



## Young adults' fear of disasters: A case study of residents from Turkey, Serbia and Macedonia



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### ABSTRACT

This paper presents the results of quantitative research regarding the level and the causes of fear of disasters among young adults in Turkey, Serbia, and Macedonia. The survey was conducted using a questionnaire that was given and then collected hand by hand that explored in depth the disaster-related fears among 537 respondents during 2016. The questionnaire explored students' basic demographics and their level of fear, as well as the causes and sources of fear. Across the three countries, the results indicated an excessive level of fear both of earthquakes and of epidemics. In addition, participants reported that they were particularly afraid for their personal lives and, to a greater extent, for the health of their parents. Experiences with bad weather conditions, pictures of the consequences of disasters, and past disaster experience were found to exacerbate fear. It was also found that females were more afraid, with a possible socio-cultural-laden link to an ethos of protection versus participation. Findings can be used to create focused strategies at a national level intended to reduce excess fear of disasters and facilitate a more prepared public through policy and education programme development.

### 1. Introduction

By definition, fear is an emotion experienced in anticipation of some threat or danger. This word is generally associated with negative feelings, such as powerlessness and helplessness, that people might experience when think about a possible risky situation [1]. It refers to peoples' anxieties about a number of other disaster-related phenomena. Examples here include burglaries and fear of security in shelters [2], being exposed to post-disaster violence [3], eviction [4], forced migration [5], delayed warning information [6], and facing discrimination and hostility in evacuation sites [7]. All these types of risk-related emotions can affect individual cognitions about sources of risk and thus the promptness and capacity with which they can react [8].

Until now, much attention has been paid to the analysis of the impact of disaster-related fear, including the one related to preparedness for response [9–11]. On one hand, Greenberg and his colleagues [12] found that people who developed constructive coping mechanisms were most likely to manage fears of disasters in a socially acceptable way, such as overcoming or dealing with fear. On the other hand, there are individuals who have high ongoing levels of fear of disasters, who deny the existence of a threat, who dismiss hazard information or who use other undesirable coping mechanisms [13,14] that tend to be self-

destructive (suppression or denial of fear) and antisocial. Such mechanisms are then thought to get in the way of taking preventive or preparedness measures. Thus, the research showed that if fears reach the extent that they produce undesirable coping, knowledge may well not be converted to actionable risk-reduction and preparedness behaviours [13]. However, some research [15] indicates that fears and anxiety at more moderate levels can facilitate behaviour and task performance. For example, fear of disasters and perceptions, knowledge and understanding of proper safety procedures for responding to earthquakes were positively correlated [16]. Another study demonstrated a facilitative effect of fears and anxiety in regard to seismic risk [17]. Therefore, people make assumptions about the possible consequences of action before considering engaging in a particular behaviour; action-outcome expectancies precede efficacy judgements [18].

Kirkwood [19] suggests that when we fail to clearly announce the nature of an environmental risk, both civil servants and citizens can have an equally false sense of security, or, alternatively, if the risk is overestimated, it can consequently cause fear and avoidance. According to Paul [20], citizens who are informed promptly about an imminent disaster through a system of alerts and notifications, combined with specific guidance and procedural knowledge, are thought to not feel an enormous amount of fear because they know they are able to go

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Fig. 1. Study area.

through a predetermined, officially sanctioned procedure. Some research, however, has shown that fears of disaster have a facilitative effect [21] in managing disasters. At the same time, if fears and anxieties are more manageable and moderate (e.g., personalized concern versus terror) and coupled with good, specific guidance from various sources [22,23], people can cope more effectively, as that form of emotional arousal is facilitative rather than obstructive. On the other hand, as mentioned above, some individuals struggle with fear in such a way that they deny the existence of a threat or, alternatively, have fatalistic expectations or other unhelpful coping strategies [12,13]. Risk communication is essential for managing infrequent disasters, as in the recent example Dalrymple et al. [24] noted concerning the Ebola outbreak. Uncertainty derived from a lack of information was later transformed into “a highly fraught environment”, with rumours spreading so that people reported excessive anxiety, fear, and panic.

For this reason, investigating public feelings of fear, anxiety and worry in relation to hazard events, can assist practitioners in planning for hazard-related events, including communication and guidance strategies to motivate and improve public decision making and preparedness [25]. All people, especially young adults, need to be concerned about environmental threats to a sustainable future [26]. Because young adults are the managers of tomorrow, their perceptions are important since they are responsible for advancing technological developments and building the future [27]. As specifically stressed by Overton [28], young adults are also quite overlooked in disaster research, although their concerns and needs are respectively remarkable.

