ISSN: 2146-1740
https://dergipark.org.tr/tr/pub/ayd,
Doi: 10.54688/ayd.1387250

Araştırma Makalesi/Research Article

EXAMINATION OF FACTORS ASSOCIATED WITH EARTHQUAKE FEAR AND COPING STRATEGIES USED

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Article Info

Received:
07/11/2023

Accepted:
13/01/2024

Abstract

This study aimed to examine the factors associated with earthquake fear and coping strategies developed by people. This cross-sectional and descriptive study was conducted with individuals over 18 years of age. The sample of the study consisted of 883 people who agreed to participate in the study. The study data were collected using the "Personal Characteristics Form", "Fear of Earthquake Scale", and "Coping with Earthquake Stress Scale". In the study, it was found that females' level of earthquake fear is higher than that of males. Married individuals have a higher level of earthquake fear compared to single individuals. It was found that those who received disaster awareness training and those who wanted to receive disaster awareness training had lower earthquake fear mean scores. As the levels of seeking social support, using religious coping, and positive reappraisal increase, the level of earthquake fear decreases. It has been determined that seeking social support is more commonly used than religious coping and positive reappraisal to cope with earthquake fear. Social support has been found to be a significant factor in coping with earthquake fear.

Keywords: Earthquake, Earthquake Fear, Coping Strategies, Social Support.

Jel Codes: H84, Q54, H80.

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Ethical Statement: Permission was obtained from Artvin Çoruh University Scientific Research and Ethics Committee dated 18.07.2023 and numbered E-18457941-050.99-98073.
Cite: Usta, G., Torpuş, K., Kanbay, Y. & Çınar Özbay, S. (2024). Examination of factors associated with earthquake fear and coping strategies used. *Akademik Yaklaşımlar Dergisi*, *15*(1)-Deprem Özel Sayısı-, 746-763.

1. Introduction

Sudden and unforeseen events, such as natural disasters, often have negative psychological effects on survivors. Disasters, especially earthquakes, shake people's sense of security. Events like these expose people to the fear of losing their lives, loved ones, and properties (Scott & Weems, 2013: 115; Shing et al., 2016: 1297). In a qualitative study following the Christchurch earthquake (2011), participants reacted differently to earthquakes and aftershocks. These reactions include a variety of anxieties, such as sudden and constant fear, apprehension, constant extreme alertness and even sadness (Rowney et al., 2014).

It was observed that many people and property were lost due to two major earthquakes centered in Kahramanmaraş, which occurred in Turkey on February 6, 2023 (AFAD, 2023: 3; EMDAT, 2023). Following natural disasters that directly or indirectly affect many people, such as the February 6 earthquakes, severe psychological reactions can be observed in individuals in the affected community (Bertinelli et al., 2023: 1). In the study on predictors of psychological distress after earthquakes in Turkey, Sumer et al. (2005: 334-336) found that education level was negatively related to general distress and positively related to individual resource variables (self-esteem, optimism, and perceived control). Kowalski and Kalayjian (2001: 76) reported that survivors of the devastating earthquake in Turkey experienced increased anxiety and high levels of fear. Başoğlu et al. (2002: 274) found that symptoms of post-traumatic stress disorder are very common, especially in earthquake survivors who experience high levels of fear. Furthermore, a study conducted by Salcioğlu et al. (2018: 20) on earthquake survivors in Turkey found that the strongest predictors of post-traumatic stress disorder were fear of future earthquakes and a reduced sense of control over life. The probability of post-traumatic stress disorder was associated with the magnitude of the event and the intensity of the fear experienced (Guerra et al., 2014: 204).

These thoughts emphasize the need to understand how earthquake survivors cope with mental stress. Therefore, when people encounter unexpected events such as earthquakes that have a highly destructive effect, they develop various spiritual defense/coping strategies. Coping can be defined as the cognitive and behavioral efforts of an individual to manage the demands of a stressful person-environment relationship (Baral & Bhagawati, 2019: 7; Folkman et al., 1986: 571). Against the threat of earthquakes, various strategies can be considered, such as strengthening the house, accepting the situation, denying the situation, seeking information, getting depressed, seeking social support, and moving house (Lopez Vazquez, 2001: 127).

