



The relationship between disaster literacy levels and disaster preparedness among adults

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Abstract

The resilience of communities to disasters is an indicator of their preparedness for such events. It is crucial for prepared communities to integrate their disaster literacy—skills in understanding, perceiving, and evaluating disasters—into disaster preparedness actions. This study aims to determine the disaster literacy and disaster preparedness levels of adults and the factors influencing these levels. This correlational and cross-sectional study included 3861 participants. Data were collected online from August 2023 to December 2023 using the Descriptive Characteristics Form, the Disaster Literacy Scale, and the Disaster Preparedness Scale. Data analysis employed frequency analysis, skewness and kurtosis, the Independent Samples t-Test, one-way ANOVA, and Pearson correlation analysis. The Pearson correlation analysis revealed a moderate positive and significant relationship between disaster literacy and disaster preparedness ($r=0.40$, $p<0.001$). Individuals with disaster experience had higher disaster literacy (Reduction, Preparedness, Response, and Recovery) and disaster preparedness scores compared to those without disaster experience ($p<0.05$). However, lower education levels, decreased income, and increased average age were associated with reduced disaster literacy and disaster preparedness levels. In line with the findings of this study, it is recommended that the level of education be increased, income levels improved, and the disaster preparedness capacity of society strengthened by considering age-related factors to increase disaster literacy and enhance disaster preparedness levels. This study is expected to make significant contributions to understanding the levels of disaster literacy and disaster preparedness in Turkey, a country prone to earthquakes and recently affected by one of the deadliest disasters, and to identify the factors influencing these levels and the relationship between disaster literacy and disaster preparedness.

Keywords Disaster · Disaster literacy · Disaster management · Disaster preparedness

1 Introduction

Disaster refers to any natural, technological, or human-induced event that can cause significant harm to communities, disrupt daily life, and result in irreparable physical, economic, and social damage beyond the capacity of local resources to address. Disasters

are divided into two: natural or technological/human-induced. Accordingly, natural events are events that have occurred since the formation of the world and are subject to the laws of physics (UNDRR 2017). Nature-induced disasters have been catastrophic and unpredictable events since the beginning of Earth's existence (Kanbara et al. 2016). Disasters not only affect the region where they occur but also pose physical and economic challenges nationally and internationally (Cvetković et al. 2024). In recent years, there has been a significant increase in the number of disasters worldwide and in Turkey, leading to substantial loss of life and property (Kurt et al. 2023). In this context, increasing disaster literacy is essential for effectively managing nature-induced disasters and for societies to become more resilient against these disasters.

"Disaster literacy is individuals' capacity to access, understand, appraise, and apply disaster information to make informed decisions and to follow instructions in everyday life concerning mitigating/prevention, preparing, responding, and recovering/rehabilitation from a disaster in order to maintain or improve quality of life during the life course" (Çalışkan and Üner 2021). It encompasses the knowledge, skills, and attitudes necessary to reduce the impact of disasters, protect oneself and others, and build community resilience (Mustadi and Atmojo 2020). This concept serves as a crucial starting point for individuals and communities to take action in reducing risks and minimizing damage (Genç et al. 2022). Individuals and communities with disaster literacy can take the necessary steps to build resilience against disasters by protecting themselves and others. This underscores the significant role of disaster literacy in reducing disaster risks and promoting sustainable development. Therefore, using disaster literacy as a key concept for people to understand is crucial for them to fully grasp that they are living in an area prone to nature-induced disasters (Logayah et al. 2024).

Being prepared for disasters is one of the crucial steps that societies must take to protect themselves from potential damages caused by disasters. In societies prepared for disasters, it is possible to develop organizational and systematic solutions to minimize the damages caused by disasters (Tómasson 2023). The ability to read, understand, and interpret information related to disasters is associated with general literacy and is essential at both individual and societal levels to enhance resilience. Preparedness refers to the planning, implementation, and evaluation aimed at reducing the adverse consequences of risks and hazards. Disaster preparedness stands as one of the most critical factors in minimizing loss and devastation in any disaster situation (Şentuna and Çakır 2020). While disaster preparedness includes the measures and planning that societies and individuals take in advance against disasters, disaster readiness refers to the effective implementation of these preparations and their successful realization in times of crisis. Readiness relies on the ability to respond swiftly and effectively in a disaster, regardless of how thorough the preparations may have been.

