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Public reactions to the disaster COVID-19: a comparative study in Italy, Lebanon, Portugal, and Serbia

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ABSTRACT

A new coronavirus emerged in December 2019 and quickly spread globally, causing unprecedented social, psychological, and economic damage. This study aimed to investigate people's emotional reactions to the COVID-19 pandemic. The dataset for this study consisted of 2,013 adults (962 males and 1,053 females) in four countries (Italy, Lebanon, Portugal, and Serbia). A snowball sampling technique that focused on recruiting the general public living in countries during the COVID-19 epidemic was utilized. An online survey was disseminated at the same time, in March–April 2020, when many countries were exposed to COVID-19. Results indicated that, with regard to gender, females had more psychological reactions to COVID-19 than did males. People who had one child were more stressed than people with no children. Extensive knowledge of COVID-19 was found to trigger more anxiety. Results showed that stress and overall emotional reactions increased with age. The findings can be used to develop psychological interventions to improve mental health and psychological resilience during the COVID-19 epidemic.

1. Introduction

A previously unknown virus and disease were identified after an outbreak in December 2019 in Wuhan, China. The novel virus was designated by the World Health Organization (WHO) as the 2019-novel coronavirus (nCoV). The WHO formally named the disease caused by the nCoV as 'COVID-19' (novel coronavirus 2019) on 11 February 2020 (WHO 2020a). Since this disease spread globally, affected many people of all ages, and it was shown that early symptoms vary and may depend on one's age and pre-existing conditions, the WHO declared COVID-19 a pandemic

on 11 March 2020, resulting in the 2019–2020 coronavirus pandemic (CDC 2020a). The initial COVID-19 outbreak spread globally much faster than previous outbreaks (Peeri et al. 2020). Today the COVID-19 outbreak continues to spread all over the world. The total number of COVID-19 cases has surpassed 15 million with more than 620,000 virus-related deaths (WHO 2020b). While some communities appear to be more prepared than others for such biological hazards, all governments around the world are racing to understand and limit the spread of the new coronavirus as part of their response phase. During this ongoing response phase, major side effects have often been overlooked, namely the anxiety and fear of citizens.

People can show various psychological reactions to extraordinary events in the world. Some of them are weak, but others can be strong and have deadly results. Anxiety is defined as a concern to do something or for something to happen with an uncertain outcome. Many previous studies have shown that anxiety is an inseparable part of life among people facing the unknown. In the medical field, it has been speculated that 'fear of pain and what we do about it may be more disabling than pain itself' (Waddell et al. 1993, p. 164). Anxiety is built on fear, the source of which depends on the underlying conditions. For example, in chronic pain, the highest correlations were found among pain-related fear measures and measures of self-reported disability and behavioral performance (Crombez et al. 1999). Stress is a type of psychological pain that occurs in response to various physical, professional, or emotional frustrations. These frustrations become stressors when they exceed normal limits of one's sense of well-being. Consequently, the sustained experience of stress may lead to physical and mental symptoms, such as anxiety and depression (King et al. 1987).

Researchers believe that anxiety-prone people tend to appraise any situation they face as threatening (Spielberger et al. 1970; Gregory 2000). People who are inclined to be anxious have increased attention to external signals with a high tendency to interpret uncertain information in a threatening manner; thus, they continuously scan the environment for possible threats (Beck 1976; Tellegen 1985). Lazarus (1966) believes that threat perception may lead to one of two statuses: a fight or a flight response. Non-anxious people are the ones who adopt a fight response, and they would be ready to exhibit some preparedness behavior in response to an imminent danger. The anxious-prone persons are the ones who adopt a flight response filled with emotions, but at the same time they may look for options and precautions to implement in times of danger.

Overall, the available literature does not allow one to draw a substantial conclusion on the role of anxiety in the preparedness behavior of communities in times of pandemic. Some studies examined risk perceptions and emotions during the early stage of the 2009 (H1N1) influenza pandemic in Britain, Hong Kong, Australia, Malaysia, Europe, and the US (Chor et al. 2009; Seale et al. 2010). These studies found that precautionary behaviors were associated with anxiety about H1N1 influenza (Goodwin et al. 2009; Jones and Salathe 2009; Rubin et al. 2009; Lau et al. 2010; Setbon and Raude 2010), risk perceptions (Chor et al. 2009; Jones and Salathe 2009; Lau et al. 2010), and the efficacy of the precautionary behaviors (Rubin et al. 2009; Lau et al. 2010). It was also found that the incidence of H1N1 influenza in the US has substantial geographical variation; consequently, the real risk of infection varies

geographically (CDC 2020b). Previous research suggested that both psychological and medical interventions are necessary to improve the quality of life in patients (Nikolić et al. 2019; Cvetković 2020). Therefore, such an investigation would add to the existing self-report measures targeting the psychological impacts of the pandemic on communities. Understanding individuals' behavior and their relation to their perceived risk is, therefore, important in terms of effective control of an infectious disease outbreak (Leung et al. 2003).

The relationship between anxiety and perception of other disasters has been inconsistent in the literature. Recent COVID-19 studies found that precautionary measures were associated with lower levels of anxiety, especially in the workforce (Tan et al. 2020). A little anxiety related to COVID-19 caused some positive situations in different countries, such as improvements in health and air and water quality (Chauhan and Singh 2020; Kumari and Toshniwal 2020; Singh and Chauhan 2020). Previous researchers found that anxiety was negatively related to the expectation of flooding (de Man et al. 1984). Later, researchers reported that elevated anxiety scores were positively related to the expectation of greater household flood damage (Simpson-Housley et al. 1986; Cvetković et al. 2018). It was also found that people with high anxiety scores tended to expect more earthquake and volcanic damage than subjects with low anxiety scores (Larraín and Simpson-Housley 1990). Furthermore, Kushnir (1982) indicated that estimates of the probability of suffering an injury from a falling satellite were significantly associated with high anxiety scores. Other researchers believe that anxiety is a cognitive bias; thus, people with high anxiety are likely to develop clinical anxiety while under stress (Mogg and Bradley 1999). Such cognitive bias may negatively affect their preparedness behavior. For example, Johnson (1997) showed that high anxiety, coupled with feelings of low self-efficacy, may lead to denial, anger, guilt, or hopelessness.

Stress and depression, or 'depressogenic vulnerabilities', are theorized to share a transactional relation where each influences the other in a bidirectional manner. In fact, Hammen (1991) posited the 'stress generation hypothesis', which suggests that depressed individuals are mostly influenced by negative beliefs and expectations of experiencing negative events in their lives. Therefore, these individuals are not only vulnerable to depression when confronted with life stressors but also generate the stressors that increase their risk for depression.

The hopelessness theory, defined as a cognitive vulnerability–stress theory of depression, suggests that a negative prediction will lead to depression when individuals encounter negative life events (Abramson et al. 1989). According to the cognitive vulnerability–stress component of this theory, the depressogenic style is hypothesized to interact with negative life events and lead to increased depressive symptoms.

In this model, some cognitive processes, such as the combination of both helplessness and hopelessness, would lead to both anxiety and depression. However, it is assumed that hopelessness without helplessness would lead to only depression. Later, Hankin and Abramson (2001) suggested that the interaction of cognitive vulnerability with negative events would lead to specific risk factor for depression. Nonetheless, the occurrence of negative events without high cognitive vulnerability would lead to general negative affect such as externalizing and internalizing associated with anxiety and depression (McMahon et al. 2003).

Table 1. Some socio-economic information of the study countries.

	GDP per capita (USD)**	Gini coefficient**	65 and older population*	Median age*
Italy	34.488	0.359	22.08	46.5
Lebanon	8.270	0.318	7.96	33.7
Portugal	23.403	0.338	20.92	44.6
Serbia	7.246	0.362	20.0	43.4

*CIA (2020).
**WB (2020).

As COVID-19 resulted from an unexpected outbreak, the current situation may provide an opportunity to examine how new information affects risk perceptions and hence, how changes in risk perceptions influence behavior. This is an under-researched area during the COVID-19 pandemic (Tran et al. 2020). Because anxiety plays a role in the preparedness and the response to any disaster (Rico 2019), the objective of this paper is to investigate the level of adults' anxiety related to the COVID-19 outbreak in four countries: Italy, Lebanon, Portugal, and Serbia.

1.1. Context of the study

Serbia and Lebanon have the lowest GDP per capita, compared to Italy and Portugal. However, the elderly population in Lebanon is only 7.0%. Serbia has respectively lower 65 and older age population than Portugal and Italy (Table 1). Italy and Portugal have older populations (median age; Portugal = 44.6, Italy = 46.5), respectively. The median age of the countries ranges from 33.7 years old (Lebanon) to 46.5 years old (Italy) (CIA 2020; WB 2020).

