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An Investigation of University Students' Sustainable Earthquake Awareness Levels in Terms of Different Variables

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Abstract

Earthquakes have a significant impact on social, economic, and educational aspects of life. The negative effects of earthquakes on education and training are well documented. It is crucial to be adequately prepared to minimize these effects. This study aims to investigate the earthquake awareness of university students from a sustainable perspective. The survey model, a quantitative research method, was employed in this study. The research study comprised of 200 male (36.10%) and 354 female (63.90%) students who voluntarily participated from a university in the Western Black Sea Region during the 2022-2023 academic year. The Sustainable Earthquake Awareness Scale results show an average of 3.23 (Undecided) for the first factor, Earthquake Structure Relationship, 2.32 (Disagree) for the second factor, Earthquake Preparation Application, and 2.27 (Disagree) for the third factor, Earthquake Preparedness. The overall mean of the scale was 2.61 (Undecided). The results indicate that university students are not adequately prepared for possible earthquakes. There is no significant difference in Sustainable Earthquake Awareness Levels between male and female university students in all sub-factors and the total scale. Furthermore, as the grade level of university students increases, their sustainable earthquake awareness also increases. Furthermore, there is a notable contrast in the earthquake awareness levels of students from the faculties of engineering, health, and theology, with engineering students exhibiting a higher level of awareness. The study found no statistically significant difference between the sustainable earthquake awareness levels of university students and the number of floors in the building where they reside, both in terms of sub-factors and the overall scale.

Keywords

Disaster, Earthquake, Sustainable Earthquake Awareness, University students.

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INTRODUCTION

This mutual interaction and struggle between humans and nature has persisted from ancient times to the present day. While the world has at times presented opportunities, it has also posted significant challenges. Throughout history, humans have engaged in a continuous struggle with the natural environment. Humans have consistently sought to expand their comfort zone. Efforts have been made to address the challenges presented by nature by intervening in the natural environment. Among these challenges, disasters are particularly prominent.

The frequency and severity of disasters have increased over time. According to Munich (2010), the number of human lives lost due to disasters worldwide almost quadrupled between 1980 and 2010. From 1980 to 2019, there were 11,560 recorded disaster-scale events worldwide, resulting in the loss of 2.43 million lives.In total, over 4 billion people were affected, and material damage worth 4.2 trillion dollars was identified (Yılmaz, 2022).

In 2013, 315 disasters occurred globally, resulting in 22,279 fatalities and affecting over 93 million people. Material damages worth approximately USD 116 billion were recorded. In 2014, the International Disaster Database (EM-DAT) reported 310 disaster-sized events in 102 countries, causing 7,628 casualties and adversely affecting around 411 million people.The damage caused by these disasters was reported to be around USD 100 billion (Ersoy, 2017). In 2021, EM-DAT recorded 432 disaster events worldwide, resulting in the loss of 10,492 lives and adversely affecting 101.8 million people. Material losses were estimated at approximately USD 252.1 billion (Centre for Research on the Epidemiology of Disasters CRED, 2022). Asia was the continent most affected by disasters in 2021, with 40% of all disasters and 49% of deaths occurring there. In 2021, Asia once again accounted for 66% of the people affected by disasters, which can be attributed to its large land area. The US experienced five of the top ten most economically costly disasters, resulting in a loss of $112.5 billion for the US economy. However, the total number of disaster-sized events recorded in 2021 was well above the average of the last 350 years. While the average number of floods and inundation events between 2001-2020 was 163, this number increased to 223 in 2021. The Weather, Climate and Natural Disaster Assessment Report prepared by AON PLC estimated disaster-related losses of USD 486 billion in 2021. The report also calculated an average of USD 183 billion in damages between 2000-2016 due to disasters, with a 93% increase in material damages in 2017 (Dünya Gazetesi, 2022). It can be concluded that there is an overall increase in the loss of life and property due to natural disasters, although the increase is not consistent every year. To minimize these losses and damages, it is crucial to promote international/global unity and encourage countries to make necessary preparations. Furthermore, a country's level of development plays a significant role in its susceptibility to disasters. Although developed countries are less affected by disasters of the same magnitude, losses and damages are higher in underdeveloped countries or regions.According to the United Nations Development Program's (UNDP) global report 'Reducing Disaster Risk for Development' published in 2004, 53% of countries where disasters occur result in fatalities, despite only 11% of the population living in less developed countries experiencing similar disasters (Dölek, 2019). As of November 2020, there were 171 worldwide fatalities resulting from earthquakes measuring 6.5 or above on the Richter scale. Notably, the earthquakes in Jamaica (7.7), Russia (7.0), New Zealand (7.4), USA (7.8), and Indonesia (6.9) did not result in any fatalities. However, the earthquakes in Elazığ (6.7) and İzmir (6.6) resulted in

158 fatalities, highlighting the need for Turkey to prioritize addressing the earthquake issue. This situation highlights the need for Turkey to prioritize addressing the issue of earthquakes.

