



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



## Predictors of emotional distress during the COVID-19 pandemic; a Croatian study

Branimir Margetić<sup>a,\*</sup>, Tina Peraica<sup>a</sup>, Kristina Stojanović<sup>a</sup>, Dragutin Ivanec<sup>b</sup>

<sup>a</sup> Department of Psychiatry, University Hospital Dubrava, Avenija Gojka Šuška 6, 10000 Zagreb, Croatia

<sup>b</sup> Department of Psychology, Faculty of Humanities and Social Sciences, Zagreb, Croatia

### ARTICLE INFO

#### Keywords:

COVID-19  
Personality  
Coping  
Emotional distress  
Depression  
Anxiety

### ABSTRACT

The study aimed to assess relations between coronavirus-related psychological distress and its potentially predictive factors. An online sample of 2860 Croatian adults filled in questionnaires on socio-demographic characteristics, distress (the Depression, Anxiety and Stress Scale 21), coping (the Brief COPE), personality (the International Personality Item Pool), and social support (the Duke-UNC Functional Social Support Questionnaire) during the COVID-19 lockdown and after the capital was hit by an earthquake. Results indicated that 15.9% of the respondents experienced severe to extreme depression, 10.7% severe to extreme anxiety, and 26.2% severe to extreme stress.

The hierarchical regressions analysis indicated that the considered variables explained a substantial percentage of the variance in depression (51.4%), anxiety (35.2%), and stress (45.5%). Main predictors of emotional distress were lower scores of Emotional Stability, higher scores of Agreeableness, avoidant coping, lack of active coping and perceived social support. The negative effect of the earthquake was weak.

Results provide information on a broad range of potentially protective or vulnerability factors that could help identify those at risk for developing coronavirus-related psychological distress. Findings suggest that promoting active coping styles and social interactions could be preventive and potentially therapeutic in general populations.

### 1. Introduction

At the beginning of February 2020, the coronavirus disease 2019 (COVID-19) pandemic turned into a global disaster. Without a vaccine or specific medications for this new virus, rapid and widespread changes in life-style were inevitable. In Croatia, official authorities suggested avoiding physical contact at first, and then (on March 16) implemented a lockdown (measures such as closed schools, theatres, and shopping centers, imposed travel restrictions). Furthermore, as a part of pandemic measures, the authorities ordered involuntary complete social isolation for the infected and their contacts. In combination with economic insecurity, such restrictions led to previously unknown psycho-social situations for millions of people around the globe.

Unfortunately, the situation in Croatia was even more severe. On March 22, at 6:24 a.m., Zagreb, Croatia's capital (about 20% of Croatian population), was hit by a series of earthquakes. The first was the largest, followed by dozens of aftershocks of smaller intensities during the next 3–4 weeks. Although the first earthquake was moderate (measured 5.5

on the Richter magnitude scale, with one tragic death, and many seriously injured), it caused devastating consequences on buildings, especially in the downtown where most buildings date back to the late 19th century. Thus, thousands of people had to leave their homes.

Such massive, prolonged, and collective stress evokes psychological reactions known as emotional distress (Shanahan et al., 2020) in a substantial proportion of the population. These reactions may range from transient fear or insomnia to severe chronic psychopathology with dominant symptoms of depression, anxiety, or posttraumatic stress disorder (Rubonis & Bickman, 1991).

In the period between February and July 2020, dozens of articles were published related to different aspects of the pandemic's psychological consequences. Articles in psychiatric journals mostly focused on dominant issues of higher psychological distress among populations (e.g., Tang et al., 2020; Wang et al., 2020) or emphasized the need for re-organizing mental health services (e.g., Duan & Zhu, 2020). A meta-analysis showed that during the COVID-19 pandemic, the prevalence of depression, anxiety, and stress in populations was 33.7, 31.9, and

\* Corresponding author.

E-mail address: [branimir.margetic@zg.t-com.hr](mailto:branimir.margetic@zg.t-com.hr) (B. Margetić).

<https://doi.org/10.1016/j.paid.2021.110691>

Received 10 September 2020; Received in revised form 2 January 2021; Accepted 22 January 2021

Available online 26 January 2021

0191-8869/© 2021 Elsevier Ltd. All rights reserved.