The information on the countries in which the study was conducted is not limited to the above. To better understand the situations related to the effects of the COVID-19 pandemic in these countries, their specific cases are also summarized.

1.1.1. Italy

Italy's population is about 60.3 million, and its population density is higher than that of most Western European countries. The novel infectious disease, COVID-19, was first confirmed to have spread to Italy on 31 January 2020, when two Chinese tourists in Rome tested positive for the virus. A cluster of cases was later detected, starting with 14 confirmed cases in Lombardy on February 21, and the first deaths occurred on February 22 (Balmer 2020). By the beginning of March, the virus was spreading rapidly and had reached all regions of Italy. The Italian government suspended all flights to and from China and declared a state of emergency on January 31. The prime minister expanded the quarantine to all of Lombardy and 14 other northern provinces on 8 March 2020, and on the following day to all of Italy.

Despite these measures, the outbreak continued to spread, so the Italian government prohibited nearly all commercial activity except for supermarkets and pharmacies. After 11 March 2020, the government ordered the closure of all non-essential businesses and industries, with additional restrictions on the movement of people from March 21. The virus in the country has mostly affected those aged 50 and over. As of 24 July 2020, the total number of confirmed cases was 245,032 with 35,082 deaths in Italy (WHO 2020b).

1.1.2. Lebanon

Lebanon's population is around 6 million, including Palestinian refugees and displaced Syrian communities. The first COVID-19-positive case in Lebanon was officially identified on February 21 as a 45-year-old woman traveling from Iran (Francis 2020). Other cases were later reported, with those infected arriving from other countries such as Egypt, the United Kingdom, and France. On February 28, the minister of education announced the closure of all educational institutions. On March 10, the first virus-related death case was reported, and on the evening of March 18 the Beirut Rafic Hariri International Airport was shut down and Lebanon went into lockdown. Although the spread of the virus appears to be under control and officials in Lebanon are striving to use all means to contain the pandemic, its evolution remains uncertain for most physicians, especially since the health sector has been negatively impacted by the latest economic crisis in the country (Huot 2020). The COVID-19 virus additionally burdened the Lebanese government and community, which have been struggling since the fall 2019 revolution. The Lebanese lira has lost around 40% of its value against the US dollar in recent months, which means goods are becoming more expensive, including medicine and medical supplies. As of 24 July 2020, the total number of confirmed cases is 3,105, with 43 deaths in Lebanon (WHO 2020b).

1.1.3. Portugal

Portugal's population is about 10.3 million. The first COVID-19-positive cases were recorded on March 2 and were imported from Italy and Spain (DGS 2020a). The number of imported cases slowly increased in the following weeks, and on April 22, imported cases from 51 countries had been recorded. They originated mainly from Spain (171 positive cases), France (130), the United Kingdom (82), the United Arab Emirates (46), and Switzerland (45). The first victim of COVID-19 was registered on March 16, and on April 27, Portugal had reached 880 fatalities. About 67% of those fatalities were people over the age of 80. No victims under 40 years old have been recorded so far (DGS 2020b). Despite the progressive spread of COVID-19 across the country, its impact continues to be characterized by high regional heterogeneity, mainly when one takes into account, in addition to the absolute numbers of cases and deaths, relative indicators according to the size of administrative units and their population density (INE 2020). The mass media, television programs, provide daily information on COVID-19 and the measures to be adopted by the population to combat this disease. Portuguese society, similar to many others, has adapted to a new way of life, and most members of the community follow the recommendations provided by the government. The total number of confirmed cases as of July 24, 2020 is 267,551, with 1,702 deaths in Portugal (WHO 2020b).

1.1.4. Serbia

Serbia's population is about 7.1 million. The first COVID-19 case was registered (officially on March 6), and a state of emergency was declared on March 15. Subsequently, a significant number of provisions and orders were formulated in Serbia. First, citizens older than 65 years in urban areas and those aged 70 and above in rural areas were prohibited from leaving their households all day, with permission

granted to go shopping only early in the morning on Sundays. Starting from April 21, this category of citizens was granted the right to leave their household three times a week. Various economic and trade measures have been enacted, including restrictions on the prices of basic groceries, bans on exports of medicines and medical equipment, etc. The government closed cafes and restaurants, casinos, bookmakers, hairdressers and beauty salons, car wash facilities, all markets (both outdoors and indoors), all facilities and outlets within shopping malls except supermarkets, grocery stores, and pharmacies. Caterers were obliged to establish a delivery service that would deliver take-out food and drink or to arrange a counter through which food and drink would be sold without entering the catering facility. Social media and networks monitoring and delivering government representative announcements indicated problems in adhering to the envisaged measures, especially in the first weeks of the state of emergency. These could probably be the consequence of the change in perspective in this less than a month-long period, which could lead to confusion among the general public. The total number of confirmed cases as of 24 July 2020 is 22,031 with 499 deaths in Serbia (WHO 2020b).

1.2. Theoretical framework

Lazarus (1999) suggested a complex cognitive model of stress to understand subjects' responses when facing extremely stressful events that include three principal components: primary appraisal, secondary appraisal, and coping resources. Primary assessment is defined as the perception of the threat, which is the process of assessing the impact of the situation on one's physical and psychological well-being. Secondary appraisal is a temporary stage that occurs following primary assessment and is defined as the cognitive evaluation concerned with what the individual can do to handle the present threat, such as blame or credit, as well as future expectancies. Coping potential is highly related to control status, especially how much people believe can be done to reduce or eliminate the source of threat. Coping resources are essential for proactive coping such as health, income, and social support (Hobfoll and Lerman 1989). Moreover, available societal resources may increase the feeling of control, which consequently enhances coping potential and may result in better disaster preparedness.

For this study, a scale was tailored to the COVID-19 pandemic. It was also assumed that the inconsistent relation between a rise in anxiety score and the perception of potential disaster might be due to other factors such as demographics and social characteristics (e.g. gender, age, education, number of children, and country). Therefore, this set of hypotheses is based on the following assumptions:

- women tend to show more anxiety and concern than men;
- younger individuals tend to show lower anxiety scores;
- less-educated individuals may have a poor understanding of COVID-19 and its associated risks, which may lead to exaggerated anxiety;
- married individuals and those with children are more likely to be concerned about the threat of the virus and its consequences on their families;
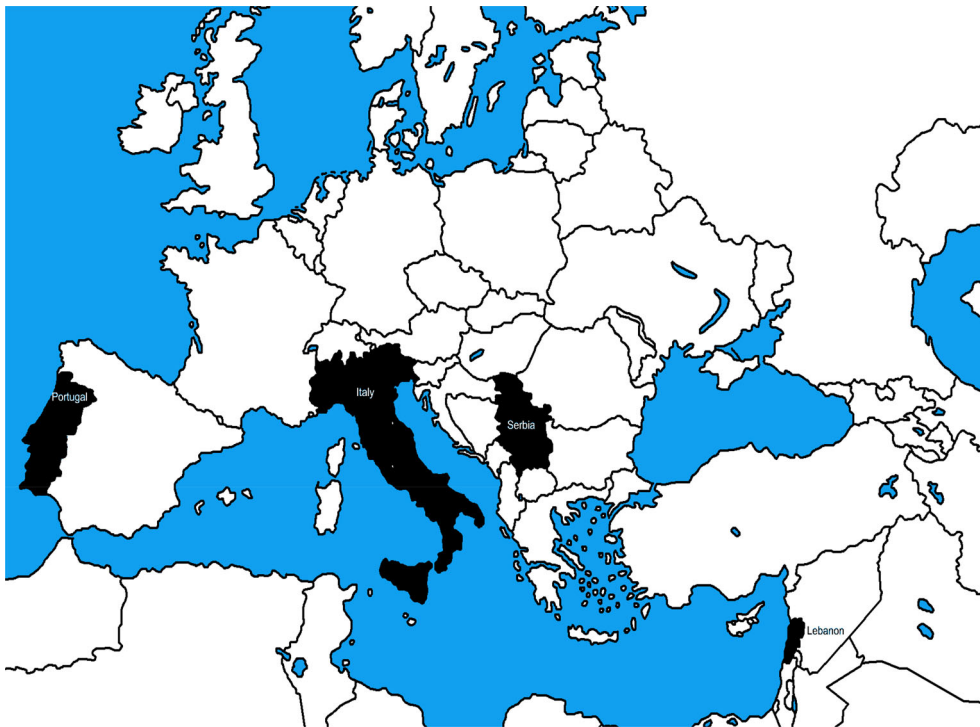
Figure 1. Study countries – Italy, Lebanon, Portugal, and Serbia.

