Earthquake fear, sleep quality, and intolerance of uncertainty: A study of adults with earthquake experience

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SUMMARY

Objective: The aim of this study was to examine the mediating role of intolerance of uncertainty in the relationship between fear of earthquake and sleep quality in individuals with direct or indirect earthquake experience.

Method: A total of 351 adults who directly or indirectly experienced the 6 February earthquake participated in the study. Data were obtained with the Earthquake Fear Scale, Insomnia Complaints and Sleep Quality Baseline Scale and Intolerance of Uncertainty Scale. The relationships between the variables were examined using the basic mediation model.

Results: In this study, fear of earthquake (β= .12**, 95% CI = [.03, .20], t=2.89, p<.01) and intolerance of uncertainty (β= .12***, 95% CI = [.06, .17], t=4.20, p<.001) had a positive and significant effect on insomnia complaints and sleep quality. In addition, intolerance of uncertainty mediated the relationship between fear of earthquake and insomnia complaints and sleep quality (β= .09***, 95% CI = [.05, .14], SH=.02).

Discussion: This study suggests that the increase in insomnia complaints and sleep quality problems in individuals with earthquake experience may be related to the increase in earthquake fear and intolerance of uncertainty. In this direction, it can be suggested that experts working with individuals with earthquake experience should focus on intolerance of uncertainty and fear of earthquake while working with sleep problems. It is also recommended that the experiences of individuals under the age of 18 should be examined and more longitudinal studies should be planned for future studies.

Key Words: Earthquake fear, Sleep quality, Insomnia problems, İntolerance of uncertainty, The mediating role.

INTRODUCTION

Humanity has faced challenging life events since its existence. One of these challenging life events is earthquakes, one of the types of natural disasters. Earthquakes, which are frequently experienced in many parts of the world, also manifest themselves in different regions and with different severity in Turkey. Earthquakes bring along a disaster life that involves different challenging processes before and after. The February 6, 2023 earthquake centered in Kahramanmaraş can be given as an example of this situation. Because it can be said that the Kahramanmaraş earthquake was effective in a wide geography in the physical dimension (1), while it affected almost all of Turkey in social and psychological terms. As a matter of fact, it is stated that the earthquake had long-lasting effects on those who directly experienced the earthquake as well as those who indirectly witnessed what happened in that region (through media, etc.) (2). It is emphasized that these effects cannot be limited to physical damage and loss of life, but should also be evaluated in social, cognitive, psychological and economic dimensions (3,4,5,6,7). The fact that individuals experiencing the earthquake exhibit emotional, cognitive, physical and social responses at different levels supports this (8). This result may be

DOI: 10.5505/kpd.2025.19794

Cite this article as: Akkaya M, Dursun A. Earthquake fear, sleep quality and intolerance of uncertainty: A study of adults with earthquake experience. Turkish J Clin Psych 2025; 28:59-70

The arrival date of article: 27.07.2024, **Acceptance date publication:** 04.12.2024

Turkish J Clinical Psychiatry 2025;28: 59-70

considered to indicate the psychological effects of the earthquake. It is noteworthy that after the earthquake, individuals' level of satisfaction with life decreased compared to before the earthquake, regardless of their personality characteristics and sociodemographic status (9). In addition, it is observed that individuals who experience earthquake experience depression, depression and nervous disorder (10). It is also reported that individuals who experience earthquake-like disasters experience less positive emotions and more negative emotions (11). One of these negative emotions is fear of earthquake.

