores. Sleep problems are an issue experienced by adolescents after an earthquake. Kahraman and Çubukcu (2025) observed high anxiety levels and impaired sleep quality in adolescents affected by the earthquake, and a clear relationship was seen between increased earthquake anxiety and impaired sleep quality. In a study conducted by Wahab and colleagues (2021) on adolescents, the prevalence of post-traumatic stress symptoms was found to be 69.9%. These results showed that these symptoms affected sleep quality and daily activities. In a study conducted by Marthoenis and et.al. (2019) in Indonesia, it was reported that approximately 58.3% of adolescents experienced trauma stress disorder and sleep problems. In a cross-sectional study by Aylaz and et.al. (2025) on the relationship between post-earthquake trauma levels and sleep quality in university students, a weak positive correlation was found between trauma level and Pittsburgh Sleep Quality Index scores. Goenjian and et.al. (2011) conducted a longitudinal study on PTSD, depression, and quality of life in adolescents after the Parnitha earthquake and concluded that there was an increase in sleep problems and a deterioration in sleep quality. The results of Bavafa and et.al. (2019) study on the relationship between the severity of depression, anxiety, and stress symptoms and sleep quality among earthquake victims in Kermanshah suggest that the severity of depression, anxiety, and stress can predict changes in the overall sleep quality of those affected by the earthquake. Stress was determined to be the sole determinant of overall sleep quality and the only factor that could explain the components of sleep quality. The results of Karabulut and et.al. (2024) on the relationship between post-earthquake anxiety and sleep problems, back and neck pain in earthquake victims centered in Kahramanmaraş also revealed that post-earthquake anxiety is associated with sleep problems and back and neck pain. The results of Geng and et.al. (2018) study on the possible relationships between sleep problems and subtypes of anxiety symptoms in adolescents exposed to disasters indicate that there is a relationship between sleep problems and anxiety symptoms. Chen and et.al. (2021) found that patterns of change in sleep problems predict mental health problems in adolescents: A 10-year cohort study on the Wenchuan earthquake in China showed that sleep problems exhibited heterogeneity after a deadly earthquake. It was concluded that more attention should be paid to individuals with stable-high and increasing sleep patterns and that the earthquake affected sleep quality. Aksu and Imrek (2023) conducted a review study from the perspective of child and adolescent psychiatry on the earthquake disaster in Turkey: From a child and adolescent psychiatry perspective, some children may develop psychiatric symptoms such as acute stress reactions, post-traumatic stress disorder, depression, anxiety disorder, increased risk of suicide, sleep disorders, substance use disorders, and psychotic disorders. The findings of this research, as evidenced in previous studies, support the evidence that trauma experienced by adolescents exposed to earthquakes is associated with poor sleep quality.

The study has certain limitations. Since the data for this study consists of adolescents who experienced the earthquake, the research results are limited to the population in which it was conducted. Therefore, generalizing the results to other populations with different types of trauma should be done with caution. The data was collected electronically (via social media platforms such as WhatsApp and Instagram) using a questionnaire method based on the consent of the adolescents and their parents and via Google Forms, which constitutes a limitation of the study. Collecting data electronically leads to a lack of knowledge about the reasons for non-response and the mental state of non-respondents.

In conclusion, according to the results obtained from this study on post-earthquake trauma levels and sleep quality in adolescents, a weak positive and statistically significant relationship was found between post-earthquake trauma levels and PSQI total scores. It was determined that as the Post-Earthquake Trauma Level Assessment Scale total score increased, PSQI scores also increased. Psychological support services should be planned and provided for adolescents after an earthquake, and training should be given on what to do and how to cope during times of stress. It is recommended that the trauma levels and sleep quality of adolescents who have experienced an earthquake be assessed and monitored when necessary.

Limitations

The study has certain limitations. Since the data for this study consists of adolescents who experienced the earthquake, the research results are limited to the population in which it was conducted. Therefore, generalizing the results to other populations with different types of trauma should be done with caution. The data was collected electronically (via social media platforms such as WhatsApp and Instagram) using a questionnaire method based on the consent of the adolescents and their parents and via Google Forms, which constitutes a limitation of the study. Collecting data electronically leads to a lack of knowledge about the reasons for non-response and the mental state of non-respondents.

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