- finally, each country possesses different levels of preparedness in their health sector for response and recovery, which may lead to different anxiety scores across the four countries with social, cultural, and economic differences.

2. Methods and data

2.1. Study area

The significance of the present study lies in testing the anxiety level related to COVID-19 in four countries (Figure 1) that differ in culture, population size, and age structure. However, all countries are located between $33° − 47°$ N latitude, and almost all have similar climates (subtropical climate zone – Mediterranean climate), except Serbia (temperate climate zone). Also, the study countries were similar in terms of the distribution of inequality, in that all countries have a little low Gini coefficient (Italy, 0.354; Lebanon, 0.318, Portugal, 0.355; Serbia, 0.396). The Gini coefficient ranges from 0 to 1, with 0 representing perfect equality and 1 representing perfect inequality (WPR 2020). It can be said that all countries have similar inequality properties, which means that the wealth or income distribution in each country is similar, while the countries' overall wealth or income differed.

2.2. Instrumentation and data collection

An online questionnaire in the four national languages was prepared for each of the four countries. A snowball sampling strategy, focused on recruiting the general public

living in countries during the COVID-19 epidemic, was utilized. The online survey was distributed to the sample during the same period, March–April 2020, after the WHO declared (on March 11) COVID-19 as a pandemic. All countries were exposed to COVID-19 while the scale was being conducting. As governments recommended the public to minimize face-to-face interactions and isolate themselves at home, existing study respondents electronically invited potential respondents. The participants were reached via social media tools (Twitter, Facebook, Instagram, etc.) and e-mails to present the questionnaire in each country, and they responded in their local languages through an online survey platform (Google.doc). Our research conformed to the Helsinki Declaration, outlining the principles for socio-medical research involving human subjects. Participants provided informed consent to participate in the study. All variables used tick boxes to determine the reasons for the acceptance or refusal of the items. The structured scale consisted of items that covered two sections: a) demographic data, b) the psychological impact of the COVID-19 outbreak and mental health status.

Demographic data were collected on gender, age, educational level, marital status, country, having a child or children, and level of COVID-19 knowledge.

In the process of preparing the questionnaire, previous surveys on the psychological impacts of pandemic diseases were reviewed (Lovibond and Lovibond 1995; Buhr and Dugas 2002; Leung et al. 2003; Rubin et al. 2009). The Anxiety of Coronavirus (COVID-19) Scale (ACS) was adopted based on both the Intolerance of Uncertainty Scale (IUS) and the Depression, Anxiety and Stress Scale (DASS-21), which were self-report measures of anxiety, depression, and stress. The authors included additional items (11 items) related to the COVID-19 outbreak. The revised scale consisted of 32 items to measure anxiety related to the COVID-19 pandemic, 2019–2020.

For the reliability study, the questionnaire was administered on 150 adults in Belgrade/Serbia. The internal consistency (Cronbach's alpha) of the overall scale was 0.918. Each subscale ranged from .84 for the Anxiety subscale, .85 for the Stress subscale, and .86 for the Depression subscale.

The correlation results between total scores and the subscales were investigated using Pearson's linear correlation coefficient. Preliminary analyses were performed to prove that the assumptions of normality, linearity, and homogeneity of variance were satisfied. A strong positive correlation between total scores and all subscales scores was found. Anxiety ($r = .833$, $p < .01$), Stress ($r = .907$, $p > .01$), and Depression ($r = .796$, $p < .01$) increase with total scores of the scale (Table 2). It means each subscale had a strong relation to the overall scale.

The main scale was assessed on a four-point Likert-type scale to determine the level of anxiety to a possible COVID-19 pandemic (1 = 'did not apply to me at all' and 4 = 'applied to me very much, or most of the time'). Respondents were asked to rate (1 to 4) their emotional statements related to COVID-19 illness. The scale was first translated into Serbian, Portuguese, Arabic, and Italian, and then conducted in the respective national language of each country.

2.3. Basic socio-economic and demographic information of the respondent

The authors spent great effort in each country to reach the participants selected through snowball sampling. The questionnaire was answered by adults aged 18 and

Table 2. Basic socio-economic and demographic information of respondents (n = 2,013).

Variable	Category	(f)	%
Country	Portugal	971	48.3
	Lebanon	429	21.3
	Serbia	408	20.3
	Italy	205	10.2
Gender	Male	962	47.7
	Female	1,053	52.3
Age	18–30	937	46.5
	31–45	674	33.5
	46–64	388	19.3
	65+	14	0,7
Marital status	Single	804	39.9
	In connection	396	19.7
	Married	733	36.4
	Divorced or widow	80	4.0
Education	Primary Sch. (grade 4–5)	34	1.7
	Secondary Sch. (grade 8–9)	111	5.5
	High school (grade 11–12)	658	32.7
	Undergraduate	687	34.1
	Master/doctorate	523	26.0
Number of children	1	319	15.8
	2–3	408	20.3
	4+	91	4.5
	None (0)	1,195	59.4
COVID-19 knowledge	Very poor	15	0.7
	Poor	79	4.0
	Moderate	857	42.6
	Good	916	45.5
	Excellent	146	7.3
TOTAL		2,013	100

over. Participants were excluded if the researcher experienced communication difficulties with them. In total, 2,073 participants completed the questionnaire. Before the analysis, all data were controlled, and multivariate outliers of the data were separated from the data set. Finally, our data set for this study constituted 2,013 adults: 962 male and 1,053 female (Table 2). There were 205 participants from Italy, 429 from Lebanon, 971 from Portugal, and 408 from Serbia. Of the participants 46.5% are 18–30 and 33.5% are 31–45 years old. In terms of marital status, 39.9% are single, and 36.4% are married. For educational status, 32.7% had finished high school, 34.1% had a bachelors or undergraduate school, and 26.0% had a masters/doctorate. Most of the participants had no dependent child (59.4%); however, 20.3% had 2–3 children, and 15.8% had only one child.

The participants generally defined their COVID-19 knowledge as 'good' (45.5%), and 'moderate' 42.6%.

2.4. Statistical analysis

In this study, for the demographic characteristics of the participants, descriptive statistics, were calculated. Statistical analyses included analysis of variance (one-way ANOVA), Pearson's correlation coefficient (r), and the multivariate linear regression model. To examine the relationship between the variables (except age) and the participants' anxiety scores, one-way ANOVA was used (Figure 2). For the age variable, the relationship was analyzed with the Pearson correlations coefficient. Besides, the
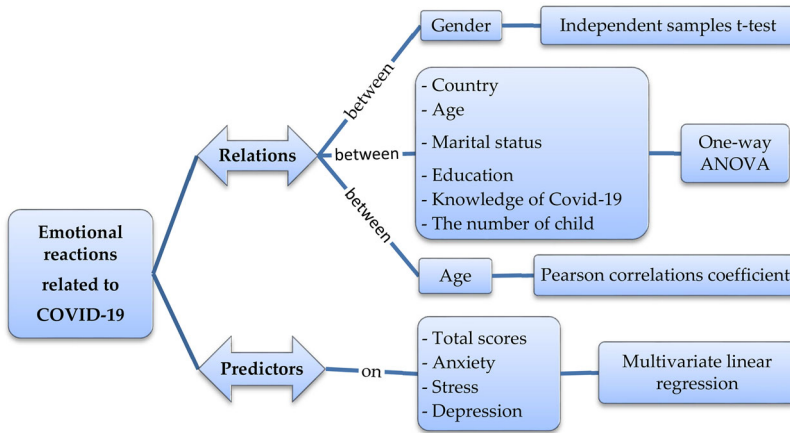
Figure 2. The study design.

Table 3. Results of a multivariate regression analysis concerning total scores and subscales scores (anxiety, stress and depression) (n = 2,013).