Fear of earthquake is one of the symptoms that can be effective on the lives of individuals affected by earthquake after observation of what happened during the earthquake (12). It is considered important to investigate earthquake fear, which is related to the emotional reactions and mental health of individuals during the earthquake process, which is a challenging life event (13). In this context, earthquake fear includes emotional fear reactions such as disturbing thoughts and somatic fear reactions such as heart palpitations (14). When the fear of earthquake experienced by individuals is evaluated from the perspective of classical conditioning, it can be said that the earthquake is an unconditioned stimulus, and stimuli such as earthquake-induced power outages, experiencing the earthquake at home and being caught while asleep are conditioned stimuli (15). For this reason, avoidance behaviors such as hesitating to enter the house after an earthquake, wanting to keep the lights on, and staying awake with the fear of an earthquake reinforce the fear of earthquakes, and small-sized tremors lead to the fear of earthquakes to persist for a long time (16). In addition, fear of earthquakes mediates the traumatization of individuals after an earthquake and indirectly increases depression (17), triggers self-efficacy and posttraumatic stress symptoms (18), and even increases the risk of individuals experiencing Posttraumatic Stress Disorder (PTSD) (19,20). Prolonged exposure to fear may cause individuals to feel certain effects more intensely. One of these effects is sleep problems and difficulty in sleeping, which manifest themselves in different developmental periods (21,22,23). As a matter of fact, it was observed that individuals affected by the earthquake most frequently experienced fear/anxiety and insomnia problems after the Kahramanmaraş-centered earthquake that recently occurred in Turkey (24). Therefore, it can be said that it is important to address the relationship between fear and sleep problems experienced after an earthquake, which can affect people of all ages.

It is observed that individuals who experience earthquake experience sleep delay and problems in sleep quality. In addition, the stress levels of individuals with sleep delay increase, and decreased sleep quality or sleep disorders may indicate high levels of depression and anxiety (21). In the post-earthquake period, many individuals with insomnia had to use sleep-related medication (12). Similarly, it has been emphasized that the sleep quality of women, young people, those whose houses were damaged in the earthquake, those who lost their loved ones and those with a history of psychiatric illness were negatively affected after the earthquake (24). In addition to deterioration in sleep quality after the earthquake, disturbing nocturnal behaviors such as nightmares related or not related to the earthquake, terror attacks or screams during sleep are observed and the effects may continue for many years (25). Therefore, it is important to investigate the reasons behind insomnia and decreased sleep quality after earthquake-like disasters. Because investigating whether individuals affected by the earthquake process will suffer from insomnia and poor sleep quality can facilitate the understanding of the conditions that may help them to have the desired sleep quality (26). Therefore, it is important to address the difficulties related to sleep quality (27), which occur after natural disasters such as earthquakes and may last for many years, in both epidemiologic and psychiatric studies (28). In this direction, it is emphasized that intolerance of uncertainty is one of the concepts that can be investigated in relation to sleep problems to be experienced during the earthquake (29).

Intolerance of uncertainty, which is triggered by the perception of the absence of important, sufficient or clear information about a situation and consequently defined as a dispositional inability to withstand a negative reaction (30), is seen as a transdiagnostic factor that occurs in emotional disorders and is associated with difficulties in the regulation

