

The relationship between earthquake fear and earthquake knowledge level among university students and the effect of sociodemographic characteristics

Üniversite öğrencilerinde deprem korkusu ile deprem bilgisi düzeyi arasındaki ilişki ve sosyodemografik özelliklerin etkisi

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doi.org/10.35232/

estudamhdsd.1776684

Abstract

Earthquakes, which are prevalent in seismically active regions such as Türkiye, significantly impact the physical and psychological well-being of individuals and frequently elicit fear. The objective of this study is to investigate the relationship between earthquake fear, knowledge levels, and sociodemographic characteristics among university students. This cross-sectional study was conducted with 360 university students (mean age: 21.2±2.2 years; 37.5% male) enrolled at Ondokuz Mayıs University between February and April 2025. Participants were drawn from Health Sciences, Medicine, Education, and Engineering faculties. Data were acquired using the nine-item sociodemographic form, seven-item Earthquake Fear Scale, and the 19-item Earthquake Knowledge Level Scale through self-reporting. No significant gender difference was observed in earthquake knowledge, but females reported significantly higher earthquake fear ($p<0.001$). Students from Health Sciences and Education faculties exhibited significantly higher knowledge and fear scores compared to those from Medicine and Engineering faculties ($p<0.001$, $p=0.047$, respectively). While direct earthquake experience did not significantly alter fear or knowledge, losing a loved one in an earthquake correlated with significantly higher fear scores ($p=0.031$). No significant correlation was found between earthquake fear and earthquake knowledge levels ($r=0.08$, $p=0.128$). Based on our findings, it is recommended that universities foster a “culture of preparedness” through practical training and drills, develop psychological support strategies for at-risk groups, and conduct multidisciplinary longitudinal studies to examine the long-term effects of educational interventions.

Keywords: Earthquake, fear, knowledge, university students

Özet

Türkiye gibi sismik olarak aktif bölgelerde yaygın olan depremler, bireylerin fiziksel ve psikolojik sağlığını önemli ölçüde etkiler ve genellikle korkuya neden olur. Bu çalışmanın amacı, üniversite öğrencileri arasında deprem korkusu, bilgi düzeyleri ve sosyodemografik özellikler arasındaki ilişkiyi araştırmaktır. Bu kesitsel çalışma, 2025 yılı Şubat ve Nisan ayları arasında Ondokuz Mayıs Üniversitesinde kayıtlı 360 üniversite öğrencisi (ortalama yaş 21,2±2,2; %37,5'i erkek) ile yürütüldü. Katılımcılar Sağlık Bilimleri, Tıp, Eğitim ve Mühendislik fakültelerinden seçildi. Veriler, öğrencilere dağıtılan dokuz maddelik Sosyodemografik veri formu, yedi maddelik Deprem Korkusu Ölçeği ve 19 maddelik Deprem Bilgisi Düzeyi Ölçeği kullanılarak öz-bildirim yoluyla elde edildi. Deprem bilgisi açısından cinsiyetler arasında önemli bir fark gözlenmedi, ancak kadınlarda önemli ölçüde daha yüksek deprem korkusu saptandı ($p<0,001$). Sağlık Bilimleri ve Eğitim fakültelerinden öğrenciler, Tıp ve Mühendislik fakültelerinden öğrencilere kıyasla önemli ölçüde daha yüksek bilgi ve korku puanları sergiledi (sırasıyla $p<0,001$, $p=0,047$). Doğrudan deprem deneyimi korku veya bilgiyi önemli ölçüde değiştirmezken, depremde sevilen birini kaybetmek önemli ölçüde daha yüksek korku puanları ile ilişkiliydi ($p=0,031$). Deprem korkusu ile deprem bilgi düzeyleri arasında önemli bir korelasyon bulunamadı ($r=0,08$, $p=0,128$). Sonuçlarımız doğrultusunda üniversitelerin uygulamalı eğitimler ve tatbikatlar aracılığıyla bir “hazırlık kültürü” oluşturması, risk altındaki gruplara yönelik psikolojik destek stratejileri geliştirmesi ve eğitim müdahalelerinin uzun vadeli etkilerini incelemek için çok disiplinli boylamalı çalışmaların yapılması önerilmektedir.

Anahtar Kelimeler: Deprem, bilgi, korku, üniversite öğrencisi

ESTUDAM Public Health Journal.