Predictor variables	Total score			Anxiety			Stress			Depression		
	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Gender	−5.22	.628	−.187**	−2.24	.275	−.183**	−2.03	.254	−.179**	−1.02	.212	−.109**
Age	−1.93	.740	−.069*	−.114	.324	−.009	−1.32	.300	−.116**	−.573	.250	−.061*
Marital	−.420	.744	−.015	−1.14	.326	−.092**	.026	.301	.002	.744	.251	.078*
Education	−.594	2.38	−.005	−1.87	1.04	−.039	.777	.968	.018	.290	.807	.008
Children	1.53	.902	.040	−.278	.395	−.017	1.16	.366	.075**	.635	.305	.050
Knowledge	1.73	.623	.062*	1.25	.272	.102*	.555	.253	.049*	−.072	.208	−.008

*$p \leq .05$.
**$p \leq .01$ B: unstandardized (B) coefficients; SE: std. error; β: standardized (β) coefficients.
Note: males, the youngest, single-headed households, secondary educated respondents, having no children, and having very poor knowledge (having lowest scores in ANOVA) coded as 0; 1 has been assigned otherwise.

multivariate linear regression model was used to determine the predictors of overall anxiety scores and subscale scores. All tests were two-tailed, with a significance level of $p < 0.05$. Statistical analysis was performed using SPSS Statistic 17.0 (IBM SPSS Statistics, New York, United States).

3. Results

Starting from the abovementioned methodological framework, the results were divided into two categories:

- The predictors of anxiety, stress, and depression related to COVID-19;
- The relations between the variables and anxiety, stress, and depression about COVID -19.

3.1. Predictors of anxiety, stress, and depression related to COVID-19

To examine the factors associated with the overall scale and subscales, we performed regression analyses, with the four scales as the dependent variable (Table 3). We
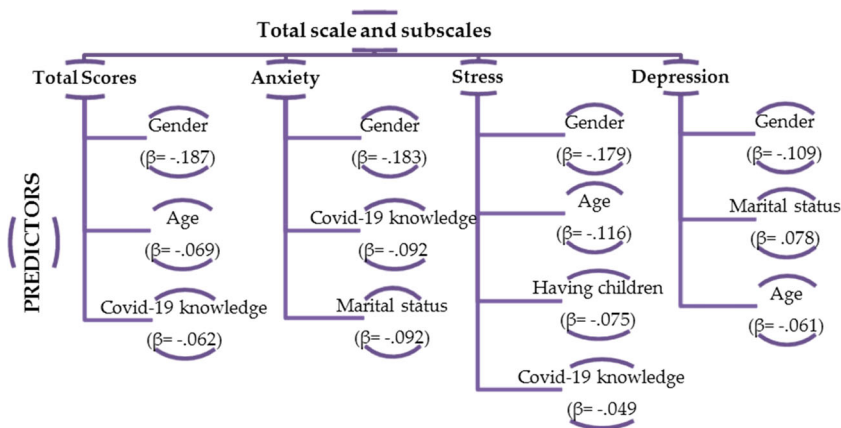
Figure 3. The predictors for emotional reactions about Covid-19.

tested the central hypothesis of which gender and age are predicting variables of citizen preparedness for a pandemic disaster. A multivariate regression analysis was used, identifying the extent to which total scores of the main dependent variables (anxiety, stress and depression) were associated with seven socio-economic variables: gender, age, marital status, education level, number of children, and COVID-19 knowledge. Previous analyses showed that the assumptions of normality, linearity, multicollinearity and homogeneity of variance had not been violated.

The multivariate regression analyses indicated that gender was the most effective predictor of the overall scale and subscales. Further analysis showed that the most important predictor for total score is gender ($\beta = -.187$), which explains the 18.7% variance in total score, followed by the age ($\beta = -.069$, 6.9%), and COVID-19 knowledge ($\beta = -.062$, 6.2%). The remaining variables did not have significant effects on the total score. This model ($R^2 = .072$, Adj. $R^2 = .069$, $F = 22.34$, $t = 74.60$, $p = .000$) with all mentioned independent variables explains the 6.9% variance of total score (Figure 3).

The results of the multivariate regressions of anxiety show that the most important predictor is gender ($\beta = -.183$), which explains the 18.3% variance in anxiety, followed by COVID-19 knowledge ($\beta = -.102$, 10.2%) and marital status ($\beta = -.092$, 9.2%). The remaining variables (e.g. age, education level, number of children) did not have significant effects on anxiety. This model ($R^2 = .63$, Adj. $R^2 = .60$, $F = 19.34$, $t = 85.68$, $p = .000$) with all mentioned independent variables explains the 60% variance of anxiety (Table 3).

Concerning to stress subscale, analyses showed that the most important predictor is gender ($\beta = -.179$), which explains the 17.9% variance in anxiety; followed by age ($\beta = -.116$, 11.6%), number of children ($\beta = -.075$, 7.5%) and COVID-19 knowledge ($\beta = -.049$, 4.9%). The remaining variables did not have significant effects on stress. This model ($R^2 = .69$, Adj. $R^2 = .66$, $F = 21.31$, $t = 76.85$, $p = .000$) with all mentioned independent variables explains the 66% variance of stress (Table 3).

In addition, the results of the multivariate regressions of depression show that the most important predictor is gender ($\beta = -.109$), which explains the 10.9% variance in depression, followed by marital status ($\beta = .078$, 7.8%) and age ($\beta = -.061$, 6.1%).

The remaining variables did not have significant effects on depression. This model ($R^2 = .56$, Adj. $R^2 = .53$, $F = 16.9$, $t = 66.83$, $p = .000$) with all mentioned independent variables explains the 53% variance of depression (Table 3).

3.2. The relations between the variables and anxiety, stress, and depression about COVID -19

Considering the importance of citizens' anxiety, stress, and depression due to COVID-19, respondents were asked to rate varying attitudes on the Likert scale ranging from 1 to 5. With respect to the total scores, the respondents mostly pointed out that they had been washing their hands all the time for fear of getting the virus (X = 2.95), and they felt life was meaningless (X = 1.29). In relation to each country, respondents in Portugal had the most scores (X = 3.16) to wash their hands all the time because of fear of getting COVID-19. After Portugal, Lebanon (X = 3.10) and Italy (X = 2.62) most frequently reported washing their hands.

Although Italian participants do the least amount of exercise for antivirus purposes (X = 1.20), in this regard, Lebanese participants have the highest average (X = 1.55), compared to other countries. Among all respondents, the Italians mostly thought that life was meaningless (X = 1.43), while the Serbian participants did not share this sentiment (X = 1.20). Respondents in Serbia, for the most part, pointed out that they wear masks while having face-to-face conversation (X = 2.54), while those in Portugal had the lowest mask usage (X = 1.46) (Table 4).

In this study, we conducted an analysis in relation to gender and found that females have higher scores than men in total scores [male/female (X) = 56.68/61.43, $p \leq .01$], anxiety [male/female (X) = 23.46/25.65, $p \leq .01$], stress [male /female (X) = 19.08/20.74, $p \leq .01$], and depression [male/female (X) = 14.14/15.05, $p \leq .01$] subscales (Table 5).

The ANOVA results reveal that respondents from Serbia have lower scores than respondents from Lebanon, Portugal, and Italy compared to total scores (X = 55.13), stress (X = 18.34), and depression subscales (X = 12.95) ($p < .01$). The obtained results showed a higher degree of resilience to psychological impacts from COVID-19 among Serbian respondents compared with those in other countries in the study. Concerning anxiety levels, Lebanese respondents have higher anxiety scores (X = 27.34) than respondents in other countries. Respondents from Italy have higher anxiety scores (X = 25.15) than respondents from Portugal (X = 23.59) ($p < .01$). In the stress subscale, Lebanese respondents have lower scores (X = 19.70) than Portuguese respondents (X = 20.69) ($p < .01$). Additionally, Lebanese respondents have lower scores (X = 14.12) than Portuguese respondents (X = 15.23) and Italians (X = 16.01) in the depression subscale ($p < .01$) (Table 6).

Regarding marital status, it was found that single persons (X = 24.07) have lower scores than married persons (X = 25.02) for anxiety. Also, single persons (X = 19.50) have lower scores than married persons (X = 20.44) in the stress subscale (Table 6).

In the education dimension, secondary school respondents (X = 54.82) have lower scores than masters/doctorate respondents (X = 60.99) in total scores. It was also found that secondary (X = 18.03) school respondents have lower scores than masters/

Table 4. Results of descriptive analysis of attitudes (n = 2,013).