of emotions (31). In addition, it is emphasized that intolerance of uncertainty, which is a dispositional trait that emerges as negative beliefs about uncertainty and its consequences (32), is associated with social anxiety, obsessive-compulsive disorder, depression, panic, eating disorders and anxiety (33). At the same time, while intolerance of uncertainty is negatively associated with PTSD, it is positively associated with posttraumatic development and it is stated that it is important to address it in order to understand the experiences of individuals after the earthquake (34). As a matter of fact, it is observed that anxiety and depression, which may occur intensely during the earthquake process (35), increase insomnia and negatively affect sleep quality, and sleep problems are thought to be related to intolerance of uncertainty (36). Although there are studies indicating that there are post-earthquake sleep problems in Turkey (37,38), there are no studies examining the relationship between sleep quality and sleep problems with fear of earthquake and intolerance of uncertainty. Considering that Turkey is an earthquake country, it can be thought that investigating the effects of post-earthquake fear on individuals' sleep life is important in terms of taking relevant measures. Because it is quite possible that people who live in regions where earthquakes are frequently experienced or who have previous earthquake experience may experience earthquake fear. Fear of earthquake causes different physical, emotional and psychological symptoms and affects sleep status (38). Similarly, it has been reported that sleep quality of individuals with earthquake fear is negatively affected and it is emphasized that different studies are needed to understand the relationship (37). It may be considered necessary to examine the effect of intolerance of uncertainty in the relationship between fear of earthquake and sleep quality and insomnia. Because it has been emphasized that the use of negative coping strategies after natural disasters such as earthquakes is related to intolerance of uncertainty (39). It is seen that there are different studies on the relationship between fear of earthquake and intolerance of uncertainty (34), fear of earthquake and sleep quality (37,40,41) and sleep quality and intolerance of uncertainty (29,42,43) and the importance of the relationship between variables is emphasized. Despite all these explanations, there is no study addressing the effect of intolerance of uncertainty on the relationship between earthquake fear and sleep quality. In summary, in this study, it is thought to be important to examine the mediating effect of intolerance of uncertainty in the relationship between earthquake fear and sleep quality. It has been suggested that intolerance of uncertainty, which appears frightening in terms of its definition and consequences, can be tolerated, perhaps accepted and embraced (44). It seems possible to cope with intolerance of uncertainty by exploring guided by CBT approaches or by intentionally experiencing uncertainty in the absence of threat (45). In this respect, it is thought that knowing the mediating effect of intolerance of uncertainty while intervening in fear-related sleep problems and sleep quality that may be experienced after earthquake experience will contribute to the related intervention studies. As a matter of fact, Turkey has recently experienced a major earthquake and research results have been obtained that insomnia is experienced and sleep quality is affected after the earthquake experience (37,38). Despite this, there are no studies that examine in detail the experiences that may have an impact on sleep quality of individuals experiencing the earthquake process. Sleep is a vital necessity for human life. It is emphasized that sleep quality may be affected and sleep problems may be experienced after challenging life events such as earthquakes. In this process, it may be important to address the relationship between fear, one of the basic emotions, which is an important element in human life, and sleep quality. Because it is stated that fear of earthquake may be experienced intensely after earthquake experience (13,14). It is thought to be valuable in terms of revealing the relationship between the two elements and emphasizing the importance of emotion regulation studies to control earthquake fear in order to improve sleep quality and cope with sleep problems. However, individuals with low tolerance for uncertainty may develop intense fear, especially for events that are difficult to predict, such as earthquakes. Time-oriented conditioning (15), which will accompany the difficulties in emotion regulation, may make it difficult to cope with the uncertainty of an earthquake that may occur at night, making it difficult to stay awake or have difficulty sleeping. This situation indicates that intolerance of uncertainty may be effective between earthquake fear and sleep status.

The lack of a study examining this relationship makes it difficult to fully explain the relationship between the variables. In this respect, the results of the research are considered important in terms of supporting mental health professionals working with individuals affected by the process and experiencing sleep problems to understand the relationship of the problem with intolerance of uncertainty and fear of earthquake and to guide the interventions to be carried out. In line with the explanations, the questions sought to be answered in the research are as follows:

- Do sleep quality and insomnia complaints differ according to direct experience of the February 6, 2023 earthquake?

- Does intolerance of uncertainty have a mediating role in the relationship between fear of earthquake and sleep quality and sleep problems?

METHOD

Research Model

In this study, causal-comparison research, which is among the descriptive research types, was used as a model. Firstly, it was examined whether experiencing the earthquake beforehand and directly experiencing it would create a significant difference on sleep quality and insomnia complaints. The hypotheses formed in this direction are as follows:

Hypotheses

- H1: Sleep quality and insomnia complaints of adults differ significantly according to their prior experience of earthquake?

- H2: Sleep quality and insomnia complaints of adults differ significantly according to their direct experience of earthquake?

Then, based on the theoretical framework, the relationship between adults' earthquake fear levels, intolerance of uncertainty levels, insomnia complaints and sleep quality variables was examined using the basic mediation model. In this context, the research model is presented in Figure 1:

Hypotheses:

- H3: Adults' fear of earthquake positively affects intolerance of uncertainty.

- H4: Adults' fear of earthquake positively affects poor sleep quality and sleep complaints.

- H5: Intolerance of uncertainty positively affects poor sleep quality and sleep complaints.

- H6: Intolerance of uncertainty has a mediating role in the relationship between fear of earthquake and sleep quality and insomnia complaints of adults.