Risk perception is driven by the one's personal circumstances, surroundings and past experiences as, in the case of weather related hazards [29]. The determinants of perceived risk were influenced by cognitive and emotional elements, including fear [30]. Fear is driven by past-event memories more than a real estimation of the probability of occurrence [31]. Young people interviewed in Mt. Vesuvius area displayed high levels of fear towards volcanic risk that then translates into a poor perceived ability to cope effectively [14]. Women have been generally associated to display more worry about hazard related risks. Similarly, Kung and Chen [32] explored that the “personal impact” factor for survivors and females were higher than for the general public and males in earthquake risk perceptions among the Taiwanese population. Females demonstrated more fear, worry, and threat in regard to such risk, indicating that they are more sensitive to these occurrences.

When examining fear in the US, among Midwestern university college students, women were more fearful than males [33].

Fears of epidemics in the aftermath of disasters have shaped the perceptions of the public and policymakers [34]. Also, there is a correlation between parents' and children's level of fear towards a disaster [35]. Local disaster workers often provided most of the post-disaster mental health interventions: supportive counselling, cognitive behaviour therapy, brief psychological intervention etc. [36]. The feelings of worry associated with future flood scenario and personal damage is indicated as the most important source of worry than interruption of supplies and damage to the home. Also, it was found significant relation between feelings of worry and the adoption of protective behaviors [37]. Similarly, people expressed a lot of negative emotions and feelings about hazards and earthquakes and there were often prompted by seeing a disaster in the media [38]. Earthquake victim children were more fearful than were non-victim children and that girls had significantly stronger fears on all subscales than did boys [39]. In another study, people who were not affected strongly underestimated the negative affect associated with a flood and because of that they have lower fear level [40].

The purpose of this research was to examine fear of disasters among university students in Serbia (Belgrade), Turkey (Ankara, Aksaray, Kirikkale, Kirsehir), and Macedonia (Skopje) about a set of disasters.

## 2. Methodology

### 2.1. Study area

Serbia and Macedonia are located in the Balkans in the northwest part of Turkey. The region between the Black Sea and the Adriatic Sea in the southeast of the European continent is called the Balkans. All three countries are places where disasters are frequently seen. Serbia and Macedonia are landlocked countries situated in south-eastern Europe in the centre of the Balkan Peninsula between 40° 35' and 46° 11' latitude North, and Turkey is located 36° 42' latitude North in south-eastern Europe and south-western Asia; in general, they are located at very close geographical coordinates (Fig. 1). These three countries have similar climate conditions, though with some differences. All three countries have a historically common cultural background history. First, The Ottoman Empire lasted in the Balkans for 500

years until the Balkan Wars in 1912–1913. Serbia and Macedonia had been part of the Ottoman Empire since the end of the 14th century. Serbs, Macedonians and Turks have lived together in the same geography for a long period of history. Because of this historical background, there are cultural and sociological similarities between these countries.

Between the 1970s and 2002, 5000 disasters occurred in Serbia [41]. According to Reliefweb data provided by UNOCHA, the most frequent events were floods, with 15 severe inundations from 1988 to 2014. More recently, from 2007 to 2016 in Serbia, approximately 21 disasters occurred, killing 90 people, injuring 620, affecting 206,754, and leaving 1470 homeless, along with causing material damage to the amount of 2 million USD. Turkey is a country that often faces disasters because of its geographical features. As a result of disasters such as earthquakes, landslides, floods, avalanches, extreme winter conditions, storms and fires, 100,537 people have died, over 61,597 people have been injured, over 108,570 buildings have been demolished, and over 1,337,000 buildings have been damaged in Turkey since the beginning of 20th century [42]. In Macedonia, from 2007 to 2016, 7 disasters occurred, in which 10 people were killed, 30 were injured, and 1 million were affected, along with material damage reaching the amount of 350 million USD. In Macedonia, the most frequent events were floods and flash floods [43].

The types of disasters are similar in three countries (Macedonia, Serbia, and Turkey) in views of vertical and horizontal characteristics of the surface, but the effect of disasters may vary because of economic and demographic features. Given such impacts, and keeping in mind that these are societies in social transition, there is a need for full comprehension of factors related to public preparedness, particularly including the emotional factors that provide the motivation (or not) for effective preparation. Thus, this study examined disaster-related fears and related issues in cohorts of students in all three countries.