2026;11(2):111-120

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Geliş Tarihi / Received:

02.09.2025

Kabul Tarihi / Accepted:

09.03.2026

Introduction

Earthquakes, phenomena caused by the sudden release of tension in the Earth's outer crust generating seismic waves that shake the ground, exert detrimental effects on individuals' lives, with the extent of these impacts varying according to their magnitude (1). Situated on the Alp-Caucasus-Himalaya seismic belt, characterized as one of the most active tectonic regions and the world's second most impactful earthquake zone, Türkiye is frequently subjected to seismic activity (2). Annually, numerous individuals globally and in Türkiye face the adverse consequences of earthquakes due to factors such as inadequate planning, erroneous settlement choices, and non-resistant structures (3). The earthquake that occurred in Nepal's Gorkha region on April 25, 2015, resulted in 22,300 injuries and 8,964 fatalities (4). In Türkiye, the 7.7-magnitude earthquake on February 6, 2023, claimed 50,783 lives and left 115,353 injured (5).

Beyond their destructive and fatal outcomes, earthquakes can also have adverse effects on physical and mental health (6). Research investigating emotional responses post-earthquake has revealed that fear is experienced more profoundly than other emotions (7, 8). A study encompassing Türkiye, Serbia, and Macedonia demonstrated that fear stemming from disasters is exceptionally high, with earthquakes being the most feared type of disaster (9). Fear is an innate emotional response that can be triggered by threats such as natural disasters, war, loss of loved ones, and unemployment (10). However, if negative effects such as restlessness, anxiety, and uneasiness persist in individuals after these threats have been eliminated, it may indicate the development of an anxiety disorder (11). Children and adolescents exposed to natural disasters

have been found to experience chronic anxiety issues persisting for many years after the event, carrying these problems into later life (12, 13). In adolescents, persistent anxiety has been shown to potentially trigger other psychological problems in later stages of life (14, 15). Possessing knowledge about earthquakes has been shown to reduce earthquake fear and to enhance preparedness levels (16). Studies conducted in Indonesia, Pakistan, and Türkiye have found a positive correlation between earthquake knowledge and earthquake risk perception, and a reduction in earthquake fear among those who received earthquake-related education (16-18). Understanding the relationship between earthquake fear and earthquake knowledge levels can facilitate the development of educational programs, reduce fatalities due to lack of information during earthquakes, and promote public awareness regarding earthquake preparedness (19). Furthermore, as future professionals—including prospective healthcare workers and engineers—university students will play a pivotal role in societal resilience and post-disaster response. Therefore, evaluating the knowledge and fear levels of this demographic is essential for developing targeted educational programs that foster a 'culture of preparedness' and mitigate the long-term impact of seismic events. The youngsters are acknowledged as agents of change by the people-centered preventive approach to disaster risk of United Nations Office for Disaster Risk Reduction and should be given the space and modalities to contribute to disaster risk reduction, in accordance with legislation, national practice and educational curricula (20). Therefore, we aimed to investigate the relationship between earthquake fear and earthquake knowledge levels among

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How to Cite:

Dündar C, Yılmaz A. The relationship between earthquake fear and earthquake knowledge level among university students and the effect of sociodemographic characteristics. *ESTUDAM Public Health Journal*. 2026;11(2):111-120

university students, and the association with their sociodemographic characteristics.

Material and Method

Participants and procedure

This cross-sectional study collected data from a sample of students attending Ondokuz Mayıs University's Kurupelit campus between February and April 2025. Ondokuz Mayıs University attracts students from all across Türkiye and, with an annual capacity exceeding 39,000 students, provides a vast and heterogeneous research universe that includes students from earthquake-affected regions. At the time of the study, the ratio of students receiving health-related education to those in non-health-related fields within the faculties and vocational schools on the Kurupelit campus was 1/1.5. To ascertain the effect of health education on earthquake fear and knowledge levels, it was decided that half of the sample would be selected from faculties in health sciences and the other half from non-health-related faculties. Sample size calculation was performed using Minitab-21 (Minitab, LLC. Ver.21, USA 2021) based on data from similar studies, determining a minimum sample size of 74 students per faculty with a Type 1 error of 5% and a study power of 80%. To mitigate potential data loss, the sample size was increased by 20%, resulting in a decision to include 90 students from each faculty.

A two-stage selection process was employed for the study. First, the participating faculties were selected through simple random sampling from a list of all faculties located within the campus. The convenience sampling method was employed to select students from the faculties included in the sample. During classroom visits scheduled between lectures, the study's objectives were briefly explained, and questionnaires were distributed to those who volunteered to participate. The data collection phase was completed over a period of three months, as the process was conducted by a single researcher two days a week and was occasionally subject to schedule adjustments. Inclusion criteria for the study were: being enrolled in one of the Ondokuz Mayıs University's Faculty of Medicine, Health Sciences, Education, or

Engineering during the 2024-2025 academic year, and voluntarily agreeing to participate in the research. Exclusion criteria were: having a physician-diagnosed psychiatric disorder and refusing to participate in the research. Therefore, 22 students were excluded from the study.