Study Group

The study group of this research was determined by convenience sampling. However, information

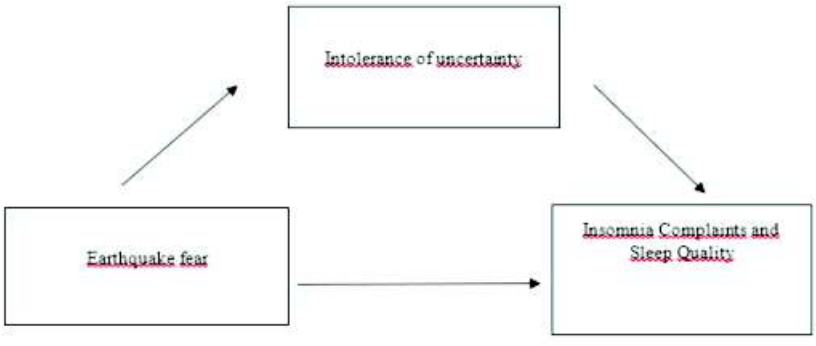

Figure 1: Research Model

about the research process was given before data collection, and care was taken not to collect data from individuals with traumatic symptoms related to the earthquake process. The data consisted of 351 adult participants aged between 18 and 64 who voluntarily responded to the form prepared through Google Form between November and December 2023. The mean age of the participants was 32.75 years and the standard deviation was 9.23 years.

Data Collection Tools

Personal Information Form: The form developed by the researchers consists of demographic information such as gender and age as well as two closed-ended questions about earthquake experience. These questions are presented below.

- Before the February 6, 2023 earthquake, did you have a direct earthquake experience?

- Did you directly experience the February 6, 2023 earthquake? (Were you in one of the 11 cities during the earthquake?)

Earthquake Fear Scale: The Earthquake Fear Scale is a 7-item scale adapted by Satıcı et al. (46) for participants aged 18 years and over to determine the degree of experiencing earthquake fear. The lowest score that can be obtained from the scale is 7 and the highest score is 35. There is no reverse coded item in the earthquake fear scale. The adaptation process of the scale was carried out in three stages and the analyses were carried out with the data obtained from 407 participants in the first stage, 505 participants in the second stage and 382 participants in the third stage. The Earthquake Fear Scale was created by revising the Fear of COVID-19 Scale developed by Ahorsu (2022) and others. Confirmatory factor analysis was conducted to test the construct validity of the scale and it was concluded that the scale had a single-factor structure. It was reported that the scale items accounted for 54.75% of the variance explained. The CFI value of the seven-item earthquake fear scale was calculated as 0.922, NFI value as 0.914 and SRMR value as 0.053. The Cronbach's alpha reliability coefficient of the scale was found to be .89 in the adaptation study. In this study, the Cronbach's alpha reliability coefficient of the earthquake fear scale was .89.

Intolerance of Uncertainty Scale: The Intolerance of Uncertainty Scale was developed by Carleton et al. in 2007. The scale was adapted into Turkish by Sarıçam et al. A total of 593 university students participated in the adaptation of the scale into Turkish. There were no reverse coded items in the scale. The scale can be scored according to sub-dimensions as well as total score. The scale has a score range between 12 and 60. The higher the score, the higher the intolerance of uncertainty. The KMO sampling compatibility coefficient of the scale was .85 and Barlett's test $\chi 2$ value was 5052.53 ($p < .001$, sd= 66). In the confirmatory factor analysis applied for the construct validity of the scale, it was found that 12 items were collected in two dimensions (prospective anxiety, inhibitory anxiety) consistent with the original form ($\chi^2 = 147.20$, sd= 48, RMSEA=.073, CFI=.95, IFI=.95, GFI=.94, SRMR=.046). The factor loadings of the scale ranged between .55 and .87; Cronbach's alpha internal consistency coefficient was .88 for the whole scale, .84 for the prospective anxiety sub-dimension, and .77 for the inhibitory anxiety sub-dimension. In this study, Cronbach's alpha internal consistency coefficient was .83 for the prospective anxiety sub-dimension, .88 for the inhibitory anxiety sub-dimension and .90 for the whole scale.

Insomnia Complaints and Sleep Quality Baseline Scale: The Insomnia Complaints and Sleep Quality Baseline Scale was developed by Gomes et al. in 2015. The scale was adapted into Turkish by Ağar et al. The adaptation of the scale into Turkish was conducted with data obtained from 180 individuals aged between 20 and 40 years. The scale consists of seven items and has a two-factor structure. The two-factor structure is also mentioned in the original study of the scale. The variance explained by the two factors together was calculated as 61.43%. The variance explained by the first factor alone was 42.52% and the variance explained by the second factor alone was 18.91%. When calculating the scale scores, item 6a and item 6b are reverse scored. These items consist of positive statements about sleep. The other five items in the scale consist of negatively worded statements expressing