## 2.2. Participants

The research was carried out during 2016 and consisted of 537 respondents: 160 from Serbia, 182 from Turkey and 195 from Macedonia. The participants from Serbia were students at the Academy of Criminalistic and Police Studies in the Faculty of Security Studies and Faculty of Geography; from Turkey, the Faculty of Education; and from Macedonia, the Faculty of Security. All students were from public schools. The sample was 44.9% male ( $N = 241$ ) and 55.1% female ( $N = 296$ ). Of those surveyed, 51.1% were between 18 and 20 years old ( $N = 274$ ), 41.9% were between 21 and 23 years old ( $N = 225$ ) and 7.1% were over the age of 24 ( $N = 38$ ) (Table 1). The average age of respondents was 19 years old, and the most represented category was those younger than age 21 (152; 77.9%). The participants were chosen

**Table 1**

Demographic information of respondents ( $N = 532$ ) in a gendered classification. In brackets there are percentages.

Variable	Category	Countries			Total
		Macedonia ( $N^1$ )	Serbia ( $N^2$ )	Turkey ( $N^3$ )	N
Gender	Male	73 (37.4)	97 (60.6)	71 (39)	241 (44.9)
	Female	122 (62.6)	63 (39.4)	111 (61)	296 (55.1)
Age (years)	18–20	152 (77.9)	72 (45)	50 (27.5)	274 (51)
	21–23	43 (22.1)	73 (45.6)	109 (59.9)	225 (41.9)
	+24	–	15 (9.4)	23 (12.6)	38 (7.1)
Perception of disaster risk	Yes	104 (53.3)	84 (52.5)	125 (68.7)	313 (58.3)
	No	91 (46.7)	76 (47.5)	57 (31.3)	224 (41.7)
Previous experiences	Yes	134 (68.7)	94 (58.8)	123 (67.6)	351 (65.4)
	No	61 (31.3)	66 (41.3)	59 (32.4)	186 (34.6)

$N^1 = 195$  (36.3%),  $N^2 = 160$  (29.8%),  $N^3 = 182$  (33.9%).

via purposive sampling method, which is a type of non-probability sampling technique. A core characteristic of non-probability sampling techniques is that samples are selected based on the subjective judgement of the researcher, rather than random selection. With typical case sampling the sample could be illustrative of other similar samples.

The study was conducted with university students who were from the departments of Security and Geography (Serbia), Social Studies Education (Turkey), and Security (Macedonia). A typical case sampling was used in this study which was a purposive sampling technique used in the normality/typicality of the units (e.g., people, cases, events, settings/context, places/sites). Because all participants learned lessons and subjects on disaster risk management in their faculties. Also they will work in some organizations (police department, fire and rescue service, local municipality, and schools) on disaster risk reduction and disaster preparedness after graduation. They were young adults and were potentially parents of their respective future societies. Young adults are individuals who will take an effective role in the disaster preparedness of the world in the future. Therefore, determining the fears of the participants regarding disasters is important in terms of determining the strategies that are appropriate in the fight against disasters.

To evaluate the students' familiarity with disasters, we asked whether they knew of the existence of disaster-related risks in their communities and if they had prior experience with disasters. Of the three countries, 313 young students (58.3%) understood the environmental risks in their place of living, and 286 students (34.6%) had personally experienced them.

## 2.3. Questionnaire design

The questionnaire was composed of two sections: the first one consisted of demographic information. The second section was a questionnaire about the various aspects of fear caused by disaster. One question was based on a binary (yes/no) structure, and the others were managed as Likert scale-based (absolutely – absolutely not) and designed to use scores from 1 to 5. Several studies were consulted [38,39,44,45] to adapt or to support the design of the questionnaire for the young adults' fear research. Some of them used self-report questionnaire for assessing fears as modified version of the Fear Survey Schedule for Children [44]. The measurement tool was given in-person to the participants in their mother tongue (Serbian, Macedonian, and Turkish) by face to face. The questions were asked in the same format. The authors applied the measurement tool separately in their own countries. Then, all data were combined and analysed together.

### 2.4. Analyses

The analysis of data was managed through analytic strategies that included both descriptive and inferential means. Statistical analyses of data were conducted using the Statistical Package for the Social Sciences (SPSS) program (SPSS 20). The internal consistency of Likert scales is good for the 11 items regarding the feeling of fear, with a Cronbach's alpha of 0.78 for the 11 items regarding the reason for fear sourced by natural disaster and an alpha of 0.89 for the items regarding the participants' fear of natural disasters.