The coping strategies of individuals in the face of events are different. Therefore, considering the concept of coping strategies in the face of stress in a standardized definition may be insufficient (R. Schwarzer & C. Schwarzer, 1996). In this regard, it is observed in the literature that various coping strategies are developed to deal with the stress caused by extraordinary situations. Lazarus and Folkman (1984: 150-153) mention two different coping strategies, emotion-focused and problem-focused, that regulate managing the stressor problem or giving emotional responses to the problem. Jeavons et al. (2000: 220-221) observed that problem-focused strategies were more common among post-traumatic coping strategies, while there was no change in emotion-focused and avoidance-focused strategies. Lehman and Taylor (1987: 546) stated that coping strategies of individuals remaining in earthquake-affected areas are generally focused on denial and disregard.

Those affected by the earthquake use healthy coping strategies such as adaptation mechanisms and social support. Social support deficiency can play a significant role in the persistence of long-term psychological effects of earthquakes (Löw et al., 2023: 6). Spurrell and McFarlane (1993: 199) mentioned that besides problem-oriented approaches, strategies such as seeking social support and developing positive thoughts also affect the level of stress. Fang et al. (2020: 8) investigated how people utilize coping strategies such as seeking social support from family and friends to achieve their goals and cope with stress. It has been stated that having high social support, also known as social capital score, has a protective effect against stress (Ali et al., 2012: 241).

Therefore, this study aimed to examine the factors associated with earthquake fear and coping strategies used by people. This study is considered important in the field of disaster management as it provides a deep understanding of coping strategies related to earthquake fear.

2. Materials and Methods

2.1. Aim

This study is designed in a cross-sectional and descriptive design to examine the factors associated with earthquake fear and the coping strategies used.

2.2. Population and Sample

The population of the study consisted of individuals over the age of 18 who volunteered to participate in the study. The data were delivered to the participants via Google Forms and their participation in the study was ensured. In the calculation of the study sample, the formula for sample calculation in unknown populations (Baş, 2010) was used.

$$n = \frac{(t^2\sigma^2)}{d^2}$$

n= Number of samples

t= Theoretical value (1.96 at 95% confidence interval; 2.58 at 99% confidence interval)

d= Margin of error (.05 at 95% confidence interval)

σ= Standard deviation (taken as .33 for this study)

The standard deviation value required for the sample calculation was determined by taking the average of the standard deviation values obtained from a study on the subject in Turkey (Erdoğan & Aksoy, 2020: 98). According to this calculation, the standard deviation value was taken as .33. As a result of the calculation made according to this value, it was calculated that the minimum sample size should be 167 people. As a result of the data collection phase, 883 people were reached.

2.3. Data Collection Tools

The study data were collected using the "Personal Characteristics Form," created by the researchers to query the sample's characteristics, along with the "Fear of Earthquake Scale (FES)" and the "Coping with Earthquake Stress Scale (CESS)".

Personal Characteristics Form: It is the form that contains the individual characteristics of the participants and their identifying information about the disasters.

Fear of Earthquake Scale (FES): It was developed by Prizmić-Larsen et al. (2023) to measure the fear of earthquakes in the general population and adapted to Turkish culture by Usta et al. (2024). The conducted analyses indicate that the scale is acceptable in terms of scope, content, and structure. The FES, which has been adapted, consists of a single dimension and 7 items. The scale has a variance of 65.8%, which is a considerably high value for a one-dimensional scale. The structure of the scale was tested with scope, structure (EFA and CFA), and convergent validity. For reliability, Cronbach's α and Split-halves test consistencies were performed, and the scale's Cronbach's α reliability coefficient was calculated as .91, indicating high reliability. The original scale is a 5-point Likert-type, scored as follows: "Strongly Disagree"=1, "Disagree"=2, "Undecided"=3, "Agree"=4, and "Strongly Agree"=5. There are no reverse-scored items in the scale, and the total scale score is obtained by summing the scores of 7 items. The scores that can be obtained from the scale range from 7 to 35. An increase in

scores from the scale indicates an increase in fear of earthquakes. The Cronbach's α is calculated .91 in this study.