Table 1. Findings Related to Descriptive Statistics

Variables	1	2	3	$\bar{}$	SS	Skewness	Kurtosis
1. Fear of earthquakes	-			22.89	6.72	-.27	-.60
2. Intolerance of uncertainty	.55**	-		39.52	9.83	-.10	-.28
3.Insomnia complaints and sleep quality	.31**	.34**	-	12.58	4.60	.25	-.09

sleep problems. A high score on the scale means a decrease in sleep quality and an increase in insomnia complaints. Cronbach's alpha coefficient of the scale was calculated as .75 for the total dimension of falling asleep and waking up problems. In this study, the Cronbach's alpha coefficient of the scale was calculated as .71.

Data collection

Within the scope of the research, ethics committee permission was first obtained (02.10.2023/230669), and then the data were collected by presenting an informed consent form to the participants.

The data collection tools used in the study and the research participation form consisting of the personal information form prepared by the researchers were applied to 353 participants aged between 18 and 64 in the data group between November and December 2023 via Google Forms. The link to participate in the research was shared by the researchers on various social media channels and chat groups, and in this way, the research participants were reached randomly. The data obtained through Google Forms were transferred to the Google Forms Excel Spreadsheet, and the data in the Excel spreadsheet were transformed into the SPSS 22.00 package program ready for use.

Data analysis

Within the scope of the research, data were first collected from 353 participants. It was checked whether there were outliers among the data. Mahalanobis distance method was used to identify outliers. The control of outliers was calculated through the Mahalanobis distance, and accordingly, since the responses of two participants were among the outliers, the final data was realized with the responses obtained from 351 participants. The analysis of the data collected within the scope of the research was carried out with SPSS 22.00 package program. In order to test the mediation model, Hayes PROCESS MACRO Plugin, which is included in the SPSS 22.00 package program, was used. Bootstrap method, Pearson correlation coefficient and descriptive statistics were used to determine the mediation model. Bootstrap analyses to determine whether the mediation effects are statistically significant were also performed with the MACRO plug-in. Estimations were made according to the 95% confidence interval.

RESULTS

Within the scope of the research, descriptive statistics of the variables were analyzed first. Table 1 shows the descriptive statistics (correlation, arithmetic mean, standard deviation, skewness and kurtosis values) of the variables.

When Table 1 is examined, it is seen that the correlation between the variables varies between .31 and .55, and the tolerance (0.70) and VIF (1.42) values do not contain a correlation relationship that indicates a multicollinearity problem. In addition, the skewness and kurtosis coefficients of the variables were between -.60 and .25 and the data were normally distributed.

Within the scope of the study, the participants were asked whether they had experienced an earthquake before February 6 and whether they had experienced the February 6, 2023 earthquake. The relationship between the participants' responses to these items and sleep quality and waking problems was analyzed by independent samples t-test. Table 2 below shows the independent samples t-test results regarding the relationship between the participants' earthquake experiences before February 6, and Table 3 shows the independent samples t-test results regarding the relationship between the participants' direct experience of the February 6 earthquake and sleep quality and waking problems.

Levene's test statistic was used to examine whether the variances were distributed homogeneously,

Table 2. 6 Independent Samples t Test Results Regarding Sleep Quality and Waking Problems According to Direct Experience of Another Earthquake Before the February 2023 Earthquake

	Before the February 6, 2023 earthquake, did you have any direct experience of another earthquake? Yes (n = 225)		No (n = 126)				
Variable	$\bar{x}$	SS	$\bar{x}$	SS	sd	T	p
Sleep quality and waking problems	12.19	4.45	13.27	4.79	349	-2.120	.04*

Note. *p < .05

which is a prerequisite for conducting an independent samples t test, and since the Levene's test value was .44 (>.05), it was concluded that the variances were distributed homogeneously and the independent samples t test could be performed. When Table 2 is examined, it is concluded that people who did not directly experience an earthquake before the February 6, 2023 earthquake ($\bar{x}$=13.27) had significantly (p <.04) more problems with sleep quality and waking up than the participants who directly experienced an earthquake before the February 6, 2023 earthquake ($\bar{x}$=12.19).