	Italy		Lebanon		Portugal		Serbia		Total scores		
Variables	X	SD	X	SD	X	SD	X	SD	X	SD	R
I feel that I have the virus whenever I cough.	1.75	.89	1.46	.63	1.57	.69	1.35	.66	1.52	.70	30
A bad headache can be a sign of COVID-19.	1.86	.77	1.89	.89	2.00	.78	1.72	.89	1.91	.83	13
I feel that I have fever whenever I am hot.	1.65	.76	1.64	.88	1.43	.66	1.43	.79	1.50	.75	26
I think about hospitalization whenever I feel Shortness of breath.	1.63	.80	1.79	.88	1.60	.78	1.21	.51	1.56	.79	28
Whoever coughs around me means that the disease will spread in my body.	1.77	.78	2.00	.89	2.15	.80	1.66	.82	1.98	.85	9
I do a lot of exercise because I am afraid to get the virus.	1.20	.53	1.55	.75	1.45	.66	1.28	.61	1.41	.67	27
I wash my hands all the time because I am afraid to get the virus.	2.62	.91	3.10	.92	3.16	.87	2.48	1.13	2.95	.98	1
I don't get out from home in fear of the virus.	2.44	1.10	3.01	.96	2.42	.97	2.23	1.07	2.51	1.07	2
I take vitamins because I am afraid to get the virus.	1.41	.67	1.87	1.09	1.44	.76	1.98	1.05	1.64	.92	21
I don't let anyone coming home because I am afraid to get the virus.	2.53	1.02	2.93	1.00	1.54	.80	2.20	1.16	2.07	1.10	7
I put a mask whenever I talk to anyone face to face.	2.09	1.14	2.07	1.04	1.46	.78	2.54	1.20	1.87	1.07	14
I put gloves whenever I talk to anyone face to face.	1.44	.88	1.72	1.06	1.27	.59	1.95	1.14	1.52	.91	31
Thinking about COVID-19 makes my heart jitter.	2.06	.94	1.90	.93	1.79	.87	2.20	1.11	1.92	.95	12
If I get the virus, I will die.	1.28	.56	1.72	.97	1.83	.70	1.38	.69	1.66	.78	19
I find COVID-19 hard to wind down.	2.25	.80	2.07	.89	2.38	.93	2.32	1.00	2.29	.93	4
I find it difficult to work up the initiative to do things.	2.03	.75	1.96	.75	1.93	.93	2.19	1.10	2.00	.92	8
I tend to overreact to situations.	2.03	.84	1.78	.81	1.78	.81	1.85	.96	1.82	.85	17
I feel that I have nothing to look forward.	1.71	.78	1.67	.88	1.74	.94	1.45	.84	1.66	.90	20
I feel down-hearted and blue.	2.00	1.09	1.57	.81	2.00	.89	1.64	.87	1.83	.90	15
I feel that I am tired.	2.40	.84	2.22	.94	2.82	.91	1.89	.97	2.46	.99	3
I am worried about situations in which I may panic and make a fool of myself.	2.00	.91	1.68	.83	1.56	.78	1.31	.59	1.58	.79	23
I found myself getting agitated each time I hear about the new infected cases.	2.12	.92	2.11	.94	2.43	.92	2.02	.88	2.25	.93	5
I find it difficult to relax.	2.02	.90	1.90	.91	2.62	.89	1.72	.91	2.22	.98	6
I feel intolerant of anything.	1.84	.96	1.72	.79	1.72	.72	1.54	.79	1.70	.78	18
I feel that I am close to panic.	1.75	.74	1.66	.86	1.41	.65	1.31	.62	1.48	.72	25
I am unable to become enthusiastic about anything.	2.14	.81	1.80	.78	1.90	.89	1.54	.83	1.83	.86	16
I feel I am not worth much as a person.	1.97	1.03	1.58	.82	1.63	.85	1.24	.59	1.57	.84	24
I become obsessed of my individual cleanness.	1.89	.71	2.11	.92	1.94	.82	1.73	.90	1.93	.86	11
I feel scared without any good reason.	1.73	.71	1.50	.80	1.67	.53	1.42	.72	1.59	.67	22
I feel that life is meaningless.	1.43	.66	1.36	.71	1.26	.57	1.20	.58	1.29	.62	32
I feel that I am rather very sensitive.	2.31	.95	1.93	.97	1.92	.88	1.77	.98	1.93	.94	10
The thought of having COVID-19 makes me cry.	1.82	.97	1.74	1.07	1.55	.76	1.25	.65	1.56	.85	29

Note: numbers are linked with questions from the questionnaire.
R – Range; X – mean; SD – mean.

Table 5. Independent samples t-test results between gender and the anxiety, stress, and depression on COVID-19.

Variable	N	%	Total scores X (SD)	Anxiety X (SD)	Stress X (SD)	Depression X (SD)
Male (M)	960	47.7	56.68 (13.17)	23.45 (5.52)	19.08 (5.36)	14.13 (4.44)
Female (F)	1053	52.3	61.43 (14.28)	25.64 (6.46)	20.74 (5.84)	15.04 (4.82)
df			2010.73	2002.94	2010.94	2010.76
t			−7.767	−8.180	−6.633	−4.412
p			.000**	.000**	.000**	.000**

$**p \leq .01$.

doctorate respondents $(X = 20.01)$ in the stress subscale. Persons holding a masters/doctorate degree $(X = 26.26)$ have higher scores than all the others in the anxiety subscale. In contrast, bachelors/undergraduate degree holders $(X = 14.27)$ have lower scores than those who finished high school $(X = 15.03)$ in the depression subscale.

It was also found that respondents who have no (0) children $(X = 16.65)$ have lower scores than respondents having one child $(X = 20.98)$ in the stress subscale. Respondents who have a moderate level $(X = 23.92)$ of COVID-19 knowledge have lower scores than respondents who have good or excellent $(X = 26.68)$ knowledge of the disease in the anxiety subscale (Table 6).

To examine the relation between age and the scale, we conducted two analyses. ANOVA analyses (Table 6) indicated persons aged 18–30 years have lower scores $(X = 58.26)$, than those aged 31–45 $(X = 60.18)$ in total scores $(p < .05)$. In the stress dimension, persons aged 18–30 years $(X = 19.27)$, have lower stress scores than those 31–45 $(X = 20.64)$, and those 46–64 years old $(X = 20.43)$ persons $(p < .01)$.

Moreover, the correlation results between age and total scores and subscales were investigated using Pearson's linear correlation coefficient. Preliminary analyses were performed to prove that the assumptions of normality, linearity, and homogeneity of variance were satisfied. A slightly positive correlation between age and stress was found, $r = .089$ n $= 2,013$, $p < .0001$, indicating that stress increases with age. A slight positive correlation between age and total scores was also found; $r = .045$, n $= 2,013$, $p < .0005$ (Table 7).

4. Discussion

Since early 2020, the entire world has been talking about the novel coronavirus (Sars-CoV2), and its related disease, COVID-19. Continuous outbreaks of COVID-19 affect those all over the world, resulting in negative health impacts, economic losses, death, unemployment, etc. According to Kwok et al. (2020), high risk-perception toward COVID-19 was found in the community, with anxiety levels higher than an influenza pandemic but lower than Severe acute respiratory syndrome (SARS-2003). Geographical risk perception differs according to various variables such as the cumulative number of confirmed cases, cumulative confirmed number of deaths, structure of the states (urban vs. rural), socio-economic status, sex, household size, population structure, and level of preparedness when encountering a pandemic disease.

We investigated four countries in the study for a geographical perspective. Results showed that Serbian respondents had higher resilience to COVID-19 than the other

Table 6. ANOVA results between demographic variables and the anxiety, stress, and depression on COVID-19 (n = 2,013).