Coping with Earthquake Stress Scale (CESS): The scale was developed by Yöndem and Eren (2008). Scale items are scored as "Always" (4), "Mostly" (3), "Sometimes" (2) "Never" (1). Scoring on the scale is done according to sub-dimensions. The higher scores reflect the greater use of the respective coping strategy. A total score is not calculated in the scale. The Cronbach α reliability coefficient of the sub-dimensions of the scale was calculated as .70 for the seeking social support sub-dimension and .81 for the religious coping sub-dimension and positive reappraisal sub-dimensions. The scale consists of three sub-dimensions. The sub-dimensions and scoring are as follows;

Religious Coping: 5 Items (2-8-9-10-11)/ Highest score 20- Lowest score 5

Positive Reappraisal: 6 Items (7-12-13-14-15-16)/ Highest score 24- Lowest score 6

Seeking Social Support: 5 Items (1-3-4-6-7) (Items 3 and 7 are reverse scored) / Highest score 20- Lowest score 5

2.4. Data Analysis

The study was evaluated by using the Statistical Package for Social Sciences (SPSS) for Windows version 26.0 package software. Skewness and kurtosis values were examined to determine whether the data were distributed normally or not, and 2.0 ± reference was taken to ensure normal distribution (Tabachnik & Fidell, 2013: 79; Kalaycı, 2014: 6-7). In the analysis of the data, descriptive statistics such as number, percentage, mean, standard deviation, and minimum-maximum values are given. Pearson correlation analysis was performed in the examination of the correlation between the variables. In searching for differences between variables, independent groups t-test, and ANOVA are used for parametric variables, while non-parametric tests like the Kruskal-Wallis H test are utilized for non-parametric variables. For statistical significance, $p<.05$ was accepted. Before starting the study, approval was obtained from Artvin Çoruh University, Scientific Research and Publication Ethics Committee (Decision No: E-18457941-050.99-98073). In addition, informed consent was obtained from the participants.

3. Results

In this section, firstly, the descriptive characteristics of the sample are provided, and then the normality analysis, mean values, and reliability information related to the measurement

tools used in the study are presented. Continuing with the analysis, the earthquake fear levels are compared based on the variables taken into account, and then the coping strategies used are discussed. In the last section of the findings, the relationship between the measurement tools used in the study, namely the fear of earthquake scale and coping with earthquake stress scale sub-dimensions, is presented.

A significant portion (67.7%) of the participants is aged 25 or younger, and 63.9% are females. Most of the participants lived in the city (82.9%), and 76.3% are single. The rate of those with higher education levels (associate degree and bachelor's degree) is 78.6% and constitutes the majority of this sample. Approximately half (58.0%) of the participants had a moderate income. The rate of those who experienced natural disasters is 12.7%, and the rate of those who lost their relatives due to any natural disaster is 20.7%. While 57% of the sample did not receive disaster awareness training, 70.3% wanted to receive disaster awareness training (Table 1).

Table 1.

Frequencies Related to The Descriptive Characteristics of The Sample

Variables	**Category**	**n**	**%**	**Variables**	**Category**	**n**	**%**
Gender	Female	564	63.9	Age	25 and younger	598	67.7
	Male	319	36.1		26 and older	285	32.3
Marital Status	Married	209	23.7	Place of Residence	City	732	82.9
	Single	674	76.3		Village	151	17.1
Education Level	Primary-Secondary Education	87	9.9	Income Level	Low	164	18.6
	Higher education	694	78.6		Moderate	512	58.0
	Graduate	102	11.6		High	207	23.4
Status of Experiencing Natural Disaster	Yes	112	12.7	Losing a Loved One in a Natural Disaster	Yes	183	20.7
	No	771	87.3		No	700	79.3
	Yes	380	43.0		Yes	621	70.3

Status of Receiving Disaster Awareness Training	No	503	57.0	Status of Request to Receive Disaster Awareness Training	No	262	29.7

The FES score ranged between 7 and 35, and the mean was 21.8 ± 7.1. The seeking social support sub-dimension scores of the CESS vary between 5 and 20, and the mean was calculated as 12.3 ± 2.8. The religious coping sub-dimension score ranged between 5 and 20, and the mean is 10.1 ± 3.5. The positive reappraisal sub-dimension score ranged between 6 and 23, and the mean was calculated as 12.1 ± 3.5 (Table 2).

Table 2.

Findings Related to The Normality, Mean, and Reliability of The Measurement Tools

Measurement Tool	Skw.	Krt.	Min.	Max.	X	SD	Cronbach
Fear of Earthquake Scale	-.016	-.822	7	35	21.8	7.1	.91
Seeking Social Support	.075	.127	5	20	12.3	2.8	.70
Religious Coping	.629	-.105	5	20	10.1	3.5	.81
Positive Reappraisal	.203	-.277	6	23	12.1	3.5	.81

Skw.: Skewness; Krt.: Kurtosis

While the FES mean score of females was 23.8 ± 6.6, the mean score of males was 18.1 ± 6.4, the difference between the groups was statistically significant (t:12.395; p< .001). The mean score of the FES for females is significantly higher than that of males. According to this finding, females have a higher level of earthquake fear compared to males.