Levene's test statistic was used to examine whether the variances were distributed homogeneously, which is a prerequisite for conducting an independent samples t test, and since the Levene's test value was .86 (>.05), it was concluded that the variances were distributed homogeneously and the independent samples t test could be performed. When Table 3 is examined; it is seen that there is no significant difference (p<.05) between the mean scores of the participants according to their direct experience of the February 6, 2023 earthquake. Although participants who directly experienced the February 6, 2023 earthquake reported that they had more problems with sleep quality and waking up than those who did not experience this earthquake, this difference was not significant.

The main hypothesis of the study is to test the mediating role of intolerance of uncertainty in the relationship between fear of earthquake and sleep quality and sleep problems. Model 4 from the PROCESS Macro Model developed by Hayes (49) was used to test the hypothesis. Accordingly, the independent variable of the study was fear of earthquake (X), the dependent variable was insomnia complaints and sleep quality (Y), and the mediating variable was intolerance of uncertainty (M). In order to conduct mediation analysis, some assumptions must be fulfilled. These are the existence of a significant relationship between the dependent variable and the mediator variable, the existence of a significant relationship between the independent variable and the mediator variable, and the existence of a significant relationship between the independent variable and the dependent variable

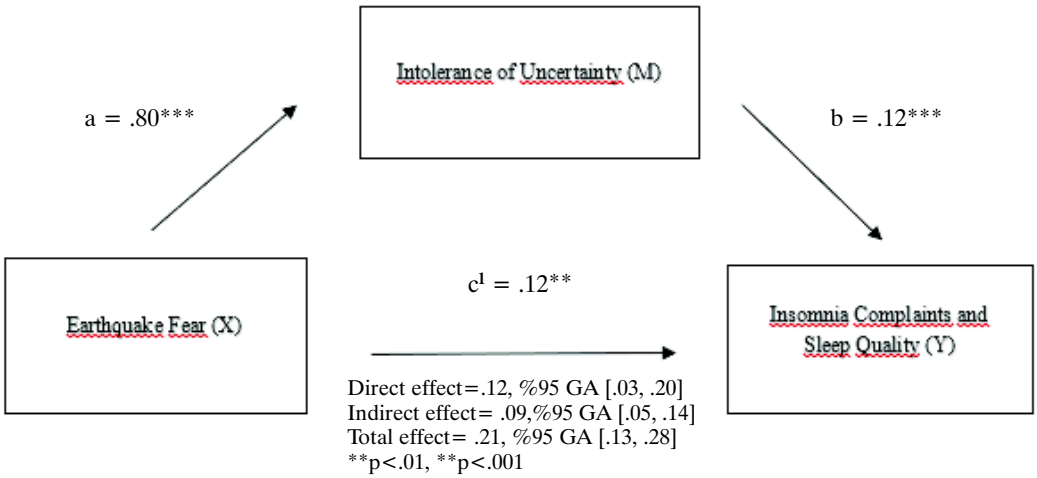

Figure 2. Mediating Role of Intolerance of Uncertainty in Experiencing Fear of Earthquake and Insomnia Complaints and Sleep Quality Related Problems. Model-4

Table 3. February 6, 2023 Independent Samples t Test Results on Sleep Quality and Waking Problems According to Direct Experience of the Earthquake

	Did you directly experience the February 6, 2023 earthquake? Yes (n = 163)		No (n = 188)				
Variable	$\bar{}$	SS	$\bar{}$	SS	sd	*T*	*p*
Sleep quality and waking problems	12.65	4.55	12.52	4.65	349	.27	.79

(50). However, it is possible to mention two types of mediation. These are full mediation and partial mediation. While full mediation is when the relationship between the independent variable and the dependent variable is found to be insignificant when the mediator variable is included, partial mediation is when the relationship between the independent variable and the dependent variable is reduced with the inclusion of the mediator variable (51). After the assumptions of mediation analysis were met, the analyses were conducted. The mediation model is presented in Figure 2 below.

Figure 2 shows that fear of earthquake significantly predicts intolerance of uncertainty, intolerance of uncertainty significantly predicts insomnia complaints and sleep quality, and finally fear of earthquake significantly predicts insomnia complaints and sleep quality. In addition, the direct effect (B=.12, 95% CI [.03, .20], indirect effect (B= .09, 95% CI [.05, .14] and total effect (B=.21, 95% CI [.13, .28]) between fear of earthquake and insomnia complaints and sleep quality are significant. The values related to the effects between the variables of the mediation model examined in the study are given in Table 4 below. The significance of the effects in the mediation model was evaluated with 5000 Boostrap samples. Estimations were made at 95% confidence interval.