29.6%, respectively (Salari et al., 2020). In a more recent meta-analysis, the prevalence of depression was 15.97% and anxiety 15.15% (Cénat et al., 2021).

Unfortunately, previous studies of knowledge, behavioural, and psychological consequences of the severe acute respiratory syndrome (SARS) epidemic in 2003 have not provided an answer for the measures that should be undertaken. For instance, this topic had been reviewed (Leppin & Aro, 2009), but due to the diversity of aims and findings, the review provided only “preliminary insights.”

Usually, when natural disasters such as floods or earthquakes happen, the community gives people emotional and physical support. Talking about the experience, active help-seeking, or learning new coping strategies are all assumed to be helpful. Therefore, social isolation due to the pandemic could limit these recovery mechanisms (Ursano et al., 2007).

The variability in the ways people cope with traumatic experiences is significant (Southwick et al., 2016). Some authors suggested that coping may be grouped into three main categories: one problem-focused and the remaining two emotion-focused styles. Problem-focused coping is assumed to be an adaptive style. It includes active planning and overcoming the problems using specific behaviours. Active or avoidant (attempting to control emotions) are two emotion-focused styles. Active emotional coping is assumed to be adaptive and avoidant emotional coping maladaptive (Cobb et al., 2016; Schneider et al., 2007). Several articles have demonstrated the connections between distress and coping during the COVID-19 pandemic. For instance, Dawson and Golijani-Moghaddam (2020) found associations between distress and the use of avoidant coping strategies in the UK sample. Avoidant coping correlated with adverse outcomes (stress, anxiety, anger, sadness, and loneliness) in language teachers (MacIntyre et al., 2020).

It seems that the most commonly used model of personality is the “Big Five Model” with five main personality traits (Neuroticism or Emotional Stability, Extraversion, Openness to Experience, Conscientiousness, and Agreeableness). Dozens of articles, including a few recent studies on relations between emotions and personality during the COVID-19 pandemic (Lee et al., 2020; Liu et al., 2021; Mazza et al., 2020), found that low Emotional Stability could be the most critical predictor of depressive symptoms or anxiety, or both, in different populations.

The results show that certain personality traits are related to specific coping strategies (for review, see Connor-Smith & Flachsbart, 2007). The researchers also studied this issue in people who were endangered by natural disasters and incidents. For instance, in a study on burn survivors, lower Emotional Stability was related to a posttraumatic stress disorder, while an avoidant coping style mediated that relationship (Lawrence & Fauerbach, 2003), or in the earthquake survivors, coping had a mediating role in the interaction between Emotional Stability, perceived social support, and depression (Wang & Gan, 2011).

Further, many articles have shown that women (e.g., Liu et al., 2020; López-Núñez et al., 2020) and younger persons (e.g., López-Núñez et al., 2020) suffer from more severe distress during the COVID-19 pandemic. Worth noting is that women generally have lower Emotional Stability scores than men and that this score increases with age (Marsh et al., 2013). In this regard, some reports state that activations of the prefrontal cortex and subcortical amygdala in responses to fear significantly change with age (Williams et al., 2006). The findings also showed that male adolescents perceived behaviours as less risky than female adolescents, were more prone to risk-taking behaviours, showed less social anxiety, and less sensitivity to adverse outcomes (Reniers et al., 2016). Thus, if coping styles are related to personality traits and if the differences in personalities are also related to age and gender, then findings that differences in gender and age are associated with differences in the use of coping styles (Meléndez et al., 2012) seem logical.

The evidence shows that social support is associated with stress resilience and reduction of depression and anxiety. Thus, social support could play a key role in mental and physical health (Ozbay et al., 2007).

Also, evidence associates social support with better psychological outcomes (Guilaran et al., 2018). In the context of the ongoing pandemic, social support could be dominantly viewed as a possibility for an individual to rely on and use emotional support in dealing with traumatic stress. Recent reports showed a negative correlation between social support and anxiety in Chinese college students during the pandemic (Cao et al., 2020). They also revealed that higher DASS-21 total scores in physicians were associated with a lower level of support from peers and supervisors (Elbay et al., 2020). Furthermore, better social and organizational support was associated with lower anxiety in nurses (Labrague & De Los Santos, 2020).