To test the level of fear for disasters between countries and disaster type variables and the reason of disaster-related fear regarding gender variables, one-way ANOVA of variance was conducted. This study is limited to the schools included in the sample where the study was conducted. Therefore, the findings were evaluated in this context.

### 3. Results and discussion

The results showed the fears of young adults, their levels of fears and the sources of their fears in this study. Starting from the above-mentioned methodological framework, the results were divided into three parts of findings:

- i. Feelings of disaster-related fear
- ii. The source of fear to disasters subjects
- iii. Gender influence on disaster-related fears.

#### 3.1. Feelings of disaster-related fear

Respondents were initially asked whether they had a fear of disasters among the eleven disasters considered. The findings indicated that almost all participants felt fear of all the disasters in various degrees. According to the mean percentage of the three countries, the highest percentage score was fear of earthquakes (66.9%), the second highest was fear of droughts (59.8%), and the third highest was fear of epidemics (58.1%). Turkish students stated that earthquakes were considered the most feared disaster (85.7%), whereas Serbian students mentioned epidemics (67.5%) to be the most feared (Table 2).

The phenomenon of droughts was the most feared disaster in Macedonia (61.0%). As floods are the main environmental hazard in Serbia, people may also have a certain worry for the epidemics that might be derived from them (e.g., typhoid fever, cholera, hepatitis). In Macedonia, drought has become dramatically more frequent in the past decades due to the probability of progressive climate change caused by the widespread irrigation of the Western Balkans [46].

These findings, with additional analyses examining mean level of

fears in the three countries, can be described as: The most feared event among Macedonian ( $\bar{X} = 3.43$ ) and Serbian ( $\bar{X} = 3.25$ ) young adults was fear of epidemics (Fig. 2). On the other hand, Turkish students mentioned earthquakes as the highest ( $\bar{X} = 4.17$ ); in fact, fear of earthquakes was the highest score registered in mean level of disaster-related fear (Table 3).

According to ANOVA results, it was determined that there was a difference between the countries in the context of the level of fear related to disasters. The mean score of fear of disaster of Turkish students was significantly different from the mean scores of students from Macedonia and Serbia (Table 3) in for all disaster types except floods. In this result, more disasters were feared in Turkey, and the effects of fear were more severe. Serbian students had more fear points regarding floods ( $\bar{X} = 3.21$ ) than Macedonian and Turkish students did.

These findings may reflect the fact that earthquakes are sudden and unforeseen catastrophic disasters that cause extensive consequences. Korkmaz [47] emphasized that judgements regarding riskiness depend on the hazard characteristics, such as controllability, benefits or casualties. In addition, consistent with risk perception findings, as expressed by Lamontagne and La Rochelle [48], seismic events are full of unknowns regarding duration and intensity in space and time, making them prone to creating enhanced risk perceptions and causing higher levels of anxiety. In countries where these events are quite common, such as China, earthquakes ranked first in terms of perception of danger level expressed by the population [49] and second in terms of feelings of dread among the Hong Kong Chinese [50].

Earthquakes have a long historical record in Turkey (since 2100 BCE). Increased population and infrastructure heightens earthquake related risk during the last century [51,52]. For example, after the Kocaeli earthquake occurred in Turkey in 1999 (where the earthquake caused approximately 17,500 fatalities and 44,000 injuries, affected 15 million people, and resulted in a total economic damage of over 15 billion USD [53]), people started to suffer disproportionate levels of psychological distress especially among parents [54]. It is plausible that such fear then influences fear of other disasters, including in the form of transmittance to younger generations.

Similar to seismic activity, epidemics bring a certain level of unpredictability in terms of time-space span and related consequences. Not all biological outbreaks can be prevented, mitigated and controlled. According to Ristanović [55], typhus caused great damage to the Serbian army and people during World War I. The epidemic of smallpox in Yugoslavia in 1972 was considered the largest post-war outbreak in Europe. The tularaemia outbreak in the area of the former Yugoslavia in the 1990s, and the oropharyngeal tularaemia registered in Sokobanja region in late 1998 spread and lasted until 1999 and 2000, respectively.