Table 4 shows that fear of earthquake (β= .12**, 95% CI = [.03, .20], t=2.89, p<.01) and intolerance of uncertainty (β= .12***, 95% CI = [.06, .17], t=4.20, p<.001) have a positive and significant effect on insomnia complaints and sleep quality. In addition to these findings, the indirect effect of fear of earthquake on insomnia complaints and sleep quality was found to be positive and significant, and intolerance of uncertainty mediated the relationship between fear of earthquake and insomnia complaints and sleep quality (β= .09***, 95% CI = [.05, .14], SH=.02).

As a result, it can be said that intolerance of uncertainty has a partial mediating role in the relationship between fear of earthquake and insomnia complaints and sleep quality. As the participants' fear of earthquake and intolerance of uncertainty increased, their complaints of insomnia and problems in sleep quality increased. In other words, the increase in insomnia complaints and problems in sleep quality is associated with the increase in fear of earthquake and intolerance of uncertainty.

DISCUSSION

This study examines the relationships between individuals' fear of earthquakes, sleep quality/insomnia problems and intolerance of uncertainty. In this direction, the experiences of individuals after the recent earthquake in Turkey on February 6, 2023 were tried to be understood. First, the relationship between sleep problems after the earthquake and the earthquake experience was examined. It was concluded that individuals who did not directly experience an earthquake before the February 6, 2023 earthquake had more problems with sleep

Table 4. Values Regarding the Effects Between Variables of the Mediation Model

Variables		Beta	SE	Minimum Confidence Interval	Maximum Confidence Interval
Fear of Earthquake (X) and Sleep Quality (Y)	Insomnia Complaints	.12**	.04	.03	.20
Earthquake Fear (X)	Uncertainty	.80***	.07	.65	.92
Intolerance (M)					
Intolerance of Uncertainty (M) Complaints and Sleep Quality (Y)	Insomnia	.12***	.03	.06	.17
Fear of Earthquakes Insomnia Complaints and Sleep Quality	Intolerance of Uncertainty	.09***	.02	.05	.14
Total Impact		=.21 %95 GA [.13, .28]			

**p< .01, ***p<.001, n=351, SE= standard error, bootstrap sample=5000, unstandardized beta coefficient (Beta) reported.

quality and insomnia than individuals who directly experienced an earthquake before the February 6, 2023 earthquake. It is emphasized that people living in regions where earthquakes are frequently experienced or who have previously experienced earthquakes may show different physical, emotional and psychological symptoms and experience sleep problems because they experience earthquake fear more intensely (38). Nevertheless, the findings of this study point to a different point. Individuals with no previous earthquake experience are more likely to have decreased sleep quality and increased sleep problems. This result may indicate that individuals who have not experienced the earthquake closely before show more intense emotional reactions and experience uncertainty more intensely. As a matter of fact, it is noteworthy that many individuals experience severe insomnia as a result of overstimulation in the post-earthquake period (12). Similarly, the relationship between intolerance of uncertainty and sleep quality and sleep problems has been emphasized (29). In this respect, it is thought that if individuals who experience the earthquake for the first time have difficulty in making sense of these first experiences and do not have experience in the level of tolerance for uncertainty, it may make it difficult for them to cope with the earthquake experience and the overstimulation they will experience may decrease sleep quality and increase sleep problems compared to other individuals.