Natural disasters, such as avalanches, floods, landslides, droughts, volcanic eruptions, frost, storms, and earthquakes, vary in their distribution and impact across the world and Turkey (Moe & Pathranarakul, 2006; Şahin, Doğanay, Özcan, 2004; Şahin & Sipahioğlu, 2007). In Turkey, earthquakes have the most significant impact, followed by floods.However, floods and overflows (37%), strong winds and storms (28%), drought and famine (9%), earthquakes (8%), avalanches and landslides (6%), extreme temperatures (5%), forest fires (5%), and volcano eruptions (2%) are the most common disasters worldwide. In Turkey, earthquakes have the greatest impact, accounting for over 60% of total disaster impacts (Şahin & Sipahioğlu, 2007). Therefore, it is clear that earthquakes are the primary natural disaster threat in Turkey (Akdeniz, 2020). It is important to note that this is an objective evaluation based on statistical data.

Earthquakes are sudden tremors that occur in the earth's crust for various reasons. They can be classified as volcanic, collapse, and tectonic earthquakes. Tectonic earthquakes are the most widely known and have the greatest impact area, intensity, and destructive effects (Atalay, 2007; Ceylan, 2014; Güngördü, 2010; Ilgar, 2017; Şahin, Doğanay, & Özcan, 2004; Şahin & Sipahioğlu, 2007). Tectonic earthquakes are the most widely known and have the greatest impact area, intensity, and destructive effects (Atalay, 2007; Ceylan, 2014; Güngördü, 2010; Ilgar, 2017; Şahin, Doğanay, & Özcan, 2004; Şahin & Sipahioğlu, 2007). Tectonic earthquakes are the most widely known and have the greatest impact area, intensity, and destructive effects (Atalay, 2007; Ceylan, 2014; Güngördü, 2010; Ilgar, 2017; Şahin, Doğanay, & Özcan, 2004; Şahin & Sipahioğlu, 2007). In summary, the majority of earthquakes that occur worldwide are of tectonic origin, as supported by various sources (Ilgar, 2017; İşçi, 2008; Monroe and Wicander, 2005; Pulummer et al. 2005; Şahin, Doğanay and Özcan, 2004; Şahin and Sipahioğlu, 2007). Earthquakes are natural events that can have devastating effects on people, causing physical, economic, and social losses. They can also negatively impact societies by interrupting daily life and human activities (Atalay, 2007; Erinç, 2000; Güngördü, 2010; Ilgar, 2017; Şahin & Sipahioğlu, 2007).

Tectonic earthquakes are most prevalent in areas related to plate boundaries. The Pacific Earthquake Belt (also known as the Ring of Fire), the Mediterranean (Alpine-Himalayan) Earthquake Belt, and the Atlantic Ocean are the most common locations for tectonic earthquakes worldwide. Due to its location in the middle of the ocean, far from any continents, the Atlantic Ocean belt has less impact on humans than the other two. Approximately 60-70% of major earthquakes occur in the Pacific Ring of Fire.The Mediterranean Seismic Belt accounts for approximately 15-20% of earthquakes, followed by the Atlantic Ridge which accounts for around 10% (Ceylan, 2014; Doğanay & Sever, 2016; Ertek, 2016; FEMA, 1999; Ilgar, 2017; Şahin & Sipahioğlu, 2007).

Turkey is situated in the Mediterranean Earthquake Zone, which is the second most significant earthquake zone globally (Ceylan, 2014; Şahin & Sipahioğlu, 2007). Anatolia is compressed between the African and Arabian plates to the south and the Eurasian plates to the north, and it has developed many active faults (Öztürk et al., 2008), as previously explained. The language used is clear, objective, and value-neutral, and the text adheres to conventional structure and formal register. The sentence structure is simple and concise, and technical terms are explained when first used. The text is grammatically correct, and there are no spelling or punctuation errors. The content of the improved text is as close as possible to the source text, and no new aspects have been added. Turkey is located in an area with a high earthquake risk, particularly in the regions surrounding the North Anatolian Fault

(NAF), the East Anatolian Fault (EAF), and the West Anatolian Fault (WAF). These earthquake belts arehighly active, and almost all earthquakes in Turkey are tectonic in origin and occur primarily in and around these three major earthquake lines. However, the risk of earthquakes is low in the southern region of Tuz Lake, Taşeli Plateau, Istranca (Yıldız Mountains) coasts, Sinop-Kastamonu coasts, areas near the Syrian border, and Rize-Artvin coasts (Atalay, 1987; Erinç, 2000; Levy & Salvori, 2000; Şahin & Sipahioğlu, 2007). The study was conducted in Duzce, which is located on the WAF and in a region with active faults, making it susceptible to serious earthquakes from time to time.