**Table 2**  
The percentage of students feeling fear of disasters in Macedonia, Serbia and Turkey.

	Self-assessment on fear						
	Countries			Total			
	Macedonia	Serbia	Turkey	N	%	SD	Ranking
Earthquakes	60.5	53.1	85.7	359	66.9	.471	1
Droughts	61.0	43.8	72.5	321	59.8	.491	2
Epidemics	29.2	67.5	80.8	312	58.1	.494	3
Extreme temperatures	35.6	60.5	68.7	300	55.9	.497	4
Wildfires	33.8	42.5	79.1	278	51.8	.504	5
Floods	42.1	56.9	54.9	273	50.8	.500	6
Storms	53.8	39.4	52.7	264	49.2	.500	7
Landslides	63.6	28.5	49.5	259	48.2	.500	8
Avalanches	63.3	21.9	52.7	259	48.2	.500	9
Volcanic eruptions	59.0	21.9	42.3	227	42.3	.494	10
Tsunamis	52.8	25.0	31.3	200	37.2	.484	11
Total (N)	182	160	195	537	100		

\*\*Every student stated his or her opinion about all types of disasters.

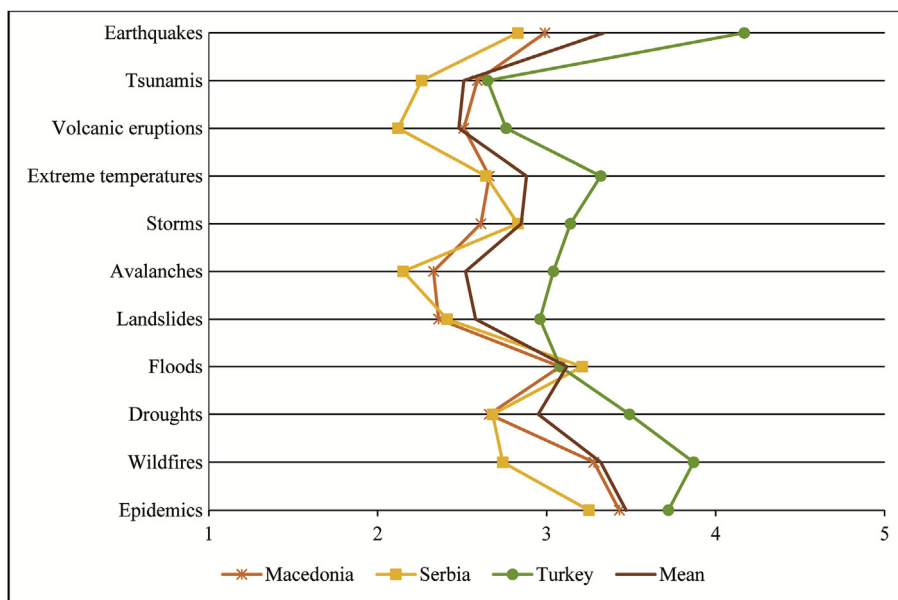


Fig. 2. The mean level of disaster-related fear for each country.

Table 3

Mean level of fear of disasters<sup>a</sup> in Macedonia, Serbia and Turkey. One-way ANOVA statistics are shown to detect the difference between the countries.

		Macedonia		Serbia		Turkey		$\bar{X}$	SD	N	%	TOTAL	p
		$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD					Value	
Geophysical	Earthquakes	2.99	2.38	2.83	1.17	4.17	1.23	3.34	1.43	359	66.9	46.36	.000 <sup>b</sup>
	Tsunamis	2.59	1.50	2.26	1.36	2.65	1.68	2.51	1.53	200	37.2	33.23	.000 <sup>b</sup>
	Volcanic eruptions	2.51	1.47	2.12	1.32	2.76	1.67	2.48	1.52	227	42.3	49.57	.000 <sup>b</sup>
Meteorological	Extreme temperatures	2.66	1.39	2.64	1.19	3.32	1.45	2.88	1.39	300	55.9	40.41	.000 <sup>b</sup>
	Storms	2.61	1.42	2.83	1.27	3.14	1.56	2.85	1.44	264	49.2	8.78	.000 <sup>b</sup>
Hydrological	Avalanches	2.33	1.42	2.15	1.28	3.04	1.58	2.52	1.48	259	48.2	56.37	.008 <sup>b</sup>
	Landslides	2.36	1.28	2.41	1.11	2.96	1.49	2.58	1.34	259	48.2	44.43	.001 <sup>b</sup>
	Floods	3.08	1.39	3.21	1.29	3.08	1.49	3.12	1.39	273	50.8	9.58	.000 <sup>b</sup>
Climatological	Droughts	2.66	1.44	2.68	1.27	3.49	1.44	2.95	1.43	321	59.8	29.52	.000 <sup>b</sup>
	Wildfires	3.28	1.35	2.74	1.17	3.87	1.42	3.32	1.40	278	51.8	86.31	.000 <sup>b</sup>
Biological	Epidemics	3.43	1.42	3.25	1.28	3.72	1.36	3.47	1.37	312	58.1	75.45	.000 <sup>b</sup>

<sup>a</sup> EM-DAT disasters classification: *geophysical* (earthquakes, tsunamis, volcanic activities), *meteorological* (extreme temperatures and storms), *hydrological* (floods, landslides, avalanches), *climatological* (droughts and wildfires) and *biological* (epidemics). Available at <http://www.emdat.be/classification>.