In short, previous research has provided information on relations between personality, age, gender, coping styles, social support, and emotional distress during the COVID-19 pandemic. However, to the best of our knowledge, no published study examined how a broad set of the variables mentioned above is related to emotional outcomes. We assume that considering these variables together would increase our knowledge of these protective or vulnerability factors associated with developing negative emotions.

We hypothesized that personality traits, dominantly lower scores of Emotional Stability, and the use of avoidant coping styles are predictive factors for higher levels of psychological distress. We also assumed that the levels of psychological distress would be higher in the population in the area hit by the earthquake, in women, in younger persons, and those “feeling” a lack of social support.

Accordingly, we aimed to evaluate the psychological distress (stress, anxiety, and depression), and personality traits, coping styles, and socio-demographic characteristics as possible predictive factors of distress during the COVID-19 lockdown, a few weeks after the capital was hit by the earthquake.

## 2. Methods

### 2.1. Participants and procedure

This study represents a part of a more extensive study. As the data was collected during the COVID-19 pandemic lockdown, social distancing was an obligation. Accordingly, an online survey was used to collect the data between April 4 and 27, 2020. The complete survey took up to 20 min and was administered through a Google-built website. Initially, people from various Croatian regions were recruited by sending the link via various social network channels (Facebook, Twitter, LinkedIn, Google+), while the snowball sampling method was used for obtaining the total sample.

Participants received comprehensive explanations about the aim of the study and information on the expected duration, security, and anonymity of data. The access to socio-demographic questions and the questionnaires was possible after the use of an “I agree” button, which assumed informed acceptance of participation in the study.

### 2.2. Measures

Socio-demographic data included gender, age, education, cohabitation status, and employment status before and during the lockdown. Participants were older than 18 and were categorized into six age bands (shown in Table 1). A question, “Were you in Zagreb on March 22?” was included in the survey to assess whether participants were in the area hit by the earthquake.

An assessment of coping styles was done by the Brief COPE (Carver, 1997). The Brief COPE is a 28-item questionnaire that uses a 4-point Likert scale (from “I haven’t been doing this at all” to “I’ve been doing this a lot”) and measures different coping methods. It is divided into 14 subscales (of two items each), which could be grouped into three main coping categories (Cobb et al., 2016; Schneider et al., 2007). The main coping categories are *problem-focused coping* (subscales: active coping, planning, instrumental support, and religion scales; current Cronbach  $\alpha$

**Table 1**  
Socio-demographic characteristics of participants ( $N = 2819\text{--}2857$ ).

Characteristics	N	%
Gender		
Men	553	19.4
Women	2304	80.6
Age, range		
18–24	335	11.7
25–34	781	27.4
35–44	827	29.0
45–54	588	20.6
55–64	271	9.5
65 $\geq$	52	1.8
Education level		
Elementary	11	0.4
High school	780	27.6
College	463	16.4
University	1282	45.4
MSc or PhD	288	10.2
Marital status		
Married or cohabitation	1455	51.7
Divorced	173	6.1
Single	552	19.6
Widowed	43	1.5
In a relationship	591	21.0
Employment status		
Employed	2061	72.1
Part time employed	118	4.1
Unemployed	241	8.4
Retired	127	4.4
Student	311	10.9
Parental status		
Parent	1502	53.0
Childlessness	1333	47.0
Place of residence number of citizens		
<10,000	640	22.5
10,001 to 40,000	422	14.8
40,001 to 70,000	264	9.3
>70,000	1516	53.3

= 0.69), *active emotional coping* (subscales: venting, positive reframing, humour, acceptance, and emotional support summarizing scales; Cronbach  $\alpha = 0.66$ ), and *avoidant emotional coping* (subscales: self-distraction, denial, behavioural disengagement, self-blame, and substance use scales; Cronbach  $\alpha = 0.68$ ). The Croatian version of the questionnaire was previously validated (Hudek-Knežević et al., 1999).