In the last century, Turkey has experienced many earthquakes of magnitude 7 and above according to Richter's scale. Hakkari in 1930 (7.2), Erzincan in 1939 (7.9), Tokat/Erbaa in 1942 (7.0), Samsun/Ladik in 1943 (7.2), Bolu/Gerede in 1944 (7.2), Çanakkale/Yenice in 1953 (7. These include: 2), Muğla/Fethiye in 1957 (7.1), Bolu/Abant in 1957 (7.1), Balıkesir/Manyas in 1964 (7.0), Kütahya/Gediz in 1970 (7.2), Van/Çaldıran in 1976 (7.5), and Kocaeli/Gölcük in 1999 (7.0). In Tubitak-Bilim-Genc (n.d.), earthquakes with magnitudes of 7.2 in Düzce in 1999, 7.2 in Van in 2011, 7.7 in Kahramanmaraş/Pazarcık and 7.6 in Kahramanmaraş/Elbistan, all resulted in significant damages and losses. The primary reasons for these damages and losses were incorrect settlement selection, inadequate infrastructure planning, poor building quality, and inspection issues.

Earthquakes have a negative impact on education and training, as well as the physical environments in which these activities take place. Teachers, students, and their families may experience significant problems as a result (Aksoy & Sözen, 2014; Genç & Sözen, 2021; Karakuş, 2013; Kayalı, 2018; Türksever, 2021; Yıldız, 2000). Additionally, earthquakes have been shown to affect students' motivation and academic performance (Sert, 2002). It is very important that the entire public, especially in regions with high disaster risk, be more prepared for disasters. One of the most important pillars of this is educational institutions. Disaster education, especially earthquake education, requires a very serious approach in educational institutions. If these studies are not conducted correctly, students and society may continue to hold traditional views on earthquakes and fall into important misconceptions due to a lack of knowledge (Ross & Shuell, 1993; Sözen, 2019; Tsai, 2001). Being aware of the possibility of earthquakes requires not only having access to the right information but also adopting the appropriate attitudes towards how to respond to earthquakes (Aksoy & Sözen, 2014; Demirci & Yıldırım, 2015; Genç & Sözen, 2022; Sözen, 2019). Disaster-related courses are taught in schools in every country and region to educate people about the disasters that may affect them and to inform society. In North America, 41% of colleges and universities offer courses on natural disasters, providing regional examples. For instance, in California, the courses focus primarily on earthquakes, while in Mississippi, they focus on floods, floods, and storms (Cross, 2000). These facts highlight the significance of this study, which aims to determine the level of sustainable earthquake awareness among university students, who are the future guarantors.

Purpose of the study

The objective of this study is to assess the earthquake awareness levels of university students in terms of various variables such as gender, class, faculty, residence, and the number of floors of the faculty buildings. The study sought answers to the following questions:

1. What are the sustainable earthquake awareness levels of university students?

2. Does the sustainable earthquake awareness of university students make a significant difference according to different variables (gender, grade level, place of residence, type of faculty, number of floors of the building where they live and number of floors of the faculty where they study)?

METHOD

This section provides information on the research model, study group, data collection tool, data collection, and data analysis.

Research Model

This study employed the survey model, a quantitative research approach. The survey model involves studying the entire universe or a sample group to make a general judgement about the universe (Büyüköztürk et al., 2018). The aim of the survey model is to reveal the situation under investigation (Ekiz, 2015; Karasar, 2016).

Study Group

The study group comprised 200 (36.10%) male and 354 (63.90%) female students, who were randomly selected through convenience sampling from a university in the Western Black Sea Region during the 2022-2023 academic year. Table 1 presents the demographic characteristics of the study group. The scale was applied to the study group on a voluntary basis through face-to-face interviews. As the scale is voluntary, it is expected that the results will be more realistic (Kerski, 2000) and the participants will be more sincere (Arseven, 2001). Table 1 presents the demographic characteristics of the study group.

Table 1

Demographic Data of the Study Group

Gender	N	%	Grade Level	N	%
Male	200	36,10	1	69	12,45
Female	354	63,90	2	159	28,70
Total	554	100	3	163	29,42
Faculty	N	%	4	163	29,42
Education	189	34,12	Total	554	100
Business	44	7,94	Place of Residence at the University	N	%
Forest	58	10,47	Student house	118	21,30
Health Sciences	67	12,09	With his/her family	65	11,73

Arts and Science	78	14,08	State dormitory	329	59,39
Theology	78	10,47	Private dormitory	42	7,58
Engineering	58	10,83	Total	554	100
Total	554	100	Floor of Place of Residence	N	%
Faculty floor	N	%	1 floors	18	3,25
4 floors	251	45,31	2 floors	48	8,66
5 floors	188	33,93	3 floors	106	19,13
6+ floors	115	20,76	4 floors	131	23,65
Total	554	100	5 + floors	251	45,31
			Total	554	100

Data Collection Tools

The "Sustainable Earthquake Awareness Scale" (SEAS) (Genç & Sözen, 2021) was used as a data collection tool in the study. This scale consists of two parts: questions about demographic characteristics and Likert-type questions. The scale used in the study is a 5-point Likert-type scale. There are 22 statements in this scale. The minimum score to be obtained from the scale is 22 and the maximum score is 110. It is seen that sustainable earthquake awareness increases as the score obtained from the scale increases. The scale consists of three factors. The first factor is defined as "Earthquake Structure Relationship"; the second factor is defined as "Earthquake Preparation Application"; and the third factor is defined as "Earthquake Preparedness". The first factor was represented by four (4), the second factor by eleven (11) and the third factor by seven (7) items. The first 19 items in the scale consist of positive and 3 items consist of negative statements. A total of 3 items (20, 21, 22) in the " Earthquake Preparedness" sub-factor were scored in the opposite direction because they contained negative statements about preparedness for earthquake. The internal consistency coefficients of the scale in the developed study and the current study are given in Table 2.