Variables	Categories	N (%)	Total scores X (sd)	Anxiety X (sd)	Stress X (sd)	Depression X (sd)
Country	Serbia	408 (20.3)	55.13 (14.07)	23.84 (6.80)	18.34 (5.51)	12.95 (4.73)
	Lebanon	429 (21.3)	61.17 (13.64)	27.34 (6.24)	19.70 (6.16)	14.12 (3.72)
	Portugal	971 (48.3)	59.51 (13.43)	23.59 (5.14)	20.69 (5.34)	15.23 (4.83)
	Italy (I)	205 (10.2)	61.34 (15.29)	25.15 (6.93)	20.17 (5.85)	16.01 (4.44)
	F/Sig.		16.48 (.000**)	42.55 (.000**)	17.22 (.000**)	32.04 (.000**)
Age	18-30	937 (46.5)	58.26 (13.30)	24.47 (6.01)	19.27 (5.53)	14.51 (4.68)
	31-45	674 (33.5)	60.18 (14.66)	24.94 (6.53)	20.64 (5.82)	14.60 (4.53)
	46-64	388 (19.3)	59.60 (14.18)	24.31 (5.69)	20.43 (5.60)	14.86 (4.82)
	65+	14 (0.7)	58.50 (14.42)	24.71 (4.95)	19.21 (5.45)	14.57 (5.43)
	F/Sig.		2.64 (.047*)	1.12 (.337)	8.88 (.000**)	.496 (.685)
Marital status	Single	804 (39.9)	58.42 (12.96)	24.07 (5.58)	19.50 (5.51)	14.84 (4.70)
	In relationship	396 (19.7)	59.25 (15.08)	25.00 (6.74)	19.76 (5.81)	14.48 (4.84)
	Married	733 (36.4)	59.82 (14.37)	25.02 (6.34)	20.44 (5.75)	14.35 (4.47)
	Divorced or widow	80 (4.0)	60.26 (14.01)	24.15 (5.77)	20.90 (5.54)	15.21 (5.00)
	F/Sig.		1.47 (.219)	3.87 (.009*)	4.46 (.001**)	1.96 (.117)
Education	Primary Sch.	34 (1.7	58.32 (11.23)	22.55 (3.80)	20.97 (5.13)	14.79 (4.63)
	Secondary Sch.	111 (5.5)	54.82 (13.93)	23.09 (6.32)	18.03 (5.32)	13.70 (5.14)
	High Sch.	658 (32.7)	59.18 (13.52)	23.77 (5.55)	20.37 (5.56)	15.03 (4.46)
	Bach./faculty	687 (34.1)	58.51 (13.55)	24.48 (5.90)	19.75 (5.52)	14.27 (4.65)
	Master/PhD	523 (26.0)	60.99 (14.95)	26.26 (6.80)	20.01 (6.04)	14.71 (4.77)
	F/Sig.		5.36 (.000**)	15.71 (.000**)	4.61 (.001**)	3.37 (.009)
COVID-19 knowledge	Very poor	15 (0.7)	58.46 (17.43)	23.13 (6.49)	21.26 (7.86)	14.06 (5.20)
	Poor	79 (3.9)	58.81 (15.65)	24.24 (6.26)	19.26 (7.09)	15.30 (4.69)
	Moderate	857 (42.6)	58.19 (12.87)	23.93 (5.47)	19.66 (5.32)	14.60 (4.52)
	Good	916 (45.5)	59.85 (14.02)	24.95 (6.17)	20.24 (5.56)	14.64 (4.78)
	Excellent	146 (7.3)	60.83 (17.77)	26.68 (8.34)	20.00 (7.09)	14.14 (4.64)
	F/Sig.		2.13 (.074)	7.96 (.000**)	1.65 (.158)	.868 (.482)
The number of children	1.00	319 (15.8)	60.15 (14.30)	24.27 (5.78)	20.98 (5.69)	14.89 (4.67)
	2-3	408 (20.3)	59.08 (14.35)	24.89 (5.78)	20.00 (5.66)	14.18 (4.47)
	4+	91 (4.3)	60.25 (15.08)	26.05 (7.63)	20.02 (6.38)	14.17 (3.68)
	None (0)	1195 (59.4)	58.85 (13.65)	24.47 (6.02)	19.65 (5.59)	14.71 (4.78)
	F/Sig.		.920 (.430)	2.49 (.058)	4.64 (.003*)	2.02 (.109)

*$p \leq .05$.
**$p \leq .01$.

Table 7. Pearson correlation test results between age and total scores, anxiety, stress and depression (n = 2,013).

	Total_score	Anxiety	Stress	Depression
Age	.045*		.089**	
Total_score		.833**	.907**	.796**
Anxiety			.622**	.423**
Stress				.680**

*$p \leq .05$.
**$p \leq .01$.

countries' participants (Lebanon, Portugal, and Italy) compared to total emotional reactions scores, as well as in the anxiety, stress and depression dimensions. We can assume that Serbian respondents had higher resilience because of specific socio-cultural reasons, such as previous experience with epidemics and the Yugoslav War period (1991 to 1999) (Hunter 1919; Mikić 2010; Ristanović 2015).

Despite having fewer deaths and confirmed cases of COVID-19, Serbia had more emotional resilience than the others statistically. Also, having a relatively smaller 65 and older population caused Serbians to be more resilient than others. COVID-19 hindered international trading almost all over the world. However, since the economy in Serbia is largely market-based and relies heavily on manufacturing and state-owned companies, the participants had more confidence in the state.

Lebanon had the youngest population (median age) among the countries in this study (CIA 2020), as well as the lowest proportion of 65 and older population. Moreover, Lebanon had the lowest death rate and number of cases of COVID-19 among all countries in the sample. This explains why Lebanese respondents were more resilient than Portuguese respondents in the stress dimension. Besides this, the Lebanese had more resilience than the Portuguese and Italians in the depression dimension.

However, Lebanon respondents had more anxiety than the other countries' participants. The population density is high (667 people in per square kilometer) in this small country. Besides, Lebanon also hosts close to 1 million refugees and asylum seekers, most notably those from Palestine, Iraq, and Syria. The Lebanese economy depends on international trade support for some products. Owing to having a small and crowded country, social and economic problems, deteriorating health, economic issues and some political gains, Lebanese participants had more anxiety than the others in relation to COVID-19.

Italy is the eighth-largest economy in the world. In terms of gross domestic product (GDP) Italy's economy is worth \$2.4 trillion and its per capita GDP is much higher than that of other countries in the study. At the time of writing, Italy had the third most deaths and confirmed cases in the world from COVID-19 (Kwok et al. 2020). It also has the highest proportion of 65 and older, compared to the other countries of this study. For these reasons, Italian participants had more anxiety than respondents from Portugal. Previous studies showed that perceived likelihood of pandemic infection tracked objective risk both dynamically and geographically (Ibuka et al. 2010).

Regarding to familial situations, marital status, and number of children were associated with emotional reactions to COVID-19. Peoples pay more importance to their family and children in normal situations. But in extraordinary times the parents can gain more anxiety and the stress (sometime depression) for their family and children. Otherwise, it was found that parental and marital status was not associated with DASS subscale scores (Sharpley et al. 1997; Wang et al. 2020a).

Gender was the most important predictor on overall scores; and the all subscales related to a pandemic disease (COVID-19), females had more emotional reactions than men. Females mentioned more fear across all disaster types in comparison to male (Norris et al. 2002; Paradise 2005; Cvetković et al. 2019). Additionally, it is possible that males are less inclined to express their fears compared to females, especially in some cultures (Baytiyeh and Naja 2015; Baytiyeh and Öcal 2016; Ocal 2019). However, some previous studies have found that males (Abebe et al. 2010; Ramzan et al. 2015) and elderly respondents are more knowledgeable (Abebe et al. 2010).

The age and the COVID-19 knowledge were the other predictors, respectively, for total emotional reaction scores. Also, it was found a slightly positive correlation between age and stress (Graham et al. 2006). We can say that emotional behaviors, stress, and depression increase with age related to pandemic outbreak (COVID-19). But Wang et al. (2020a) found different results that age was not associated with DASS subscale scores.

Education level was not a significant predictor of overall score or subscales in the study; however, some interesting results were found in the education dimension. People with master/PhD degree had lower anxiety than all the others; also, people with a bachelor (undergraduate) degree had lower depression scores than those who graduated high school On the other hand, people with master's/PhD degrees had more overall emotional reactions and stress to COVID-19 than the respondents who had finished only secondary school. These results show that there was a decrease in anxiety (mild emotional reactions) and depression associated with the COVID-19 pandemic, as awareness increases with education. There was, however, an increase in general COVID-19 psychological reactions and stress. As the level of knowledge would increase with education under normal conditions, it would be expected that the level of anxiety would be low, as educated people would learn about the measures to be taken with regard to possible pandemics (Cvetković et al. 2018; Kumiko and Shaw 2019; Cvetković et al. 2020). However, in this study, it is thought that the panic atmosphere associated with COVID-19 disease continues at the time of the study and this disease still constitutes an 'unknown threat'.

5. Conclusions

This study provides timely assessment of the risk perception of adults during the COVID-19 epidemic in Italy, Lebanon, Portugal, and Serbia. During the study, the respondents rated their psychological situation to the COVID-19 pandemic. Lessons learned from the COVID-19 pandemic can provide valuable insights into how to handle future epidemics. These include proper hand hygiene, isolation of infected individuals, isolation of individuals with suspected symptoms or fever, and preventing direct contact with suspected animal reservoir hosts.

Our results have several immediate and significant public health implications. First, female gender, being more educated and knowledgeable, married, older, and geographical differences were associated with a greater psychological impact of the outbreak and higher levels of stress, anxiety, and depression at various levels.

Second, male gender, being single, being less educated and knowledgeable, younger, and geographic differences were associated with a smaller psychological impact of the outbreak and lower levels of stress, anxiety, and depression at various levels. Specific conditions of countries could be associated with lower or higher psychological impacts. Countries with aging populations and social and political issues may have more stress, anxiety, and depression while countries with younger populations and few political problems may have less psychological impact related to pandemic diseases.