<sup>b</sup> Significant correlation ( $p < 0.05$ ).

### 3.2. The source of fear of disasters

The reason for disaster-related fears and anxieties is an important question for understanding this phenomenon. Therefore, the respondents mentioned specific reasons underpinning their disaster-related fears. One-way ANOVA was performed to determine the influence of the country on causes of fear of disasters (Table 4).

The greatest fears in relation to disasters are about the life and health of parents ( $\bar{x} = 4.39$ ), a lack of water ( $\bar{x} = 3.88$ ) and the participants' own lives and health ( $\bar{x} = 3.76$ ). The scores were similar in all three countries (Table 4). Generally, Turkish students reported the highest level of fear for relatives and had the highest ratings across all items. Serbian and Macedonian respondents stated worries about their parents. Similarly, Macedonian students had worries about the lives of their children. Comparing the level of fear in the three countries, respondents did not rate fears about their own lives and health as high as fears about their parents' lives and the health, however this item was still amongst their top three reasons in terms of score magnitudes. It seems that participants were not as worried about their personal

situations as they were about the situations of their parents or children. This finding has direct implications on risk communication and public education strategies in disaster preparedness. Prioritizing the needs of other members of the family and the community over individual needs in the event of a disaster is an important point of view for an effective disaster planning. This finding also concerns social and traditional understanding. In Balkan societies, familial and social values are prioritized over individual values. The basis for an effective risk management strategy must be a clear message for improving awareness among young adults that takes into account their actual concerns about their parents or children [56].

Supporting these findings, Elinder and Erixson [57] found that young adults could physically adapt and move more quickly in risky situations, giving them a higher probability of survival. In addition, younger people were found to feel less afraid of a set of natural-related hazards in several studies [50,58–60] compared to adults and children [61]. Another study that was conducted in the US after Hurricane Andrew demonstrated how young adults typically had strong parental support [62], which may then have been translated into enhanced



**Table 4**  
The reasons for disaster-related fears in each country. Mean values ( $\bar{x}$ ) and gender influence are shown in relation to the items.

	M	S	T	TOTAL		Gender influence			
				$\bar{x}$ (SD)	Rank	Male	Female	t	p
I fear for the life and health of my parents	4.35	4.05	4.72	4.39 (1.11)	1	4.1	4.6	-5.2	.000 <sup>a</sup>
I fear a lack of water	3.98	3.38	4.21	3.88 (1.28)	2	3.5	4.2	-5.7	.000 <sup>a</sup>
I fear for my life and health	3.83	3.18	4.19	3.76 (1.44)	3	3.2	4.2	-7.8	.000 <sup>a</sup>
I fear a post-disaster epidemic	3.89	3.09	4.05	3.71 (1.36)	4	3.3	4	-5.7	.000 <sup>a</sup>
I fear a lack of food	3.67	2.95	3.9	3.53 (1.36)	5	3.1	3.9	-6.2	.000 <sup>a</sup>
I fear for the life and health of my children	4.35	2.66	4.4	3.40 (1.72)	6	3.4	3.4	0	0.98
I am afraid that we won't have enough money for recovery	3.46	2.76	4.05	3.37 (1.41)	7	3	3.7	-6	.000 <sup>a</sup>
I fear for the life and health of my future wife/husband	2.95	2.63	4.23	3.29 (1.68)	8	3.2	3.4	-1	0.31
I fear for the goods in my house	3.27	2.57	3.45	3.12 (1.41)	9	2.8	3.4	-4.9	.000 <sup>a</sup>
I fear for the life and health of my pets	2.85	2.86	3.57	3.09 (1.50)	10	2.7	3.4	-6	.000 <sup>a</sup>
I fear economic damage	2.85	2.86	3.45	2.92 (1.43)	11	2.6	3.2	-5.1	.000 <sup>a</sup>

M: Macedonia, S: Serbia, T: Turkey, SD: Standard deviation.

<sup>a</sup> Significant correlation ( $p < 0.01$ ).

worries about the parents during disaster situations.