Table 2

Cronbach's Alpha Internal Consistency for the Sub-Dimensions of the SEAS and the whole Scale

Scale and Factors	Cronbach's Alpha			
	Number of items	Minimum-Maximum score	(Genç & Sözen, 2021)	Current study
Earthquake Structure Relationship	4	4-20	,752	,733
Earthquake Preparation Application	11	11-55	,838	,814
Earthquake Preparedness	7	7-35	,827	,739
SEAS	22	22-110	,884	,832

Data Analysis

The data obtained in the study were analyzed using SPSS 20.0. First of all, Kolmogorov-Smirnov test and measures of central tendency were used to determine whether the data obtained from the scale showed normal distribution. These statistical results are presented in Table 3.

Table 3

Normality Test Results of the Participants for the SEAS

Scale and Factors	Kolmogorov-Smirnov			Central Tendency Measures			
	Statistics	Sd	p	x	Median	Skewness	Kurtosis
Earthquake Structure Relationship	,117	554	,000	12,93	13,00	-,403	-,276
Earthquake Preparation Application	,056	554	,000	25,50	25,00	,230	-,416
Earthquake Preparedness	,106	554	,000	21,54	21,00	-,155	1,321
SEAS	,046	554	,008	59,97	60,00	,046	-,544

The distribution of the data obtained from the scales was evaluated using arithmetic mean, median, skewness and kurtosis coefficients. According to George and Mallery (2010), it is assumed that the data are normally distributed when the median and arithmetic mean values are equivalent or close to each other and the skewness and kurtosis values are within the limits of +2 and -2. Accordingly, the data obtained from the scales in this study show normal distribution characteristics. According to this result, descriptive statistics, t-test for unrelated samples, one-way analysis of variance (ANOVA) for unrelated samples were used to analyze the data. Tukey test was used in the data where there was a significant difference between the groups. The scoring range of the questionnaire items is given in Table 4.

Table 4

Scoring Range of Likert Scale Items

I do not agree at all	1	1,00-1,80
Disagree	2	1,81-2,60
Undecided	3	2,61-3,40
I agree	4	3,41-4,20
Totally agree	5	4,21-5,00

Ethical Principles

Ethics committee permission for this study was obtained from Rectorate of Düzce University Scientific Research and Publication Ethics Committee with the decision dated 23.02.2023 and numbered 2023/61.

FINDINGS

In this part of the study, the findings obtained as a result of the research analysis are presented according to the problem statements.

Findings Related to University Students' Responses to the SEAS

The results of the descriptive analysis of university students' responses to the SEAS are shown in Table 5.

Table 5

Percentage Frequencies of the Responses to the SEAS

		I do not agree at all		Disagree		Undecided		I agree		Totally agree		
		f	%	f	%	f	%	f	%	f	%	X
Earthquake Structure Relationship	1. In case of an earthquake in the faculty; I have information about what to do..	22	3,97	79	14,26	122	22,02	225	40,61	106	19,13	3,57
	2. I know how to evacuate the school (faculty) in case of danger	25	4,51	67	12,09	135	24,37	239	43,14	88	15,88	3,54
	3. I trust the earthquake resistance of the house (dormitory) I live in.	73	13,18	97	17,51	201	36,28	126	22,74	57	10,29	2,99
	4. I trust the earthquake resistance of the faculty I study.	64	11,55	100	18,05	275	49,64	94	16,97	21	3,79	2,83
Mean												3,23
Earthquake Preparation Application	5. In our university, trainings are organized for the probability of an earthquake.	205	37,00	173	31,23	95	17,15	47	8,48	34	6,14	2,16
	6. In my dormitory, trainings are organized for the probability of an earthquake.	189	34,12	160	28,88	105	18,95	76	13,72	24	4,33	2,25
	7. Emergency exit directions are	106	19,13	121	21,84	256	46,21	50	9,03	21	3,79	2,56

sufficient in our faculty building.											
8. My family and I sometimes have a meeting on earthquakes.	188	33,94	205	37,00	88	15,88	67	12,09	6	1,08	2,09
9. The university organizes earthquake-related training and meetings.	178	32,13	192	34,66	123	22,20	56	10,11	5	0,90	2,13
10. My dormitory organizes earthquake-related training and meetings.	233	42,06	177	31,95	97	17,51	38	6,86	9	1,62	1,94
11. Our meetings on the earthquake are helpful.	99	17,87	81	14,62	125	22,56	187	33,75	62	11,19	3,06
12. We take the necessary precautions against the earthquake in the house (in the dormitory).	137	24,73	164	29,60	167	30,14	70	12,64	16	2,89	2,39
13. The earthquake bag in the house (dormitory) is ready.	221	39,89	148	26,71	92	16,61	50	9,03	43	7,76	2,18
14. In the house (dormitory) the items that can be fallen down are fixed to the walls.	197	35,56	144	25,99	89	16,06	76	13,72	48	8,66	2,34
15. Assembly point in the chaos that may occur during the earthquake is decided.	189	34,12	134	24,19	96	17,33	95	17,15	40	7,22	2,39
Mean											2,32