The mean FES score for participants aged 25 and below is 21.6 ± 7.2, whereas it is 22.1 ± 6.8 for participants aged 26 and above. The difference in scores between these age groups is not statistically significant (t: -1.031; p>0.05). Therefore, the fear of earthquakes does not vary according to the age variable.

The average FES score for married participants is 23.0 ± 6.8, while it is 21.5 ± 7.1 for single participants. The difference in scores between these groups is statistically significant (t: 2.607; p<0.05). Based on this finding, the level of earthquake fear is higher among married participants compared to single participants.

The mean FES score for participants living in the city is 21.9 ± 6.9, and for those living in the village, it is 21.8 ± 7.5. The difference in scores between these groups is not statistically significant (t: 0.043; p > 0.05). Hence, the earthquake fear level does not vary significantly based on the place of residence. Although the medians of FES scores differ among different educational levels in the sample, this difference is not statistically significant (KW: 0.203; p > 0.05). Therefore, the earthquake fear level does not significantly differ based on the educational level.

The mean FES score for participants with low income is 21.1 ± 7.2, for those with moderate income it is 21.9 ± 7.0, and for participants with high income, it is 21.5 ± 7.2. The difference in scores between these income groups is not statistically significant (F: 0.202; p>0.05). According to this finding, earthquake fear does not vary significantly based on income levels. The mean FES score for participants who have experienced a natural disaster is 22.0 ± 7.2, while for those who haven't experienced one, it is 21.6 ± 6.8. The difference between these groups is not statistically significant (t: 0.686; p> 0.05). Therefore, earthquake fear does not significantly differ based on the experience of a natural disaster. The mean FES score for participants who lost a close relative in a natural disaster is 22.9 ± 7.3, and for those who haven't lost a close relative, it is 21.6 ± 7.0. The difference in scores between these groups is not statistically significant (t: 1.845; p>0.05). Hence, earthquake fear levels do not vary significantly based on the experience of losing a close relative in a natural disaster.

The mean FES score for participants who received disaster awareness training is 20.7 ± 6.9, while for those who haven't received disaster awareness training, it is 22.7 ± 7.1. The difference in scores between these groups is statistically significant (t: -3.939; p< 0.001). Based on this finding, participants who haven't received disaster awareness training exhibit higher levels of earthquake fear compared to those who have received disaster awareness training. The mean FES score for participants who want to receive disaster awareness training is 22.4 ± 6.9, while for those who do not want to receive such education, it is 20.3 ± 7.2. The difference in scores between these groups is statistically significant (t: 4.008; p < 0.001). According to this finding, participants who want to receive disaster awareness training have higher levels of earthquake fear compared to those who do not want to receive such education (Table 3).

Table 3.

Comparison of Fear of Earthquake Scale (FES) Mean Scores According to Descriptive Variables

Variables	Category	n	X	SD	Significance
Gender	[a]Female	564	23.8	6.6	t:12.395
	[b]Male	319	18.1	6.4	p:.000
Age	25 and younger	598	21.6	7.2	t:-1.031
	26 and older	285	22.1	6.8	p:.303
Marital Status	[a]Married	209	23.0	6.8	t:2.607
	[b]Single	674	21.5	7.1	p:.009
Residence	City	732	21.9	6.9	t:.043
	Village	151	21.8	7.5	p:.965
*Education Level	Primary-Secondary Education	87	449.4		KW:.203
	Higher education	694	442.4		p:.904
	Graduate	102	433.0		
Income Level	Low	164	21.8	7.2	F:.202
	Moderate	512	21.9	7.0	p:.817
	High	207	21.5	7.2	
Status of Experiencing Natural Disaster	Yes	112	22.0	7.2	t:.686
	No	771	21.6	6.8	p:.493
Losing a Loved One in a Natural Disaster	Yes	183	22.9	7.3	t:1.845
	No	700	21.6	7.0	p:.065
Status of Receiving Disaster Awareness Training	[b]Yes	380	20.7	6.9	t:-3.939
	[a]No	503	22.7	7.1	p:.000
Status of Request to Receive Disaster Awareness Training	Yes	[a]621	22.4	6.9	t:4.008
	No	[b]262	20.3	7.2	p:.000

*As the data did not follow a normal distribution, median values were given, and a nonparametric test was conducted; a > b.