Ethical approval for the study was obtained from the Ondokuz Mayıs University Clinical Research Ethics Committee (KAEK:2024/430). The study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. After informed consent was obtained from all participants, data were collected by self-report using the questionnaire. The questionnaire included a nine-item sociodemographic data form prepared by the researchers, a 19-item Earthquake Knowledge Level Scale, and a seven-item Earthquake Fear Scale.

Measures

Sociodemographic data form

The survey included nine descriptive items covering participants' demographic and background information: gender, age, faculty, marital and economic status, living arrangements, earthquake exposure, loss of a loved one in an earthquake, and any physician-diagnosed psychiatric illness.

Earthquake Fear Scale (EFS)

This measurement tool, developed by Prizmic Larsen et al. (21) in 2023, inspired by the COVID-19 fear scale, is used to measure earthquake fear. The validity and reliability study of the scale was conducted by Satıcı et al. (22), and its Cronbach's alpha coefficient was determined to be 0.89. Comprising seven items with a five-point Likert structure (1=Strongly Disagree, 5=Strongly Agree), higher scores obtained from this scale indicate a higher level of earthquake fear.

Earthquake Knowledge Level Scale (EKLS)

This is a 19-item, five-point Likert scale developed by Genç and Sözen (23). The Cronbach's alpha value of the scale was determined by the researchers to be 0.868. The sub-dimensions of the scale are defined as "Knowledge of Earthquake Zone Distribution" (7 items), "Knowledge of Earthquake Effects" (7 items), and "Earthquake Education" (5 items). The lowest possible score on the scale

is 19, and the highest is 95. Increasing scores indicate that individuals possess more knowledge about earthquakes.

Data Analysis

Data obtained from the questionnaire were analyzed using SPSS 26 (IBM Corporation, Armonk, NY, USA). Numerical variables were presented as mean \pm standard deviation, while qualitative data were presented as number and percentage. The normality of numerical variables was assessed using the Kolmogorov-Smirnov test. Student's t-test and ANOVA were used for inter-group comparisons of parametric distributed continuous variables, while Mann Whitney U and Kruskal Wallis tests

were used for non-parametric distributed variables. Spearman correlation analysis was employed to examine the relationship between numerical variables. The level of statistical significance was accepted as " $p < 0.05$ ".

Results

The study group comprised a total of 360 university students, with a mean age of 21.2 ± 2.2 years, of whom 135 (37.5%) were male and 225 (62.5%) were female. Half of the students resided in state dormitories, and the majority of students living in dormitories were from health sciences and education faculties (Table 1).

Table 1: Sociodemographic characteristics of participants

Characteristics	n	%
Gender		
Male	135	37.5
Female	225	62.5
Marital status		
Married	5	1.4
Single	355	98.6
Economic status		
Income equals expenses	199	55.3
Income less than expenses	104	28.9
Income more than expenses	57	15.8
Accommodation		
State dormitory	182	50.6
Family home	78	21.7
Student house	77	21.4
Private dormitory	23	6.3
Faculty of		
Medicine	90	25.0
Health Sciences	90	25.0
Education	90	25.0
Engineering	90	25.0
Earthquake experience		
Yes	214	59.4
No	146	40.6
Loss of relative in earthquake		
Yes	20	5.6
No	340	94.4
Total	360	100.0

The distribution of scale scores according to sociodemographic characteristics is presented in Table 2. While no statistically significant difference was found between the mean EKLS scores based on gender ($p=0.260$), the mean EFS scores were significantly higher in females than in males ($p<0.001$). Students from the Faculties of Health Sciences and Education exhibited significantly higher EKLS and EFS scores than those from the

Faculties of Medicine and Engineering ($p<0.001$ and $p=0.047$, respectively). No statistically significant difference was observed in scale scores between participants who had experienced an earthquake and those who had not ($p=0.657$, $p=0.627$). However, the earthquake fear scores of participants who had lost a relative in an earthquake were statistically significantly higher compared to those who had not experienced such a loss ($p=0.031$).