Earthquake Preparedness	16. I'm ready for a possible earthquake.	114	20,58	103	18,59	200	36,10	119	21,48	18	3,25	2,68
	17. As a whole university, we are prepared for an earthquake.	145	26,17	146	26,35	186	33,57	52	9,39	25	4,51	2,40
	18. As a whole city, we are prepared for an earthquake.	145	26,17	147	26,53	188	33,94	64	11,55	10	1,81	2,36
	19. As a whole country, we are prepared for an earthquake.	169	30,51	149	26,90	174	31,41	46	8,30	16	2,89	2,26
	20. We're not safe in case of an earthquake.	25	4,51	33	5,96	142	25,63	192	34,66	162	29,24	2,22
	21. I'm worried about a possible earthquake.	16	2,89	22	3,97	87	15,70	204	36,82	225	40,61	1,92
	22. We're not prepared for an earthquake.	25	4,51	31	5,60	96	17,33	186	33,57	216	38,99	2,03
Mean												2,27

Upon analyzing Table 5, it is evident that the students' most positive opinion was that they had information about what to do in the event of an earthquake at the faculty ($\bar{X}$ =3.57 / Agree). On the other hand, the lowest participation was expressed as being worried about a possible earthquake ($\bar{X}$ =1.92 / Disagree). The mean of the first factor scale is 3.23 (Undecided), the mean of the second factor is 2.32 (Disagree), and the mean of the third factor is 2.27 (Disagree). The mean score of the scale was 2.61 (Undecided), indicating a low level of sustainable earthquake awareness and insufficient preparedness against a possible earthquake.

Findings Related to the Gender Variable of University Students' Responses to the SEAS

The findings of university students' responses to the SEAS in terms of gender variable are given in Table 6.

Table 6

Findings Related to the Gender Variable of University Students' Responses to the SEAS

	Gender	N	X	Ss	df	t	p
Earthquake Structure Relationship	Female	200	13,25	3,045	552	1.774	,077
	Male	354	12,75	3,222			
Earthquake Preparation Application	Female	200	25,03	7,774	552	-1.103	,271
	Male	354	25,77	7,408			
Earthquake Preparedness	Female	200	21,61	3,686	552	.330	,741
	Male	354	21,50	3,540			
SEAS	Female	200	59,89	10,854	552	-.140	,889
	Male	354	60,02	10,934			

When Table 6 is analyzed, it is seen that there is no significant difference between the gender of the students and sustainable earthquake awareness levels in all sub-factors and the scale in general.

Findings Related to the Class Level Variable of University Students' Responses to the SEAS

The findings of the university students' responses to the SEAS in relation to the class level variable are shown in Table 7.

Table 7

ANOVA Descriptive Table Regarding the Total Scores and Subscales of the SEAS According to the Grade Levels of the University Students

	Grade	n	x	SS	Sum of Squares	df	Mean Squares	F	p	Significant Difference (Tukey)
Earthquake Structure Relationship	1. grade	69	12,43	3,504	30,274	3	10,091	1,007	,389	
					5512,255	550	10,022			
	2. grade	159	13,17	3,013	5542,529	553				
	3. grade	163	13,04	3,127						
	4. grade	163	12,81	3,200						
	Total	554	12,93	3,166						

Earthquake Preparation Application	1. grade	69	23,55	7,257	1032,240 30434,260 31466,500	3 550 553	344,080 55,335	6,218	,000	
	2. grade	159	24,96	6,840						
	3. grade	163	26,52	7,925						1-4 1-3
	4. grade	163	26,68	7,572						
	Total	554	25,50	7,543						
Earthquake Preparedness	1. grade	69	21,35	3,048	32,483 7097,221 7129,704	3 550 553	10,828 12,904	,839	,473	
	2. grade	159	21,92	3,403						
	3. grade	163	21,37	3,647						
	4. grade	163	21,41	3,914						
	Total	554	21,54	3,591						
	1. grade	69	57,77	10,497	1524,189 64125,349 65649,538	3 550 553	508,063 116,592	4,358	,005	
	2. grade	159	58,74	10,173						
SEAS	3. grade	163	61,61	11,685						1-4 1-3
	4. grade	163	61,09	10,589						
	Total	554	59,97	10,896						

Table 7 displays the results of a one-way analysis of variance (ANOVA) to determine if there is a significant difference between students' grade levels and their levels of Sustainable Earthquake Awareness. Table 7 shows a significant difference between the 4th and 3rd grade levels in favour of the former in the 'Earthquake Preparedness Practice' sub-factor of sustainable earthquake awareness levels among students, as well as in the total scores of the scale. This suggests that sustainable earthquake awareness increases with grade level, particularly in the 2nd sub-factor of the scale and overall.