Turkey is considered a country at risk of nature-induced disasters due to its location, where several tectonic plates converge and are actively moving (Çamaş and Turan 2023). Our Minister Ali Yerlikaya, who expressed with sorrow that we, as a nation, experienced the "Disaster of the Century" on February 6, said, "In these earthquakes that caused heavy destruction in 11 provinces, 124 districts, 6 thousand 929 villages and neighborhoods in an area of 120 thousand square kilometers, 53 thousand people died. We lost 537 of our lives and 107,213 of our citizens were injured. The earthquakes centered in Kahramanmaraş, which directly affected 14 million of our citizens, entered the world literature in terms of their area of impact (Ministry of the Interior 2024). The disaster left over a million homeless (Topal et al. 2024) and inflicted severe damage on infrastructure, including hospitals and healthcare facilities. This major earthquake

underscored the importance of disaster preparedness in disaster response (Patwary et al. 2023).

Upon review of the literature, it was found that disaster literacy (Çalışkan and Üner 2021; Demirdelen and Çakıcı 2021; Genç et al. 2022) and disaster preparedness (individual readiness) (Hasan et al. 2022; Avcı 2023; Patel et al. 2023) have been separately examined, yet there is a lack of specialized studies exploring their interrelationships. This study evaluates the relationship between individuals' theoretical knowledge about disasters and the implementation of this knowledge in preparedness actions. Therefore, it is believed that this study will make significant contributions to understanding the levels of disaster literacy and disaster preparedness in Turkey—a country prone to earthquakes and recently affected by one of the deadliest disasters—and to identifying the factors influencing these levels and comprehending the relationship between disaster literacy and disaster preparedness.

2 Research design and method

2.1 Research type

This study was conducted as a correlational and cross-sectional descriptive research to test the relationship between the disaster literacy levels of adults and their disaster preparedness.

2.2 Research population and sample

The population of the study consisted of adult individuals in Turkey, and the sample included adults who agreed to participate in the study between August 2023 and December 2023. The purposive sampling method, one of the non-probability sampling techniques, was used for sample selection. Given that the study population exceeded 10,000 individuals, a sample size of 384 was deemed sufficient for an unlimited population (Cochran 1977). The study was completed on the specified dates with individuals who met the inclusion criteria; literate, had no communication problems, no psychological disorders and agreed to participate in the study via an online survey. Exclusion criteria from the study were being under the age of 18 and having problems accessing the internet. The study was completed with the participation of 3861 adult individuals.

2.3 Data collection tools

The study utilized a Descriptive Characteristics Form, which included the sociodemographic features of the participants, as well as the Disaster Literacy Scale and the Disaster Preparedness Scale.

The Descriptive Characteristics Form, developed by the researchers, consists of seven questions that are believed to influence participants' concepts related to disasters (Age, Gender, Socio-economic status, Education level, Disaster-related experiences).

The Disaster Literacy Scale, developed by Çalışkan and Üner (2022), consists of 61 items and 4 sub-dimensions (mitigation, preparedness, response, and recovery). Each item is scored and rated on a 5-point scale (1—Very difficult, 2—Difficult, 3—Neutral, 4—Easy, and 5—Very easy). The scale does not contain any reverse items (Çalışkan and Üner

2022). The total score that can be obtained on the scale ranges from 61 to 305, with higher scores indicating higher levels of disaster literacy among participants. Cronbach Alpha value of this scale is 0.954. In our study, Cronbach Alpha value was found to be 0.97.

The Disaster Preparedness Scale, developed by Şentuna and Çakır (2020), consists of 13 items and 4 dimensions. The scale includes four sub-dimensions: "disaster physical protection," "disaster planning," "disaster aid," and "disaster warning systems". The items are rated on a 4-point Likert scale: "1—Strongly No," "2—No," "3—Yes," and "4—Strongly Yes." The minimum score that can be obtained on the scale is 13, and the maximum score is 52. Higher scores indicate higher levels of disaster preparedness (Şentuna and Çakır, 2020). The total Cronbach Alpha internal consistency coefficient of the scale was determined as 0.82 by the researchers. In this study, the total scale Cronbach's Alpha internal consistency coefficient was determined as 0.92.

2.4 Data collection process

The data of the study were collected online between August 2023 and December 2023 using snowball sampling method, which is a type of purposive sampling. The data were collected online due to the convenience it provides in terms of time, cost and access required to reach the research population. Participants who agreed to participate in the study and were reached through social media were sent the study link via e-mail. The study link was sent only once and no reminders were sent again. Then, they were asked to share the study link on social media platforms to facilitate data collection. The link is organised so that each participant can fill it in once.