Table 2: Distribution of scale scores by sociodemographic characteristics

Characteristics	EKLS (Mean±SD)	p	EFS (Mean±SD)	p
Gender				
Male	65.9±9.3	0.260	18.7±6.2	<0.001
Female	66.9±8.4		23.0±6.1	
Economic status				
Income equals expenses	66.4±8.1	0.930	21.7±6.7	0.890
Income less than expenses	65.9±9.1		21.2±6.1	
Income more than expenses	68.8±8.5		21.6±7.2	
Accommodation				
State dormitory	66.5±9.0	0.001	21.9±6.1	0.620
Family home	64.0±7.4		20.7±5.8	
Student house	62.7±10.7		21.4±6.1	
Private dormitory	68.1±8.6		21.4±7.0	
Faculty				
Medicine	63.8±8.4	<0.001	20.3±5.3	0.047
Health Sciences	69.2±8.7		21.6±7.4	
Education	68.4±7.6		22.8±6.3	
Engineering	64.8±9.1		20.8±6.6	
Earthquake experience				
Yes	66.3±8.4	0.657	21.5±6.3	0.627
No	66.9±9.3		21.1±6.7	
Loss of relative in earthquake				
Yes	68.2±7.6	0.184	24.8±6.7	0.031
No	66.4±8.8		21.2±6.4	

EKLS = Earthquake Knowledge Level Scale; EFS = Earthquake Fear Scale; SD = Standart Deviation

Regarding the “*earthquake education*” sub-dimension of the Earthquake Knowledge Level Scale, female students (13.2 ± 4.5) were found to score significantly higher than male students (11.6 ± 5.2 ; $p=0.002$). Nevertheless, the overall mean score obtained by the students in this sub-dimension (12.6) constituted only half of the maximum possible score (25.0).

A weak and statistically non-significant correlation was found between participants’ Earthquake

Knowledge Level Scale scores and Earthquake Fear Scale scores ($r=0.08$, $p=0.128$).

Discussion

The mean score on the Earthquake Knowledge Level Scale among university students was found to be relatively high. Similar studies conducted in Türkiye have also shown that the mean knowledge level scale score ranges between 67 and 73 (23-25). No significant difference was found in earthquake

knowledge levels between male and female students. This finding suggests that both male and female students have equal access to earthquake-related information and education. It also indicates that educational programs and awareness efforts have a similar impact on both genders. A study on students in Bangladesh reported a relationship between earthquake knowledge and gender, with female students possessing more knowledge than male students (26). Another study conducted in China found no significant relationship between earthquake knowledge and gender (27). Contrary to our study, another study conducted in Türkiye found a significant difference in earthquake knowledge levels between genders (28). These discrepancies observed across studies may stem from variations in educational programs and regional factors. The content, scope, duration, or teaching methods of earthquake education provided in one region may differ from another (29). Additionally, regional socio-cultural factors and earthquake risk perception can also influence knowledge levels.

The third sub-dimension of the Earthquake Knowledge Level Scale, titled “*Earthquake Education*”, pertains to the education individuals have received regarding earthquakes. The items in this sub-dimension measure the status of pre-earthquake training, as well as education on the psychological and social impacts of earthquakes (25). Our study suggests a deficiency in this area, as university students achieved only half of the maximum possible score in this sub-dimension. Possessing comprehensive knowledge about earthquakes positively influences preparedness and the ability to take an active role in implementing necessary measures for oneself and one’s environment (30). The materialization of disaster preparedness and the equipping of individuals and households against earthquake effects are made possible through a “*culture of preparedness*” nurtured by systematic earthquake instruction within school and family environments. This indicates that providing earthquake education is a vital necessity for fostering a culture of disaster preparedness.

Regarding earthquake fear levels by gender, female students’ mean scores were found to be higher than those of male students. Consistent with our findings, studies conducted on university

students in two different regions of Türkiye also show that women experience more fear and are more affected by earthquakes compared to men (31, 32). A study conducted with 722 university students who experienced the Van earthquake also showed that female students had a higher risk of developing post-traumatic stress disorder after the earthquake than male students (33). These findings suggest that women may experience higher anxiety due to their greater susceptibility to post-earthquake psychological impacts.

In our study, no significant difference was found in earthquake knowledge level scores between those who had experienced an earthquake and those who had not, nor between those who had lost a relative in an earthquake and those who had not. A study conducted in North America has shown that university curricula enhance students’ disaster awareness, while the establishment of university emergency procedures affects students’ disaster preparedness (34). In a study involving 739 students in Bolu, university students who had experienced an earthquake were found to have a higher level of earthquake knowledge (24). Conversely, studies conducted in Türkiye, similar to our findings, reported no relationship between earthquake knowledge level and earthquake experience (28, 35). Variations observed in the literature regarding earthquake knowledge levels result from sociodemographic, cultural differences, and diverse disaster information strategies across countries (36). It might be expected that individuals living in regions known to be more prone to earthquakes tend to acquire more knowledge and awareness about them, thus explaining the differences in research outcomes.