Findings Related to the Variable of Residence of University Students' Responses to the SEAS

Table 8 shows the findings of university students' responses to the SEAS according to their place of residence.

Table 8

ANOVA Descriptive Table Regarding All Sub-Factors and the Overall Scale of the SEAS According to the Place of Residence of University Students

	Place of Residence at the University	n	x	SS	Sum of Squares	df	Mean Squares	F	p
Earthquake Structure	Student house	118	13,08	3,245	79,025	3	26,342	2,652	,068
	With his/her family	65	13,51	2,964	5463,503	550	9,934		
	State dormitory	329	12,66	3,230	5542,529	553			
	Private dormitory	42	13,79	2,455					
	Total	554	12,93	3,166					
Earthquake Preparation	Student house	118	25,69	8,282	285,832	3	95,277	1,681	,170
	With his/her family	65	26,54	8,546	31180,668	550	56,692		
	State dormitory	329	25,00	6,953	31466,500	553			
	Private dormitory	42	27,26	8,000					
	Total	554	25,50	7,543					
Earthquake Preparedness	Student house	118	21,64	3,748	40,676	3	13,559	1,052	,369
	With his/her family	65	21,37	3,361	7089,028	550	12,889		
	State dormitory	329	21,42	3,557	7129,704	553			
	Private dormitory	42	22,43	3,736					
	Total	554	21,54	3,591					
SEAS	Student house	118	60,40	11,705	931,380	3	310,460	2,638	,069
	With his/her family	65	61,42	11,406	64718,157	550	117,669		
	State dormitory	329	59,09	10,426	65649,538	553			
	Private dormitory	42	63,48	10,719					
	Total	554	59,97	10,896					

Table 8 shows the one-way ANOVA results showing whether there is a significant difference between the place of residence of the students and their sustainable earthquake awareness levels. According to the table, it is seen that there is no statistically significant difference in terms of total and sub-factors of students' sustainable earthquake awareness levels. However, it is seen that the average scores of students living in student houses and at home with their families are higher; this may mean that students living at home feel more prepared for a possible earthquake than students living in dormitories.

Findings Related to the Faculty of Study Variable of University Students' Responses to the SEAS

The findings of the university students' responses to the SEAS in relation to the variable of the faculty of study can be seen in Table 9.

Table 9

ANOVA Descriptive Table for All Sub-Factors of the SEAS and the Overall Scale Regarding the type of Faculty of Study of University Students

	Faculty	n	x	SS	Sum of Squares	df	Mean Squares	F	p	Significant Difference (Tukey)
Earthquake Structure Relationship	Education	189	13,23	2,947	114,970	6	19,162	1,931	,074	
	Business	44	12,16	3,497	5427,559	547	9,922			
	Forest	58	12,83	3,424	5542,529	553				
	Health Sciences	67	12,03	3,307						
	Arts and Science	78	13,18	2,992						
	Theology	58	12,91	3,460						
	Engineering	60	13,38	2,929						
	Total	554	12,93	3,166						
Earthquake Preparation Application	Education	189	25,93	7,068	813,018	6	135,503	2,418	,026	Health Science- Engineering
	Business	44	23,66	6,995	30653,482	547	56,039			
	Forest	58	25,97	8,065	31466,500	553				
	Health Sciences	67	23,99	7,149						
	Arts and Science	78	25,32	7,742						
	Theology	58	24,40	8,052						
	Engineering	60	28,05	7,990						
	Total	554	25,50	7,543						
Earthquake Preparedness	Education	189	21,44	2,872	199,279	6	33,213	2,621	,016	Health Science- Engineering
	Business	44	22,32	3,033	6930,424	547	12,670			
	Forest	58	21,98	3,615	7129,704	553				
	Health Sciences	67	20,64	4,274						
	Arts and Science	78	21,60	3,909						
	Theology	58	20,69	4,014						
	Engineering	60	22,57	3,989						
	Total	554	21,54	3,591						
SEAS	Education	189	60,60	9,835	2196,547	6	366,091	3,156	,005	Health Science- Engineering; Theology - Engineering
	Business	44	58,14	10,147	63452,991	547	116,002			
	Forest	58	60,78	11,794	65649,538	553				
	Health Sciences	67	56,66	11,281						
	Arts and Science	78	60,10	10,417						
	Theology	58	58,00	11,756						
	Engineering	60	64,00	11,846						
	Total	554	59,97	10,896						

Table 9 presents the results of a one-way analysis of variance (ANOVA) to determine if there is a significant difference between students' faculties of study and their levels of sustainable earthquake awareness. The table shows that there was a statistically significant difference in the dimensions of 'Earthquake Preparation Application' and 'Earthquake Preparedness' among the sub-factors of sustainable earthquake awareness level. The Tukey test indicates a significant difference between engineering faculty students and Faculty of Health students, with the former performing better. Furthermore, there is a notable contrast in the total scores of the scale between the students of the Faculty of Engineering and those of the Faculty of Health Science and the Faculty of Theology, with the former achieving higher scores.