2.5 Data analysis

The data were analyzed using SPSS 23 software. Participants' descriptive characteristics were expressed as numbers and percentages. For statistical analysis, a significance level of 0.05 was accepted within a 95% confidence interval. The normal distribution of the scales used in the study was assessed by examining the skewness and kurtosis coefficients. The Cronbach's alpha (α) coefficient was calculated to determine the internal consistency of the scales and subscales. The Independent Samples t-test was used to compare two groups, and a one-way ANOVA test was used to compare more than two groups. Pearson correlation analysis was employed to identify the relationship between disaster literacy and disaster preparedness.

3 Results

Parametric tests require data to be normally distributed as an assumption (Mishra et al. 2019). Therefore, the normality of the data was first assessed to determine if this assumption was met. Analysis of the Skewness and Kurtosis coefficients obtained from the normality assessment of the scales used in the study (Table 1) revealed that the data exhibited normal distribution.

To assess the internal consistency of the scales and subscales, Cronbach's alpha (α) coefficients were computed. An α coefficient between 0.81 and 1.00 indicates high reliability for the scale (Kiliç 2016). The α coefficients of the scales are provided in Table 1. Upon reviewing Table 1, it is evident that the scales used in the study exhibit high reliability.

Table 1 Skewness, Kurtosis and Cronbach's alpha (α) coefficients

Scales	Skewness coefficient	Kurtosis coefficient	Cronbach α coefficient
Disaster Literacy Scale (Mitigation)	−0.562	−0.350	0.97
Disaster Literacy Scale (Preparedness)	−0.608	−0.292	0.97
Disaster Literacy Scale (Response)	−0.644	−0.349	0.97
Disaster Literacy Scale (Recovery)	−0.552	−0.512	0.97
Disaster Preparedness Scale	0.059	−0.642	0.92

Tablo-2 shows the distribution of the participants according to certain characteristics. The majority of the participants in the study are in the 18–24 age range (42%), and approximately 53% of the participants are university graduates. Furthermore, 51.6% of the participants have experienced a disaster before.

Tablo-2 analysis reveals that participants with disaster experience tend to have higher scores in disaster literacy (mitigation, preparedness, response, and recovery) and disaster preparedness compared to those without disaster experience, although the difference is not statistically significant ($p > 0.05$). Participants from nuclear families have statistically significantly higher scores in disaster literacy (mitigation, preparedness, response, and recovery) compared to participants from extended families ($p < 0.05$). Additionally, employed participants were found to exhibit higher disaster preparedness scores compared to unemployed participants, and this difference is statistically significant ($p < 0.05$).

Participants' disaster literacy (mitigation, preparedness, response, and recovery) scores and disaster preparedness scores vary significantly ($p < 0.05$) according to their educational backgrounds. It is observed that participants with postgraduate education have the lowest scores in disaster literacy and disaster preparedness. There is a statistically significant difference ($p < 0.05$) in disaster literacy (mitigation, preparedness, response, and recovery) scores between participants with postgraduate education and those with high school and undergraduate education. Participants with the highest disaster literacy (mitigation, preparedness, response, and recovery) scores were those who graduated from university. Literate participants had significantly lower disaster literacy (preparedness) scores compared to participants with primary, high school, and university education ($p < 0.05$). Additionally, literate participants had significantly lower disaster preparedness scores compared to participants with high school and university education ($p < 0.05$). Participants whose income exceeded their expenses had higher disaster preparedness and disaster literacy scores compared to those whose income matched their expenses or was less, and this difference was statistically significant ($p < 0.05$) (Table 2).

Approximately three-quarters of individuals who have encountered disasters have experienced earthquakes. Participants who have experienced disasters most commonly report encountering earthquakes, floods, and fires, respectively. When the impact of disasters on participants who have experienced disasters is examined, it can be stated that the most commonly encountered impact is psychological. About one-third of participants who have experienced disasters have been psychologically affected by the disaster they experienced. While psychological impact is most commonly encountered in participants who have experienced earthquakes, participants who have experienced other types of disasters most commonly report material loss as the impact of the disaster. The types of disasters experienced by participants and the frequencies of disaster impacts are presented in Table 3.