In this study, while there was no significant difference in earthquake fear levels between those who had experienced an earthquake and those who had not, the mean scores of those who had lost a relative in an earthquake were significantly higher than those who had not experienced such a loss. Consistent with our findings, in a survey involving 537 university students from Serbia, Türkiye, and Croatia, it was found that participants who had experienced a disaster showed more fear than those who had not (21). Another study conducted in Romania found that those with

earthquake experience reported higher levels of fear (37). Similar to the literature, studies in Türkiye have determined that individuals who have experienced earthquakes tend to fear them more (22, 38). The differences in findings may be due to regional, economic, and various psychological factors. Political, economic, and social conditions in different countries can affect individuals' anxieties and mental health, and the prevalence of anxiety disorders can vary according to welfare levels and social risk factors across countries (39).

A study examining earthquake knowledge levels across faculties found that students in health sciences had lower average earthquake knowledge levels compared to other faculties (25). Another study focusing on students in Vocational Schools of Health Services reported earthquake knowledge levels above the scale's midpoint (28). In our study, health science students had higher earthquake knowledge scores than other faculties, while medical faculty students had lower scores. The higher proportion of state dormitory residents among health sciences students, who also had higher earthquake knowledge scores, might explain this observation. Research indicates that individuals with lower socioeconomic status have a higher perception of risk, and there is a positive correlation between earthquake risk perception and knowledge level (17, 30). Regarding earthquake fear scores, medical faculty students had the lowest average, while health science students had higher averages than engineering and medical faculties. It can be hypothesized that as disaster awareness and risk perception increase, earthquake fear may also increase. Similarly, conducted research supports this hypothesis (18, 40).

We found no significant relationship between participants' earthquake fear levels and earthquake knowledge levels. Conversely, the literature includes studies reporting a relationship between earthquake knowledge and earthquake risk perception, and that perceived risk influences earthquake fear (17, 18). Furthermore, research conducted in China indicates that earthquake knowledge and risk perception significantly affect earthquake preparedness (27). A study in Mexico found that although women were more knowledgeable about earthquakes than men, they reported greater fear

of them (19). A study conducted in Türkiye stated that being knowledgeable about earthquakes reduces fear stemming from them and raises public awareness regarding earthquake preparedness (16). The divergent findings in various studies stem from methodological differences such as the study population, sample size, and the scales used. The variety of disaster preparedness activities undertaken by countries and their differing perceptions of risk can also explain this situation. A study evaluating countries' disaster risk perception indicated that different communities tend to use various information sources for disaster preparedness, have different risk perceptions, and in high-risk earthquake regions like Japan, individuals are more knowledgeable and more anxious about earthquakes (41).

Limitations

To our knowledge, this is the first study in the literature to evaluate the relationship between earthquake knowledge level and earthquake fear. However, our study has some limitations. This study was conducted in only one city and among university students, thus not representing all students. Being a cross-sectional study, a clear cause-and-effect relationship cannot be definitively stated. Results might differ immediately after an earthquake or in highly affected regions. Furthermore, the subjective nature of the scales used and the reliance on participants' self-report constitute other limitations.

Conclusions

This study identified no statistically significant correlation between earthquake knowledge levels and earthquake fear scale scores among the participating university students. However, the low scores observed in the earthquake education sub-dimension indicate a deficiency in this area. Consequently, universities should organize periodic drills and workshops in collaboration with disaster management authorities to foster a practical "*culture of preparedness*". Beyond the demographic variations identified, higher fear levels were observed among female students and those who had experienced a loss. Providing targeted psychological support services to these at-risk groups—particularly female students—would be

instrumental in mitigating the long-term effects of psychological trauma. Furthermore, future research should employ longitudinal designs to examine the long-term impact of educational interventions on the knowledge-fear dynamic in a multidisciplinary manner.

Funding

The authors did not receive support from any organization for the submitted work.

Author contributions

A.Y. was responsible for conceptualization, methodology, formal analysis, and writing – original draft preparation. C.D. contributed to formal analysis and was involved in writing – original draft, writing – review and editing, and supervision. All authors have read and agreed to the published version of the manuscript.

Ethics approval

Ethical approval for the study was obtained from the Ondokuz Mayıs University Clinical Research Ethics Committee (KA EK:2024/430).

Conflict of interest statement

The authors declare no conflicts of interest.

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