In this study, in terms of mean scores, the lowest scores on reasons behind young adults' fear was their economic damage, which proved equal in all three countries. Turkish and Macedonian participants stated that economic damage was a source of disaster-related fear, while Serbian participants stated that the goods in their home were a source of disaster-related fear (Table 4).

One question we asked was used to determine the type of factors that exacerbate fear of disasters (Table 5). The average of "fear encourager" scores varied from 2.43 to 3.12. The two items with the highest scores were "experience with intense weather conditions" (3.12) and "seeing pictures about consequences of disasters" (3.10). Experience with intense weather conditions is a direct experience, as is experiencing intense weather conditions through images disseminated through media (e.g., television, social media, and internet) that show more extreme conditions and pictures of devastation. Past disaster experience had higher ratings (the third of mean ratings), with the highest ratings (above midpoint) in Turkey. Past experiences related to increased fear include actual exposure combined with other exposure in life.

TV and other video are among the most important sets of tools for communicating efficiently in a disaster risk situation. Media can encourage fears but can also raise awareness and preparedness. In fact, television and other media are a rapid and efficient communication tool used in all stages of disasters. But the influence of movies had the fourth highest rating in Turkey behind intense weather experience, pictures, and past experience. In addition, it can be seen an educational tool as well [63]. In several risk-perception papers, mass media was found to be the preferential information tool in hazard situations [14,64]. Radio programmes had the lowest mean rating, perhaps demonstrating that without a visual representation regarding an emergency situation,

**Table 5**  
Descriptive statistics of sources that exacerbate disaster-related fear in the three countries.

	Macedonia		Serbia		Turkey		Total	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Experienced intense weather conditions	3.18	1.34	3.03	1.27	3.15	1.55	3.12	1.40
Pictures	3.35	1.26	2.98	1.16	2.95	1.62	3.10	1.38
Past experience	2.81	1.38	2.82	1.45	3.13	1.67	2.92	1.51
Television and other video	3.04	1.37	2.63	1.32	3.03	1.61	2.91	1.46
Conversations	2.99	1.30	2.67	1.31	2.86	1.49	2.85	1.38
Movies	2.93	1.42	2.24	1.18	3.07	1.57	2.77	1.46
Radio programmes	2.38	1.13	1.91	1.01	2.94	1.43	2.43	1.28

SD: standard deviation.

people are less fearful of the risks. This may indicate that radio is the not the most powerful media channel for communicating risks about potential hazards and occurrences in those countries or localities [65]. The influence of movies on the natural disasters had the second lowest mean rating, though variability across countries was noted. Literature on disaster movies is credited with increasing attention and awareness towards these environmental issues [66].

### 3.3. Gender influence on disaster-related fears

The disparities between men and women in disaster research have been widely discussed among learned specialists, who attribute differences according to biological factors, cultural norms and attributes present in each society [67]. The results suggested that for the general public and for males compared to females, "personal impact" factor was higher. For this reason and to simply examine the differences between genders and compare them with the little research available on this topic for this age cohort [68], we examined the influence of gender on the level of fear in the three countries among the participants of the survey. Statistically significant differences were found between young-men and women in causing of disaster-related fears (Table 4).

Females mentioned more fear intensity across all disaster types in comparison to their male peers. Similar results were found in interviews with 243 Arab and Muslim individuals in Agadir (Morocco) concerning their general seismic knowledge and personal feelings of danger (individual and household) [63]. In that study, women were found to fear earthquakes and related damage more than men were, while men were less afraid and generally considered themselves more knowledgeable about seismic causes, activities, and effects. Females felt more fear, worry, and threat in regard to this personal impact risk. It seems that the trend concerning adult women and men can be similarly detected among students, where females' fear intensity is higher across potential risk-related situations. Reasons for gender discrepancies include a range of possibilities, such as social background, self-esteem, social support, and exposure to stressful events, as findings indicate that females typically have greater disaster-related fears across ages, cultures and ethnic groups [61]. Additionally, we can assume that is very possible that males are less inclined to express their fears compared to females, especially in some cultures [69]. Among college students in Lebanon, for example, no gendered related significance difference was found concerning earthquake preparedness [70], despite a series of ethnically based wars and insurgencies fought from 1991 to 1999.