Table 2 Frequency analysis, t test and ANOVA results

Variables	n	%	Mitigation Mean–Sd	Preparedness Mean–Sd	Response Mean–Sd	Recovery Mean–Sd	DPS Mean–Sd
Age							
18–24	1629	42.2	3.48 ± 0.96	3.52 ± 0.98	3.54 ± 1.02	3.47 ± 1.03	3.07 ± 0.86
25–34	689	17.8	3.47 ± 1.01	3.50 ± 1.03	3.54 ± 1.05	3.49 ± 1.07	3.12 ± 0.94
35–44	722	18.7	3.40 ± 0.99	3.42 ± 1.00	3.46 ± 1.04	3.41 ± 1.03	3.02 ± 0.89
45–54	602	15.6	3.47 ± 0.93	3.50 ± 0.93	3.55 ± 0.94	3.50 ± 0.96	3.13 ± 0.89
55 and over	219	5.7	3.52 ± 0.92	3.50 ± 0.93	3.60 ± 0.92	3.51 ± 0.95	3.02 ± 0.93
Test and <i>p</i> value			F:1.098 <i>p</i> : 0.36	F:1.159 <i>p</i> : 0.33	F:1.154 <i>p</i> : 0.33	F:0.836 <i>p</i> : 0.50	F:1.860 <i>p</i> : 0.12
Education Level							
Literate	150	3.9	3.33 ± 0.84	3.30 ± 0.89	3.40 ± 0.92	3.33 ± 0.92	2.90 ± 0.90
Primary school	582	15.1	3.44 ± 0.98	3.48 ± 0.99	3.53 ± 1.00	3.50 ± 1.00	3.02 ± 0.89
High school	976	25.3	3.46 ± 1.01	3.49 ± 1.00	3.53 ± 1.03	3.49 ± 1.03	3.10 ± 0.92
University	2052	53.1	3.49 ± 0.95	3.53 ± 0.97	3.55 ± 1.00	3.48 ± 1.02	3.10 ± 0.86
Postgraduate	101	2.6	3.22 ± 1.07	3.18 ± 1.09	3.21 ± 1.11	3.20 ± 1.17	2.98 ± 1.05
Test and <i>p</i> value			F:2.811 <i>p</i> : 0.02*	F:4.759 <i>p</i> : 0.01*	F:3.390 <i>p</i> : 0.01*	F:2.813 <i>p</i> : 0.02*	F:2.874 <i>p</i> : 0.02*
Employment status							
Employed	1898	49.2	3.47 ± 0.99	3.49 ± 1.00	3.53 ± 1.03	3.47 ± 1.04	3.14 ± 0.92
Unemployed	1963	50.8	3.45 ± 0.94	3.49 ± 0.96	3.53 ± 0.99	3.47 ± 1.00	3.01 ± 0.86
Test and <i>p</i> value			t: 0.587 <i>p</i> : 0.55	t: 0.114 <i>p</i> : 0.09	t: -0.280 <i>p</i> : 0.78	t: 0.13 <i>p</i> : 0.89	t: 4.468 <i>p</i> : < 0.001*
Family Type							
Nuclear	3029	78.5	3.48 ± 0.96	3.51 ± 0.97	3.55 ± 1.00	3.49 ± 1.02	3.08 ± 0.88
Extended	832	21.5	3.39 ± 0.98	3.42 ± 1.00	3.47 ± 1.03	3.40 ± 1.04	3.08 ± 0.92
Test and <i>p</i> value			t: 2.327 <i>p</i> : 0.02*	t: 2.438 <i>p</i> : 0.015*	t: 2.104 <i>p</i> : 0.03*	t: 2.134 <i>p</i> : 0.03*	t: -0.259 <i>p</i> : 0.79

Table 2 (continued)

Variables	n	%	Mitigation Mean–Sd	Preparedness Mean–Sd	Response Mean–Sd	Recovery Mean–Sd	DPS Mean–Sd
Income level							
Income lower than expenses	963	24.9	3.38 ± 1.03	3.42 ± 1.04	3.45 ± 1.08	3.39 ± 1.09	2.97 ± 0.91
Income equals expenses	1998	51.7	3.46 ± 0.93	3.49 ± 0.95	3.52 ± 0.98	3.47 ± 0.99	3.08 ± 0.86
Income higher than expenses	900	23.3	3.56 ± 0.96	3.59 ± 0.97	3.63 ± 0.99	3.56 ± 1.02	3.19 ± 0.92
Test and p value			F:7.417 p: 0.001*	F:6.680 p: 0.001*	F:6.782 p: 0.001*	F:6.219 p: 0.002*	F:14.155 p < 0.001*
Disaster experience							
Experienced a disaster	1993	51.6	3.48 ± 0.95	3.51 ± 0.97	3.55 ± 1.00	3.49 ± 1.02	3.09 ± 0.88
Not experienced a disaster	1868	48.4	3.45 ± 0.98	3.47 ± 0.99	3.51 ± 1.02	3.45 ± 1.03	3.07 ± 0.91
Test and p value			t: 0.938 p: 0.34	t: 1.167 p: 0.24	t: 1.068 p: 0.28	t: 1.087 p: 0.27	t: 0.646 p: 0.51