When the CESS sub-dimension mean scores were examined, it was determined that the mean score of the seeking social support sub-dimension was 2.5 ± .6, the religious coping sub-dimension was 2.0 ± .7, and the positive reappraisal sub-dimension was 2.0 ± .6. When the difference in mean scores between the sub-dimensions was examined, a statistically significant difference was determined (F:190.532; p< .001). According to this finding seeking social support is more commonly used than religious coping and positive reappraisal to cope with the earthquake fear (Table 4).

Table 4.

*Comparison of Methods of Coping with The Fear of Earthquakes**

Coping with Earthquake Stress Scale Sub-Dimensions	**n**	**Min**	**Max**	**X**	**SD**	**Significance**
[a]Seeking Social Support	883	1	4	2.5	.6	F:.190,532 p:.000
[b]Religious Coping		1	4	2.0	.7	
[b]Positive Reappraisal		1	3.83	2.0	.6	

*A comparison was made over the arithmetic means of the sub-dimensions; a>b

A negative and statistically significant relationship was found between the mean fear of earthquakes and seeking social support score (r:-.111; p< .05). As the level of seeking social support of the participants increases, the level of earthquake fears decreases. When the relationship between the fear of earthquakes and religious coping, which is one of the sub-dimensions of the CESS, was examined, a negative and significant relationship was found (r:-.097). According to this finding, as the level of religious coping increases, the fear of earthquakes decreases. When the relationship between the fear of earthquakes and positive reappraisal, which is another sub-dimension of the CESS, was examined, a negative and significant relationship was found between these two variables (r:-.105; p< .001). According to this finding, as the level of positive reappraisal increases, the fear of earthquakes decreases (Table 5).

Table 5.

The Relationship Between The Fear of Earthquake Scale and Coping with Earthquake Stress Scale Sub-Dimensions

Variables	**1**	**2**	**3**	**4**
1. Earthquake Fear	1	-.111	-.097*	-.105*
2. Seeking Social Support		1	.090*	.106.
3. Religious Coping			1	.229**
4. Positive Reappraisal				1

* p<.05;** p<.001

4. Discussion

Earthquakes affect people's emotional reactions and mental health. The evidence shows that during and after an earthquake, people experience many intense emotions, with fear being the most intense and frequently reported emotion (Ristić Dedić et al., 2023: 145). To the best of our knowledge, there are no studies examining individuals' earthquake fear levels and predictors. This study is the first to examine the factors associated with earthquake fear and coping strategies developed by individuals.

In the study, in terms of socio-demographic variables, the earthquake fear level of females was found to be higher than males. In a previous study, it was determined that females had more fear of earthquakes than males among those who experienced earthquakes (Prizmić-Larsen et al., 2023: 12). Other studies have confirmed that females experience more distress than males after an earthquake, thus confirming gender differences in distress (Sumer et al., 2005: 337). Kung and Chen (2012:1541-1542) found that females perceive themselves as more fearful, anxious, and threatened towards earthquake risk. Thus, while females are more afraid of earthquakes, males are more prepared, which can be explained by socially determined differences between men and women and gender roles attributed to disaster preparedness (Azim & Islam, 2016: 203).

In the study, the earthquake fear level of married participants was found to be higher than single participants. Donner and Rodríguez (2008: 1102) stated that single mothers are more sensitive to disaster risk than the general population. Since fear of earthquakes is a newly created scale, when the literature is examined, there is no study evaluating earthquake fear and marital status. Therefore, future studies need to examine the relationship between earthquake

fear and marital status and focus on developing interventions accordingly. It can be stated that married individuals, especially when faced with events that pose a high risk of death, may experience an increase in their fear levels due to emotionally binding relationships such as spouses and children.