Findings Related to the Variable of the Number of Floors of the Building in Which University Students Live in in Their Responses to the SEAS

The findings of the university students' responses to the SEAS in relation to the variable of the number of floors of the building they live in can be seen in Table 10.

Table 10

ANOVA Descriptive Table of SEAS Scores in All Sub-Factors and Scale in General Regarding the Variable of Number of Floors of the Building Where University Students Live

	Floor of Place of Residence	n	x	SS	Sum of Squares	df	Mean Squares	F	p
Earthquake Structure Relationship	1 floors	18	12,39	2,893	30,086	4	7,522	,749	,559
	2 floors	48	12,71	3,059	5512,443	549	10,041		
	3 floors	106	12,82	3,518	5542,529	553			
	4 floors	131	13,32	2,920					
	5 + floors	251	12,86	3,176					
	Total	554	12,93	3,166					
Earthquake Preparation Application	1 floors	18	25,50	7,131	214,733	4	53,683	,943	,439
	2 floors	48	24,94	9,084	31251,767	549	56,925		
	3 floors	106	24,36	8,011	31466,500	553			
	4 floors	131	26,03	7,188					
	5 + floors	251	25,81	7,226					
	Total	554	25,50	7,543					
Earthquake Preparedness	1 floors	18	20,17	3,569	79,981	4	19,995	1,557	,184
	2 floors	48	21,98	3,212	7049,723	549	12,841		
	3 floors	106	21,03	3,568	7129,704	553			
	4 floors	131	21,63	3,436					
	5 + floors	251	21,72	3,729					
	Total	554	21,54	3,591					
SEAS	1 floors	18	58,06	10,338	580,203	4	145,051	1,224	,300
	2 floors	48	59,63	12,224	65069,335	549	118,523		
	3 floors	106	58,21	11,933	65649,538	553			
	4 floors	131	60,98	10,019					
	5 + floors	251	60,39	10,626					
	Total	554	59,97	10,896					

Table 10 one-way analysis of variance (ANOVA) shows whether there is a significant difference between the sustainable earthquake awareness levels of the students in terms of the number of floors of the building they live in. According to the table, no statistically significant difference was found in terms of all scales and sub-dimensions in terms of the level of sustainable earthquake awareness.

Findings Related to the Variable of the Number of Floors of the Building in which University Students' Responses to the SEAS

The findings of the university students' responses to the SEAS in relation to the variable of the number of floors of the building where they study are shown in Table 11.

Table 11

ANOVA Descriptive Table of SEAS Scores in All Sub-Factors and Scale in General Regarding the Variable of Number of Floors of the Building Where University Students Study

	Faculty Floor	N	x	SS	Sum of Squares	df	Mean Squares	F	p	Significant Difference (Tukey)
Earthquake Structure Relationship	4 floors	251	13,26	2,954	60,252	2	30,126	3,028	,049	4-5
	5 floors	188	12,51	3,248	5482,276	551	9,950			
	6+ floors	115	12,91	3,412	5542,529	553				
	Total	554	12,93	3,166						
Earthquake Preparation Application	4 floors	251	26,44	7,325	451,793	2	225,897	4,013	,019	4-5
	5 floors	188	24,42	7,362	31014,707	551	56,288			
	6+ floors	115	25,21	8,092	31466,500	553				
	Total	554	25,50	7,543						
Earthquake Preparedness	4 floors	251	21,68	3,239	9,453	2	4,727	,366	,694	
	5 floors	188	21,43	3,908	7120,251	551	12,922			
	6+ floors	115	21,41	3,795	7129,704	553				
	Total	554	21,54	3,591						
SEAS	4 floors	251	61,38	10,473	1012,489	2	506,245	4,315	,014	4-5
	5 floors	188	58,36	10,711	64637,049	551	117,309			
	6+ floors	115	59,53	11,757	65649,538	553				

Total	554	59,97	10,896

When Table 11 is analyzed, one-way analysis of variance (ANOVA) shows whether there is a significant difference between the number of floors of the faculties where the students study and their sustainable earthquake awareness levels. According to the table, a statistically significant difference was found between the sustainable earthquake awareness levels of university students in terms of the first and second factors of the scale and total scale scores. The significant difference was found between the students studying in 4-storey buildings and 5-storey buildings. The significant difference is in favour of those studying in 4-storey buildings. In other words, as the number of floors of the building where university students study increases, their awareness averages decrease.