*Statistically significant values ($p < 0.05$)
Statistically significant values are in bold

Table 3 Disaster types experienced by participants and effects of disasters

		Earthquake	Flood	Fire	Landslide	Other	Total
Material loss	n	283	119	72	14	9	497
	%	19.2%	37.2%	47.4%	53.8%	50.0%	
Loss of life among relatives	n	186	19	8	2	1	216
	%	12.6%	5.9%	5.3%	7.7%	5.6%	
Injury	n	42	17	22	3	1	85
	%	2.8%	5.3%	14.5%	11.5%	5.6%	
Injury among relatives	n	150	25	27	4	1	207
	%	10.2%	7.8%	17.8%	15.4%	5.6%	
Illness	n	66	25	14	2	1	108
	%	4.5%	7.8%	9.2%	7.7%	5.6%	
Illness among relatives	n	116	24	5	2	0	147
	%	7.9%	7.5%	3.3%	7.7%	0.0%	
Psychological impact	n	746	108	56	7	9	926
	%	50.5%	33.8%	36.8%	26.9%	50.0%	
Not affected	n	517	98	27	1	3	646
	%	35.0%	30.6%	17.8%	3.8%	16.7%	
		1477	320	152	26	18	1993

The correlation analysis using Pearson correlation coefficient to determine the relationship between disaster literacy and disaster preparedness is presented in Table 4. The analysis revealed a moderate positive and significant relationship between disaster literacy and

Table 4 Pearson correlation analysis results

Scales and sub-dimensions	Analysis	Disaster Prepared-ness	Recovery	Response	Preparedness	Mitigation
Mitigation	Pearson r	0.402*	0.856*	0.876*	0.917*	1
	p	0.000	0.000	0.000	00.000	
	n	3861	3861	3861	3861	3861
Preparedness	Pearson r	0.406*	0.883*	0.921*	1	
	p	0.000	0.000	0.000		
	n	3861	3861	3861	3861	
Response	Pearson r	0.405*	0.920*	1		
	p	0.000	00.000			
	n	3861	3861	3861		
Recovery	Pearson r	0.417*	1			
	p	0.000				
	n	3861	3861			
Disaster Preparedness	Pearson r	1				
	p					
	n	3861				

*Correlation significant at $p < 0.01$

disaster preparedness ($r=0.40$, $p<0.001$). The square of the correlation coefficient (R^2 : Coefficient of determination) can be computed to convert into a measure of explained variance. This result can be interpreted as the proportion of variance in one variable that can be explained by the other variable (Janse et al. 2021). For instance, the correlation between disaster literacy and disaster preparedness was calculated as $r=0.402$ and $R^2=0.16$. Therefore, 16% of the variability in disaster preparedness can be explained by disaster literacy.

4 Discussion

The resilience of communities to disasters is an indicator of their preparedness for such events. Prepared communities have developed and implemented a comprehensive action plan that covers both pre-disaster and post-disaster phases. Individual preparedness forms the foundation of community preparedness, as personal preparation efforts contribute to overall societal resilience (Di Ludovico et al. 2023; Cvetković et al. 2024). However, in studies related to disaster preparedness, individuals' levels of understanding disasters are often not assessed prior to measuring their preparedness levels (Şahin et al. 2018; Appleby-Arnold et al. 2021). It is crucial first to evaluate disaster literacy, which involves understanding, perceiving, and consciously assessing disasters, before evaluating the implementation levels of disaster preparedness. This study was conducted to determine the relationship between disaster literacy levels and disaster preparedness of adults. We measured whether individuals have translated their theoretical knowledge about disasters into practical applications in their lives and how this relates to their disaster experience. Furthermore, analyses of disaster literacy were conducted separately for each phase of disasters.