Another situation examined in this study is the relationship between direct earthquake experience and sleep problems and sleep quality. In this direction, it is noteworthy that even though individuals who directly experienced the February 6, 2023 earthquake experienced sleep quality and waking problems more than those who did not directly experience the earthquake, the difference was not significant. This situation can be explained by the fact that the earthquake took place in a very large region and even if they were not in the earthquake zone themselves, their relatives were affected or many individuals lost their lives due to the fact that it was a nationwide disaster, that is, a social trauma. As a matter of fact, individuals who are exposed to what happened in the earthquake zone through social media or mass media are more likely to experience indirect traumatic effects. In addition, the fact that the first of the major earthquakes occurred at night and occurred during sleeping hours is thought to increase the likelihood of triggering the fear of being caught in an earthquake during sleep. Because fear of earthquake may occur as a result of conditioning to stimuli such as experiencing the earthquake at home and being caught while asleep (15). Thus, individuals who do not want to sleep or who experience sleep delay may experience more intense stress, and the likelihood of decreased sleep quality or disorders increases (21). In addition, the fact that women, young people, individuals whose houses were damaged in the earthquake, who lost their loved ones and who have a history of psychiatric illness are in the risky group for sleep problems after the earthquake indicates that the earthquake has an effect on a large sample in terms of sleep problems (24). However, after the February 6 earthquakes, it may be thought that the loss of loved ones and homes of many individuals, whether in the earthquake zone or not, may have an effect on sleep problems.

Another result of the study is the relationship between fear of earthquake, sleep quality, insomnia complaints and intolerance of uncertainty. Accordingly, it is observed that fear of earthquake increases intolerance of uncertainty, insomnia complaints and poor sleep quality. This result confirms the first two hypotheses in the mediation model. In addition, it also supports the research result (37) that sleep quality of individuals who experience earthquake fear is negatively affected. Again, it was reported that a large proportion (83.20%) of the survivors had sleep problems after the earthquake, with insomnia being one of these problems (52), and that sleep problems were associated with fear of earthquake (53). Similarly, intolerance of uncertainty seems to explain the complaints of insomnia and the decrease in sleep quality. In other words, as the levels of fear of earthquake and intolerance of uncertainty increase, the likelihood of decreased sleep quality and sleep problems increases. Finally, the study concluded that intolerance of uncertainty partially mediates the relationship between fear of earthquake and insomnia complaints and sleep quality. This result confirms the last two hypotheses of the research model. It also indicates that the increase in insomnia complaints and sleep quality problems may be

related to the increase in fear of earthquake and intolerance of uncertainty. It is emphasized that intolerance of uncertainty is important in understanding the experiences of individuals after earthquakes (34) and sleep problems are thought to be related to intolerance of uncertainty (36). It is observed that individuals with shorter sleep duration after earthquake-like disasters have a higher risk of PTSD symptoms (54), and PTSD is associated with fear of earthquakes (18,20). In addition, it has been reported that intolerance of uncertainty has a strong relationship with anxiety sensitivity that may trigger fear of earthquake, which is one of the possible consequences of earthquake experience, and intolerance of uncertainty is an important risk factor for sleep problems (36). This explanation also supports the finding obtained in this study. In another study, it is emphasized that intolerance of uncertainty mediates the relationship between negative life events and sleep problems, and it is stated that intolerance of uncertainty is a concept that should be considered for intervention in sleep disorders (55). Because the intolerance of uncertainty model emphasizes that individuals use individual anxiety as a means of coping with discomfort when the outcome is uncertain (56). Considering that the earthquake process is also full of uncertainties, individuals' use of anxiety as a means of self-protection and coping may lead to sleep delays or insomnia by causing them to be constantly on guard.

As a result, the study presents a finding that is not addressed in the literature with its perspective on the role of fear of earthquake, sleep quality and insomnia complaints and intolerance of uncertainty. However, the study has some limitations. This study is a quantitative research that deals with the relationship between earthquake fear, sleep problems and intolerance of uncertainty. Qualitative or mixed design studies can be planned to address the relationship in depth. In addition, the study was conducted in a cross-sectional manner. Longitudinal studies can be planned to see long-term effects. As a result of the study, it was observed that intolerance of uncertainty had a significant effect on earthquake fear and sleep problems. Support programs that will increase the ability to tolerate uncertainty can be prepared for individuals with earthquake experience to cope with sleep problems or earthquake fear. This study did not focus on a specific developmental period as a sample. In future studies on the subject, it may be recommended to examine the experiences of special samples of children, adolescents, adults or older adults. In the context of the research results, it can be suggested that mental health professionals working with individuals with earthquake experience should evaluate earthquake fear and intolerance of uncertainty as effective factors in cases related to sleep problems of clients. In addition, preventive studies can be planned by presenting informative content on earthquake fear and intolerance of uncertainty to individuals with earthquake experience.

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