More research should be carried out on the development of effective methods to provide early and timely detection of such diseases' psychological symptoms. A number of future studies can be conducted to collect more scientific information on this

area. First of all, research based on direct experience with the disease can be conducted in the future, which can make a significant contribution to better understanding adults or children's fear of pandemics. Second, the relationship between the economic situation and emotional reactions of participants to the pandemic can be investigated.

Our findings can be used to formulate psychological interventions to improve mental health and psychological resilience during the COVID-19 epidemic, such as cognitive behavior therapy and mindfulness-based therapy (Ho et al. 2020). Our findings directly inform on the emotional reactions during the COVID-19 outbreak.

This study has several limitations. In consideration of the time-sensitivity of the COVID-19 outbreak, we adopted an online survey with snowball sampling strategy. This sampling strategy is not based on a random selection; thus, the study populations do not reflect the actual pattern of the general population. To preserve individual rights, we were not allowed to collect personal information from the respondents. As our study does not reflect the actual pattern of the general population, the conclusion was less generalizable. Furthermore, a longitudinal study would show temporal changes during the COVID-19 pandemic (Wang et al. 2020b). Besides this, the participants' self-reported levels of emotional reactions may be insufficient evidence to fully assess their psychological situation.

Author contributions

A.Ö. conceived the study idea, developed the study design and developed the scale with H.B. while V.M.C. conducted the pilot and reliability studies. A.Ö., V.M.C., H.B., and F.T. contributed to questionnaire dissemination. A.Ö. managed and drafted the methodology; managed all data, and assisted V.M.C. in analyzing and interpreting the data. H.B. also contributed to drafting the introduction; A.Ö. and M.Z. drafted the discussion, V.M.C. and H.B. contributed to the discussion; A.Ö. V.M.C., H.B., and F.T. critically reviewed the data analysis and contributed to the content for revising and finalizing the manuscript. M.Z. also edited the entire manuscript. Acknowledgments

References

Abebe G, Deribew A, Apers L, Woldemichael K, Shiffa J, Tesfaye M, Abdissa A, Deribie F, Jira C, Bezabih M, et al. 2010. Knowledge, health seeking behavior and perceived stigma towards tuberculosis among tuberculosis suspects in a rural community in southwest Ethiopia. PLOS One. 5(10):e13339.

Abramson LY, Metalsky GI, Alloy LB. 1989. Hopelessness depression: a theory- based subtype of depression. Psychol Rev. 96(2):358–372.

Balmer C. 2020. Coronavirus outbreaks grows in northern Italy, 16 cases reported in one day, Thomson Reuters (reported by Angelo Amante) (21 February 2020). [accessed 2020 Apr 18]. https://mobile.reuters.com/article/amp/idUSKBN20F2GF.

Baytiyeh H, Naja MK. 2015. Are colleges in Lebanon preparing students for future earthquake disasters? Int J Disaster Risk Reduct. 14:519–526.

Baytiyeh H, Öcal A. 2016. High school students' perceptions of earthquake disaster: a comparative study of Lebanon and Turkey. Int J Disaster Risk Reduct. 18:56–63. http://www.sciencedirect.com/science/article/pii/S2212420916300358.

Beck AT. 1976. Cognitive therapy and emotional disorders. New York: International Universities Press.

Buhr K, Dugas MK. 2002. The intolerance of uncertainty scale: psychometric properties of the English version. Behav Res Ther. 40(8):931–945.

[CDC] Centers for Disease Control and Prevention. 2020a. How coronavirus spreads, coronavirus disease 2019 (COVID-19). [accessed 2020 Mar 26]. https://www.cdc.gov/coronavirus/2019-ncov/prepare/transmission.html.

CDC. 2020b. H1N1 flu (2009). [accessed 2020 Apr 12]. http://www.cdc.gov/h1n1flu/updates/.

Chauhan A, Singh RP. 2020. Decline in PM2. 5 concentrations over major cities around the world associated with COVID-19. Environ Res. 187:109634.

Chor JS, Ngai KL, Goggins WB, Wong MC, Wong SY, Lee N, Leung TF, Rainer TH, Griffiths S, Chan PK. 2009. Willingness of Hong Kong healthcare workers to accept pre-pandemic influenza vaccination at different WHO alert levels: two questionnaire surveys. BMJ. 339:b3391.

CIA. 2020. The world factbook [accessed 2020 May 26]. https://www.cia.gov/library/publications/the-world-factbook/fields/335.html.

Crombez G, Vlaeyen JW, Heuts PH, Lysens R. 1999. Pain-related fear is more disabling than pain itself: evidence on the role of pain-related fear in chronic back pain disability. Pain. 80(1-2):329–339.

Cvetković V. 2020. Disaster risk management [Upravljanje rizicima u vanrednim situacijama]. Belgrade: Scientific-Professional Society for Disaster Risk Management.

Cvetković VM, Nikolić N, Radovanović Nenadić U, Öcal A, K. Noji E, Zečević M. 2020. Preparedness and preventive behaviors for a pandemic disaster caused by COVID-19 in Serbia. Int J Environ Res Public Health. 17(11):4124.

Cvetković VM, Öcal A, Ivanov A. 2019. Young adults' fear of disasters: a case study of residents from Turkey, Serbia and Macedonia. Int J Disaster Risk Reduct. 35:101095.

Cvetković VM, Ristanović E, Gačić J. 2018. Citizens attitudes about the emergency situations caused by epidemics in Serbia. Iran J Public Health. 47(8):1213–1214.

Cvetković VM, Roder G, Öcal A, Tarolli P, Dragićević S. 2018. The role of gender in preparedness and response behaviors towards flood risk in Serbia. Int J Environ Res Public Health. 15(12):2761.

de Man A, Simpson-Housley P, Curtis F, Smith D. 1984. Trait anxiety and response to potential flood disaster. Psychol Rep. 54(2):507–512.

[DGS] Direção-Geral da Saúde. 2020a. Relatório de Situação No: 001. [accessed 2020 Apr 23]. https://covid19.min-saude.pt/wp-content/uploads/2020/03/Relato%CC%81rio-de-Situac%CC%A7a%CC%83o-1.pdf.

DGS. 2020b. Relatório de Situação No: 055. [accessed 2020 Apr 27]. https://covid19.min-saude.pt/wp-content/uploads/2020/04/55_DGS_boletim_20200426.pdf.

Francis E. 2020. Lebanon confirms first case of coronavirus, two more suspected. Reuters. [accessed 2020 Mar 30]. https://www.reuters.com/article/us-china-health-lebanon-minister/lebanon-confirms-first-case-of-coronavirus-two-more-suspected-idUSKBN20F225.

Goodwin R, Haque S, Neto F, Myers LB. 2009. Initial psychological responses to Influenza A, H1N1 "Swine flu". BMC Infect Dis. 9(1):166.

Graham JE, Christian LM, Kiecolt-Glaser JK. 2006. Stress, age, and immune function: toward a lifespan approach. J Behav Med. 29(4):389–400.

Gregory RJ. 2000. Psychological testing: history principles and applications. 3rd ed. Boston: Allyn & Bacon.

Hammen C. 1991. Generation of stress in the course of unipolar depression. J Abnorm Psychol. 100(4):555–561.

Hankin BL, Abramson LY. 2001. Development of gender differences in depression: an elaborated cognitive vulnerability-transactional stress theory. Psychol Bull. 127(6):773–796.

Ho CS, Chee CY, Ho RC. 2020. Mental health strategies to combat the psychological impact of COVID-19 beyond paranoia and panic. Ann Acad Med Singap. 49(3):155–160.

Hobfoll SE, Lerman M. 1989. Predicting receipt of social support: a longitudinal study of parents' reaction to their child's illness. Health Psychol. 8(1):61–77.

Hunter W. 1919. The Serbian epidemics of typhus and relapsing fever in 1915: their origin, course, and preventive measures employed for their arrest (an etiological and preventive study based on records of British military sanitary mission to Serbia, 1915). Proceedings of the Section of Epidemiology and State Medicine; Kragujevac; Nov 28. [accessed 2020 April 15]. https://journals.sagepub.com/doi/pdf/10.1177/003591572001301502.

Huot A. 2020. Covid-19: can the Lebanese health system cope with the epidemic? Le Commerce. [accessed 2020 Mar 30]. https://www.lecommercedulevant.com/article/29696-covid-19-can-the-lebanese-health-system-cope-with-the-epidemic. Ibuka Y, Chapman GB, Meyers LA, Li M, Galvani AP. 2010. The dynamics of risk perceptions and precautionary behavior in response to 2009 (H1N1) pandemic influenza. BMC Infect Dis. 10:296.