Our study found that individuals with disaster experience had higher disaster literacy scores (mitigation, preparedness, response, and recovery) and disaster preparedness scores compared to those without disaster experience ($p<0.05$). Similarly, other studies have shown that individuals who have experienced one or more disasters have a better understanding of disaster-related information and are more willing to prepare for future disasters (Chung and Yen 2016; Tkachuck et al. 2018; Nguyễn et al. 2023; Torpus et al. 2024). It has been observed that individuals who were highly exposed to the September 11 attacks in 2001 were better prepared for Hurricane Sandy in 2012 compared to those who were not exposed or were minimally exposed to the September 11 attacks. Additionally, those with disaster experience were found to be more aware of preparedness campaigns, more likely to gather information about these campaigns, and more inclined to recognize the inadequacies of existing preparations, leading to a greater willingness to prepare (Gargano et al. 2015). In their study, Sattler et al. (2000) indicated that disaster experience influences individuals' propensity to engage in preparedness activities; however, this inclination diminishes over time (Sattler et al. 2000). Contrary to our findings, there are studies suggesting that disaster experience does not significantly impact disaster literacy and preparedness (Simms et al. 2013; Demirci 2021; Wang and Tsai 2022; Çelik 2023; Nguyễn et al. 2023). For example, Chen et al. (2012) found that Houston residents who experienced Hurricane Ike showed no progress in developing an evacuation plan or understanding what to do in an emergency a year later (Chen et al. 2012). It appears that individuals who, along with their family members or relatives, have experienced and been affected by disasters are aware of disasters but do not engage in any preparatory actions as a result (Çelik 2023). In a study conducted by Simms et al. (2013) 80% of participants reported having experienced

a hurricane disaster. Despite their disaster experiences, only 28% of participants indicated that they were in the preparation stage for a hurricane, and merely 8% reported being fully prepared (Simms et al. 2013). Disaster experience can be gained not only by directly experiencing a disaster but also by participating in disaster education and subsequent disaster drills. Individuals who have received disaster education are found to be more aware of disaster preparedness campaigns, gather more information about these campaigns, and tend to recognize the inadequacy of current preparations, making them more inclined to prepare. Amini et al. (2024) examined the effectiveness of a training programme to improve knowledge, functional skills and attitudes in natural disaster volunteers and found that participants who were subjected to a structured training programme had significant improvements in their knowledge, skills and attitudes towards disaster preparedness compared to those who did not receive training.

In communities affected by disasters, common psychological disorders include post-traumatic stress disorder (PTSD), anxiety disorders, and depression (Young et al. 1998; Cheng et al. 2018; Dagnino et al. 2024; Gökkaya et al. 2024; Taşkın et al. 2025). The most common psychological disorder observed after a disaster is PTSD, with prevalence rates ranging from 4 to 60%. A study on those affected by the 2010 Haiti earthquake found that 36.7% of the survivors exhibited symptoms of PTSD, while 25.9% showed signs of depression (Cénat and Derivois 2014). In our study, when examining the effects of disasters on participants, the most commonly encountered impact appears to be psychological, with approximately one-third of participants experiencing psychological effects from the disaster. In their meta-analysis, Keya et al. (2023) found a link between disaster and poorer outcomes for mental health. Leiva-Bianchi et al. (2018) also found that the duration of exposure to the disaster correlates with increased negative effects (Leiva-Bianchi et al. 2018). This result of our study is consistent with the literature.

Increasing levels of education enhance individuals' awareness, directly contributing to cognitive and problem-solving skills development, and indirectly reducing poverty, facilitating access to information, and enhancing social capital. This, in turn, is believed to increase both individual and societal resilience (Muttarak and Lutz 2014). In our study, as participants' education level increases, their disaster literacy and disaster preparedness levels significantly increase ($p < 0.05$). Numerous studies on disaster preparedness report that individuals with higher education are more inclined to adopt preparedness measures for various disasters (Al-rousan et al. 2015; Castañeda et al. 2020). Hoffman and Muttarak (2017) found in their research on education's impact on disaster preparedness that receiving an additional year of education increases the likelihood of taking preparedness measures by an average of 6%. Furthermore, a 10% increase in the proportion of family members aged ≤ 5 years increases the preparedness rate of family members by 17%, and as the education level within the family increases, the literacy levels of other individuals also increase. Zamboni and Martin (2020) found a significant relationship between education levels within the family and the preparedness of all family members. Our study is consistent with the literature in this respect.