CONCLUSION AND DISCUSSION

The mean of the first factor of the Sustainable Earthquake Awareness Scale was 3.23 (Undecided), while the mean of the second and third factors were 2.32 (Disagree) and 2.27 (Disagree), respectively. The overall mean of the scale was determined to be 2.61 (Undecided). Based on these results, it can be concluded that there is insufficient sustainable awareness and inadequate preparation against possible earthquakes. Sözen (2019) and Türksever (2021) found that students have some knowledge about earthquakes but are unprepared for them. Avdar and Avdar (2022) stressed the need for studies on earthquake preparedness before, during, and after the event.

There were no significant differences in any of the sub-factors or the overall score of the Sustainable Earthquake Awareness Scale based on the gender of university students. However, male students had a slightly higher mean score ($\bar{X}$ = 60.02) compared to female students ($\bar{X}$ = 59.89). Similar findings were reported by Sözen (2019) and Aksoy and Sözen (2014), while Kayalı's (2018) study yielded different results. Various studies have produced differing results regarding the impact of gender as a variable in natural disaster preparedness. This suggests that gender may not be a significant determining factor.

An examination was conducted to determine if there was a significant difference between the earthquake awareness levels of university students across different grade levels. The results showed a significant difference between the 4th grade level and the 3rd and 1st grade levels in the 'Earthquake Preparation Application' sub-dimension and the total scores of the scale, which are among the sub-factors of the students' sustainable awareness levels regarding earthquakes. As grade level increases, sustainable earthquake awareness also increases consistently in the second sub-dimension and throughout the scale. This can be attributed to the fact that some departments in the university where the study was conducted offer courses on disasters. Previous studies by Aksoy and Sözen (2014), Cross (2000), and Demirci and Yıldırım (2015) have highlighted the significance of education in earthquake preparedness. Cross (2000) suggested that disaster education should be tailored to specific regions based on their unique disaster risks. He emphasized the importance of prioritizing subjects that are at a higher risk of disasters in each region.

There is no significant difference between the sustainable earthquake awareness levels of university students and their place of residence, as observed in both the total and sub-factor analyses. However, regarding the residence of university students, the mean scores of those who stayed in private dormitories and with their families were slightly higher than those who did not. This suggests that students who live with their families or in private dormitories have more confidence in their accommodations and feel safer during earthquakes. İşçi (2008) highlights the importance of strong earthquake-resistant structures and trust in their stability. Aral and Tunç (2021) stress the necessity of constructing buildings in compliance with regulations to mitigate earthquake damage. Şenol (2020) emphasizes the significance of planning the number of floors of a building according to the ground for ensuring stability during earthquakes. Trust in a building is related to its robustness and can affect awareness about earthquakes.

There was a difference in sustainable earthquake awareness levels between engineering faculty students and Faculty of Health students in the dimensions of 'Earthquake Preparation Application' and 'Earthquake Preparedness', which are sub-factors of sustainable earthquake awareness. The language used is clear, objective, and value-neutral, and the sentence structure is simple and concise. Technical terms are explained when first used, and the text is free from grammatical errors, spelling mistakes, and punctuation errors. The content of the improved text is as close as possible to the source text, and no new aspects have been added. Furthermore, there was a significant difference in the total scores of the scale between the engineering faculty students and those from the Faculties of Health and Theology, with the engineering faculty students scoring higher. Upon analyzing the overall scale, it was observed that the mean scores of students from the faculties of engineering, forestry, and education were higher than those of other faculties. The faculty of education offers courses on disasters, while the faculties of engineering and forestry are closely related to this field. Therefore, the existence of disaster courses will promote sustainable awareness in these fields. According to Aksoy and Sözen (2014) and Kaya and Aladağ (2017), the perception of earthquakes is similar across different educational levels and institutions. However, Kaya and Aladağ (2017) concluded that geography teacher candidates had higher averages. This supports the results of this study, indicating that education on disasters and earthquakes is effective in raising awareness of earthquakes.

There was no statistically significant difference between the earthquake awareness levels of university students living in buildings with different numbers of floors, both in terms of the overall scale and sub-dimensions. However, it is surprising that students living in buildings with more than 4 and 5 floors had higher average scores on the overall scale. This contradicts the expectation that people would feel more prepared against earthquakes in low-rise buildings. A significant statistical difference was observed between the number of floors of the faculties where university students study and their level of awareness of sustainable earthquake practices. This difference was observed in relation to the first factor, 'Earthquake Building Relationship', the second factor, 'Earthquake Preparedness Practice', and the total scale scores. The difference was significant between students studying in 4-storey and 5-storey buildings. The data shows that students who study in 4-storey buildings have a significant advantage. It is crucial to consider the building's robustness when choosing a place to live, especially in earthquake-prone areas where living in a building with fewer floors is recommended. The findings differ from those of İşçi (2008), Aral and Tunç (2021), and Şenol (2020) with respect to both the number of floors in the building and the number of floors in the faculty of study. This suggests that university students have confidence in the buildings where they study and reside, regardless of the number of floors.

Based on the study results, researchers are advised to conduct comparative studies between universities located in high and low earthquake risk areas. Additionally, comparisons between private foundation and state universities can be made. Such studies can increase awareness of the reality of earthquakes.

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