In terms of more specific socio-cultural reasons that might underpin gender differences in these respondents in the Balkans, gender roles have undergone profound changes over time, especially during the Yugoslav war period from 1991 to 1999. In those years, there was a re-institutionalization of patriarchal domination [71], in which the society

reflected a sense of hyper-masculinity. However, it could be assumed that the current situation is distant from that of the 1990s and the war period, which would appear to largely invalidate this possibility. However, as Kaser [72] noted, a patriarchal tradition, similar to that of two to three decades ago, apparently continues to be an influence in the attitudes of current younger generations. Therefore, this gender differentiation might be reflective of such socio-cultural emphasis, coupled with age-old “women and children first” slogan that underpinned previous humanitarian and rescue efforts during war-related and other crises. Behaviours reflecting this emphasis were detected numerous times during the humanitarian evacuations in the Balkans and Turkey in previous decades [73]. These boundaries were designed to protect women (and children) but may also had the unintended consequence of favouring “protection” over “participation”, which created barriers related to perceived efficacy around the management of hazards and risk reduction. Women and children are among the groups most affected by the destructive effects of wars and disasters. Additionally, psychological reactions that are biologically innate in women play an essential role in their response to frightening and destructive events in emergency situations. That's why women generally reported being less confident, but perhaps had more realistic views about being prepared while also reporting more household- and family-level cares, concerns, and preparedness behaviors [74].

When looking at gender discrepancies related to reasons for disaster-related fear, some significant statistical differences were found, with the exception of fear for the life of their husband/wife and children. Thus, considering the generally high fear for all the items proposed to both genders, female respondents expressed greater intensity of reasons for fear for all the items described (e.g., for their own and their parents' lives, economic damage). As children rely on parents to take care of problems in everyday life, it is plausible that the stress parents suffer from the trauma of disaster events might predict the level of fear experienced by children [75].

#### 4. Conclusion

Experts, researchers and practitioners agree that fear is a natural emotional precondition designed to keep us safe and give us the means to take action without remaining paralyzed in a crisis situation. However, not all people, especially young adults, are concerned or worried about a set of environmental issues that they might encounter. For this reason, we investigated their knowledge and fear about disasters and the relations of these among university students in Serbia, Macedonia and Turkey. Overall, students in the three countries reported that earthquakes and epidemics are the disasters they most worry about, while schools include the notion of disaster risk reduction in education (chiefly, on seismic activities) from elementary to graduate levels in Macedonia and Turkey [43,76]. It nevertheless appears that young adults carry some level of worry and concern. With that in mind, while schools may be demonstrating proactive initiatives on raising risk awareness, helping young people couple physical forms of preparedness with psychosocial forms appears to be a necessary consideration [77]. That is, as children typically have high levels of fear about disasters, as documented earlier in this paper [78], part of any educational efforts and related evaluation should be targeting and assessing, respectively, whether education typically pushes children into arousal zones that produce more action than they do avoidance. Additionally, via education outside of school, more efforts should be implemented at a community level. As suggested by Tuladhar et al. [79] students and the community should interact and participate in disaster education together, which can produce and enhance strong networks and societal cohesion-known predictors of enhanced hazard preparedness [22].

Concerning the causes of fear, young adults felt more afraid for their parents' health than anything else, including their own health. After themselves, they had more fears in relation to themselves or others (i.e., children, partner) than to material aspects (house, other material

losses), with the exception of fears of being without food. In addition, students agreed that the main source of fear is experience of bad weather conditions, visual images and previous experience with disasters. Of course, various experiences are invariably filtered through a cultural and familial lens; thus, such experiences can be attenuated or amplified through family discussions or oral transmission. This includes turning “threat” talk into “challenge” talk and resultant coping strategies, the latter being quite convincingly shown to improve task performance while also reducing fears [80]. That is, such responsibilities should not be confined to school and education programmes but should rather be part of family culture and related discussions. In addition, gender was found to be a predictor of worry, demonstrating that young female students are more fearful than their male counterparts.

It is important to acknowledge that the sample of interviewees was relatively small and may not perfectly match the entire body of college students in the three countries due to sampling method. For this reason, it is important for future researchers to build on current findings and to explore in more depth the feelings and related variables that work together and underpin perceptions and preparedness about environmental risks. This research thus should be considered preliminary but important, as it includes data information about the risk and communication messaging in these countries. Of course, findings can also provide insight not only for emergency management practitioners but also for policy makers, educational institutions and, ultimately, young people and their families themselves. In addition to the family environment, where children learn first, schools themselves, from primary to colleges, are a key source for building disaster preparedness and increasing awareness about our earth's changes and movements and the overlap between more scientific-laden knowledge and critical “human factors”, including those in disaster risk-reduction and resilience contexts.

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#### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijdr.2019.101095>.

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