[INE] Instituto Nacional de Estatistica. 2020. Indicadores de contexto para a pandemia COVID-19 em Portugal. [accessed 2020 Apr 27]. https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_destaques&DESTAQUESdest_boui=430278968&DESTAQUESmodo=2.

Johnson JD. 1997. Cancer-related information seeking. Cresskill (NJ): Hampton.

Jones JH, Salathe M. 2009. Early assessment of anxiety and behavioral response to novel swine-origin influenza A(H1N1). PLoS One. 4(12):e8032.

King MG, King M, Stanley G, Burrows GD. 1987. Stress: theory and practice. Sydney: Grune & Stratton Incorporated.

Kumari P, Toshniwal D. 2020. Impact of lockdown measures during COVID-19 on air quality–a case study of India. Int J Environ Health Res. 29(6):1–8.

Kumiko F, Shaw R. 2019. Preparing international joint project: use of Japanese flood hazard map in Bangladesh. Int J Disaster Risk Manage. 1(1):62–80.

Kushnir T. 1982. Skylab effects: psychological reactions to a human-made environmental hazard. Environ Behav. 14(1):84–93.

Kwok KO, Li KK, Chan HH, Yi YY, Tang A, Wei WI, Wong YSJ. 2020. Community responses during the early phase of the COVID-19 epidemic in Hong Kong: risk perception, information exposure and preventive measures. Emerg. Infect Dis. 26(7):1575–1579.

Larraín P, Simpson-Housley P. 1990. Geophysical variables and behavior: LX. Lonquimay and Alhué, Chile: tension from volcanic and earthquake hazard. Percept Mot Skills. 70(1): 296–298.

Lau JT, Griffiths S, Choi KC, Lin C. 2010. Prevalence of preventive behaviors and associated factors during early phase of the H1N1 influenza epidemic. Am J Infect Control. 38(5): 374–380.

Lazarus RS. 1966. Psychological stress and the coping mechanism. New York: McGraw-Hill.

Lazarus RS. 1999. Stress and emotion: a new synthesis. New York: Springer.

Leung G, Lam T, Ho L, Ho S, Chan B, Wong I, Hedley AJ, Health C. 2003. The impact of community psychological responses on outbreak control for severe acute respiratory syndrome in Hong Kong. J Epidemiol Community Health. 57(11):857–863.

Lovibond PF, Lovibond SH. 1995. The structure of negative emotional states: comparison of the depression anxiety stress scales (DASS) with the Beck depression and anxiety inventories. Behav Res Ther. 33(3):335–343.

McMahon SD, Grant KE, Compas BE, Thurm AE, Ey S. 2003. Stress and psychopathology in children and adolescents: is there evidence of specificity? J Child Psychol Psychiatry. 44(1): 107–133.

Mikić D. 2010. Zarazne bolesti u srpskom narodu i vojsci tokom ratova u 20. veku – Rad srpskog saniteta na njihovoj prevenciji i lečenju [Infectious diseases in the Serbian people and the military during the wars in the 20th century - The work of the Serbian medical team on their prevention and treatment]. Belgrade: Medija centar "Odbrana".

Mogg K, Bradley BP. 1999. Some methodological issues in assessing attentional biases for threatening faces in anxiety: a replication study using a modified version of the probe detection task. Behav Res Ther. 37(6):595–604.

Nikolić N, Cvetković V, Zečević M. 2019. Human resource management in environmental protection in Serbia. Bull Serbian Geogr Soc. 100(1):51–72. DOI:.

Norris FH, Friedman MJ, Watson PJ, Byrne CM, Diaz E, Kaniasty K. 2002. 60,000 disaster victims speak: Part I. An empirical review of the empirical literature, 1981-2001. Psychiatry. 65 (3):207–239..Ocal A. 2019. Natural disasters in Turkey: social and economic perspective. Int J Disaster Risk Manage. 1(1):51–61.

Paradise TR. 2005. Perception of earthquake risk in Agadir, Morocco: a case study from a Muslim community. Environ Hazards. 6(3):167–180.

Peeri NC, Shrestha N, Rahman MS, Zaki R, Tan Z, Bibi S, Baghbanzadeh M, Aghamohammadi N, Zhang W, Haque U. 2020. The SARS, MERS and novel coronavirus (COVID-19) epidemics, the newest and biggest global health threats: what lessons have we learned? Int J Epidemiol. 49(3):717–726.

Ramzan M, Ansar A, Nadeem S. 2015. Dengue epidemics: knowledge perhaps is the only key to success. J Ayub Med Coll Abbottabad. 27:402–406.

Rico G. 2019. School-community collaboration: disaster preparedness towards building resilient communities. Int J Disaster Risk Manage. 1(2):45–59.

Ristanović E. 2015. Infectious agents as a security challenge: experience of typhus, variola and tularemia outbreaks in Serbia. Bezbednost. 57:5–20.

Rubin GJ, Amlôt R, Page L, Wessely S. 2009. Public perceptions, anxiety, and behaviour change in relation to the swine flu outbreak: cross sectional telephone survey. BMJ. 339(jul02 3):b2651.

Seale H, Heywood AE, McLaws M-L, Ward KF, Lowbridge CP, Van D, MacIntyre CR. 2010. Why do I need it? I am not at risk! Public perceptions towards the pandemic (H1N1) 2009 vaccine. BMC Infect Dis. 10:99.

Setbon M, Raude J. 2010. Factors in vaccination intention against the pandemic influenza A/ H1N1. Eur J Public Health. 20(5):490–494.

Sharpley CF, Bitsika V, Efremidis B. 1997. Influence of gender, parental health, and perceived expertise of assistance upon stress, anxiety, and depression among parents of children with autism. J Intellect Dev Disabil. 22(1):19–28.

Simpson-Housley P, de Man AF, Yachnin R. 1986. Trait-anxiety and appraisal of flood hazard, a brief comment. Psychol Rep. 58(2):509–510.

Singh RP, Chauhan A. 2020. Impact of lockdown on air quality in India during COVID-19 pandemic. Air Qual Atmos Heal. 13:921–928.

Spielberger CD, Gorsuch RL, Lushene RE. 1970. STAI manual for the state–trait anxiety inventory. Palo Alto, CA: Consulting Psychologists Press.

Tan W, Hao F, McIntyre RS, Jiang L, Jiang X, Zhang L, Zhao X, Zou Y, Hu Y, Luo X, et al. 2020. Is returning to work during the COVID-19 pandemic stressful? A study on immediate

mental health status and psychoneuroimmunity prevention measures of Chinese workforce. Brain Behav Immun. 87:84–92.

Tellegen A. 1985. Structures of mood and personality and their relevance to assessing anxiety, with an emphasis on self-report. In: Tuma AH, Maser JD, editors. Anxiety and anxiety disorders. Hillsdale (NJ): Lawrence Erlbaum; p. 681–706.

[WB] The World Bank. 2020. Indicators. [accessed 2020 May 26]. https://data.worldbank.org/indicator.

Tran BX, Ha GH, Nguyen LH, Vu GT, Hoang MT, Le HT, Latkin CA, Ho CSH, Ho RCM. 2020. Studies of novel coronavirus disease 19 (COVID-19) pandemic: a global analysis of literature. Int J Environ Res Public Health. 17(11):4095.

Waddell G, Newton M, Henderson I, Somerville D, Main CA. 1993. A fear-avoidance beliefs questionnaire (FABQ) and the role of fear-avoidance beliefs in chronic low back pain and disability. Pain. 52(2):157–168.

Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, Ho RC. 2020a. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. Int J Environ Res Public Health. 17(5):1729.

Wang C, Pan R, Wan X, Tan Y, Xu L, McIntyre RS, Ho C. 2020b. A longitudinal study on the mental health of general population during the COVID-19 epidemic in China. Brain Behavior Immun. 87:40–48.

[WHO] World Health Organization. 2020a. Naming the coronavirus disease (COVID-19) and the virus that causes it. [accessed 2020 Mar 28]. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-(COVID-2019)-and-the-virus-that-causes-it.

WHO. 2020b. Coronavirus disease (Covid-19) situation dashboard. [accessed 2020 Jun 14]. https://covid19.who.int/.

[WPR] World Population Review. 2020. Gini coefficient by country. [accessed 2020 May 25]. https://worldpopulationreview.com/countries/gini-coefficient-by-country/.