In the study, it was found that those who received disaster awareness training and those who wanted to receive disaster awareness training had lower earthquake fear mean scores. In a study, a significant difference was found between earthquake training and earthquake risk perception, earthquake fear, and perceived earthquake preparedness, and between earthquake training and real preparedness mean scores. In addition, those who received earthquake training were found to have higher perceived and real earthquake preparedness levels and earthquake risk perception mean scores than those who did not (Gün Çınğı & Yazgan, 2022: 660). Kung and Chen (2012: 1541-1542) found that earthquake preparedness training and post-earthquake coping activity were strongly associated with reducing the earthquake threat to one's life and property, as well as the anxiety that an earthquake would happen. In studies examining the relationship between disaster education and fear and anxiety (Righi et al., 2021; Mishra & Suar, 2012; Lehman & Taylor, 1987; Yeon et al., 2020), it has been stated that people's emotional arousal generally affects receiving education and preparation. Therefore, attention should be paid to educational strategies related to disaster planning and coping with the fear of earthquakes. Earthquake preparedness requires a certain level of knowledge and awareness, thus reducing the level of fear. It is important to educate the public in reducing the fear of earthquakes or developing coping strategies. Earthquake education is considered essential in reducing the level of earthquake fear.

The present study determined that as the levels of seeking social support, religious coping, and positive reappraisal increase, the level of earthquake fear decreases. The importance of religious orientation in the face of painful and unforeseen situations is emphasized (Sinding Bentzen, 2019: 7). Religious coping is widely regarded as a common post-disaster strategy and is often emphasized that faith is associated with lower stress and better mental health (Pargament et al., 2004: 727). It is seen that various strategies are used to cope with stress and fear in extraordinary situations, from social support to seeking religion to coping (Feder et al., 2013; García et al., 2014; Pratama, 2023; Wood et al., 2021). It has been observed that religious orientations play an active role in coping with stress and fear of earthquakes. In this regard, the findings of this study are consistent with the literature. Increasing the level of religious coping and positive reappraisal is emerging as a significant factor in reducing the fear of earthquakes.

These findings highlight the importance of religious orientations when dealing with painful and unpredictable situations.

In this study, it was determined that seeking social support behavior is used more than religious coping and positive reappraisal to cope with the fear of earthquakes. Receiving social support and socializing are significant factors in coping with the fear of earthquakes (Fang et al., 2020: 7). Providing social support in fear-inducing situations, such as earthquakes, has been linked to better well-being and health psychology in different populations. It has also been reported that this support can contribute to the adaptation process (Charuvastra & Cloitre, 2008: 320). It is known that social support and creating positive emotions have a protective role in fear and stressful situations. Social support can contribute to individuals' coping abilities with stress and provide emotional relief (Ozbay et al., 2007). Social support and stakeholder participation are important factors commonly used in coping with the adverse consequences of an earthquake. Social support can be an essential factor in reducing the level of earthquake fear among individuals experiencing earthquake-related fear.

5. Limitations

This study has three scientific limitations, and it is crucial to consider these limitations. The first limitation is that the data collection process is carried out through an online Google form. While this method facilitates the ease of obtaining participants' responses in real-time, it may make it difficult to observe important contexts such as participants' social or demographic characteristics. The second limitation is that although the relationships between the variables were reported in the study, the cause-effect relationship could not be examined. While correlation analyses only show the existence of the relationship between variables, more comprehensive and experimental studies are needed to determine the cause-and-effect relationship. The third limitation is that the data collection process was initiated four months after the occurrence of the earthquake disaster, and various variables that could influence participants' levels of earthquake fear could not be determined.

6. Conclusion

Females have higher levels of earthquake fear compared to males, married individuals have higher levels than single individuals, individuals who haven't received disaster awareness training have higher levels than those who have, and individuals who want to receive disaster awareness training have higher levels than those who do not want to receive disaster awareness training. It is thought that it is important to develop gender-focused disaster strategies and

organize disaster awareness training in order to reduce individuals' earthquake fear levels. The level of earthquake fear does not vary according to age, place of residence, education level, income level, natural disaster experience status, and loss of a relative in a natural disaster. To cope with earthquake fear, seeking social support behavior is more commonly used compared to religious coping and positive reappraisal. It is thought that it is important to encourage individuals to benefit from social support seeking programs in coping with the fear of earthquakes. As the levels of seeking social support, using religious coping, and positive reappraisal increase, the level of earthquake fear decreases. It is thought that adopting positive reappraisal and religious coping strategies is important in reducing individuals' earthquake fear levels.

Peer-review: Externally peer-reviewed.

Contribution Rate Statement: The authors contributed equally

Conflicts of Interest: There is no potential conflict of interest in this study.

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