In our study, a significant relationship was found between nuclear family structure and disaster literacy across all subscales, whereas no significant relationship was found between nuclear family structure and preparedness. Increased social interaction among family members leads to higher levels of knowledge and skill exchange. Specifically, education provided by parents during childhood is observed to influence preparedness behaviors (Muttarak and Pothisiri 2013). Watson et al. (2011) conducted a survey with students at a university in Texas following a hurricane, and they noted that students expressed not only the belief that they could better prepare for disasters but also that they needed more

information about disasters to better prepare (Watson et al. 2011). Participants in the survey, 70% ($n=361$) of whom were living with their families, relied on their families for guidance on disaster-related issues, as reported by Nguyễn et al. (2023) in their study measuring the role of individual and community-based resources in disaster preparedness in Seattle, USA. The majority of participants lived in single-family homes, and the disaster preparedness rate was determined to be 68%. Their study did not find a relationship between extended family ties and preparedness (Nguyễn et al. 2023). Family bonds are important not only for pre-disaster preparedness but also for post-disaster support, with family support being the first expected source of assistance in the face of disasters (Hawkins and Maurer 2010).

Household income positively impacts the resilience of households against disasters. Şentuna and Çakır (2020) indicated in their study conducted in Balıkesir that approximately 70% of households with insufficient income reside in non-resistant structures (Şentuna and Çakır 2020). Sattler et al. administered surveys to students under hurricane alerts in two different instances (i.e., during two different hurricanes). They noted that among the survey participants, those who were much more prepared for hurricanes had higher income levels and greater perceived control over their behaviors (i.e., locus of control) (Sattler et al. 2000). In our study, similar to the studies mentioned, we found significant associations between economic income status and both disaster literacy and disaster preparedness ($p < 0.05$). Bulut (2023) conducted a study on disaster literacy, revealing that individuals with income exceeding expenses tend to have higher levels of disaster literacy compared to other income categories (Bulut 2023). Nguyễn et al. (2023) found that an individual's income level positively influences their ability to purchase materials, determine security options, or engage in other disaster prevention efforts (Nguyễn et al. 2023). When individuals, especially those facing financial hardship or other forms of disadvantage, find themselves in such situations, preparing for uncertain, intermittent, and rare events can be challenging. This result of our study is consistent with the literature.

5 Limitations

The present study has some limitations. The research is limited to individuals in adulthood who use digital platforms and the internet. The results obtained from the scales used to measure the variables examined within the scope of the research are limited to the characteristics measured by the scale and the answers given by the participants. The results obtained from the research are limited to the participants with whom the research was conducted.

6 Conclusion

In this study, a positive relationship was found between disaster literacy and disaster preparedness. As individuals' disaster literacy increases, their levels of individual disaster preparedness also increase. The research findings indicate that individuals who have experienced disasters themselves or through close relatives have a better understanding of disaster-related information and are more willing to prepare for disasters. Additionally, participants in the study have predominantly experienced earthquake disasters, which have had the most significant psychological impact on them following these events. Individual

preparedness forms the basis of societal preparedness against disasters, highlighting the critical importance of individual efforts in this regard. Increasing individuals' knowledge about disasters can be achieved through enhancing their disaster literacy. To accomplish this, it is essential to raise individual education levels and incorporate more disaster-related topics into educational curricula and resources. Moreover, it is essential to explore diverse communication methods aimed at improving household disaster literacy levels to raise individual awareness. Disaster preparedness is shaped by various factors. Our study found that individuals who demonstrate comprehension, perception, and conscientious assessment of disasters contribute to enhancing these factors. Hence, there is a need to intensify efforts in conducting more studies focused on enhancing disaster preparedness.

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Declarations

Conflict of interest The author(s) declared no potential conflicts of interest concerning the research, authorship and/or publication of this article.

Ethical approval We warrant that the material contained in the manuscript represents original work, has not been published elsewhere and is not under consideration for publication elsewhere. Before commencing the study, ethical approval was obtained from the Ethics Committee of Social and Human Sciences at Kastamonu University with the number 8/16 dated 11.07.2023. Permission to use the scales was secured from the authors. Additionally, informed consent was obtained from all participants prior to the start of the research. The research was conducted in accordance with the ethical standards of the Declaration of Helsinki. The data that support the findings of this study are available from the corresponding author, upon reasonable request.

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