An assessment of personality was done by the Croatian version of International Personality Item Pool (IPIP 50). The questionnaire is based on the Big-Five Factor structure and consists of 50 items (10 items for each factor) assessed with a 5-point, Likert-type scale, (ranging from 1 = very inaccurate to 5 = very accurate). The first factor, Emotional Stability is composed of items that measure emotional reactivity. Higher scores indicate calm and relaxed individuals who are not prone to intensive emotional reactions. It has a Cronbach  $\alpha$  coefficient of 0.91. The second factor, Extraversion, is composed of items that measure the proneness toward social interactions. Higher scores indicate proneness for social relations, while people with low scores are reserved and quiet. The Cronbach  $\alpha$  coefficient was 0.88.

The third factor is Intellect and measures the degree of interests in novelty, change, abstract ideas and values. High results point to an imaginative person who enjoys variety, novelty, and change, and who has intellectual and artistic interests. It has an internal consistency of 0.80. The next factor is Agreeableness. It measures the degree of interests in the needs of others. Higher results indicate altruism, a need to be supportive and empathetic. It has a Cronbach  $\alpha$  coefficient of 0.83. The last factor, Conscientiousness, measures the degree to which somebody is organized and prone to control impulses. Higher scores point to characteristic of a responsible, hard-working and well organized person. It has an internal consistency of 0.83. The questionnaire was previously validated in the Croatian population (Mlacić & Goldberg, 2007).

The Depression, Anxiety, and Stress Scale 21 (DASS-21) (Lovibond & Lovibond, 1995) is a 21-item self-report questionnaire that measures emotional distress in three subcategories (depression, anxiety, and stress). Each subscale consists of seven items. Participants should indicate on a 4-degree Likert scale (from 0 = did not apply to me at all to 3 = applied to me very much or most of the time) how often they felt described negative conditions over the past week. DASS-21 is suitable for on-line research. The Croatian translation is proven as reliable instrument for research in the Croatian population (Ivezić et al., 2012). The internal consistency (Cronbach  $\alpha$ ) of each subscale was high: for depression  $\alpha = 0.91$ , anxiety  $\alpha = 0.86$ , and stress  $\alpha = 0.90$ .

The strength of the person's social support was measured by the Duke-UNC Functional Social Support Questionnaire (FSSQ). It is an eight-item instrument to measure network. Participants should indicate on a 5-degree Likert scale (from "As much as I would like" to "Much less than I would like."). Higher scores indicate better social support (i.e., "I have people who care what happens to me") (Broadhead et al., 1988). It is important to note that the FSSQ measures the strength of a person's perception and need for social support network in general, not the strength of actual help in certain situation. The Croatian translation of the original version was made according to the World Health Organization guidelines (Sartorius & Kuyken, 1994). The Cronbach  $\alpha$  for the scale was 0.93.

### 2.3. Statistical analysis

All of the analyses were performed using SPSS 25 for Windows (IBM, Chicago, IL, USA). Descriptive analysis included means and standard deviations. The comparison of the groups was based on *t*-tests. The Pearson correlation coefficients determined the bivariate correlation. Hierarchical multiple regression analyses enabled estimation of the *incremental variance explained* by predictor variables on depression, anxiety, and stress. Cohen's *d* was used as the effect size measure. The pairwise approach was used in dealing with the problem of missing data to maximize the number of available data.

### 2.4. Ethics

This study was conducted in accordance with the principles of the Declaration of Helsinki and was approved by the ethics committee of the University Hospital Dubrava, Zagreb, Croatia (No. 2020/3004-02). All subjects gave electronic informed consent after receiving detailed information regarding the aims of the study.

## 3. Results

In the study, 2860 participants provided their responses, and 2641 of them entirely completed all questionnaires. The characteristics of the participants are presented in Table 1.

During the study period, 23 (0.8%) of the sample tested positive for the virus although none required hospitalization, 164 (5.7%) of the participants reported to have an infected family member or close friend, and 120 (4.2%) reported that they are ordered to be self-isolated (absolutely separated, without close contact with anyone, including family members).

DASS-21 scores were: depression  $M = 12.66$  ( $SD = 11.220$ ), anxiety  $M = 10.37$  ( $SD = 10.191$ ) and stress  $M = 16.75$  ( $SD = 11.512$ ).

As shown (Table 2), the majority of participants reported normal scores of depression and anxiety, while 48.2% participants reported normal stress levels.

Independent samples *t*-test (Table 3) revealed statistically significant differences in DASS scores between those who were and those who were not in Zagreb when the earthquake took place. It was evident that the effect of the earthquake(s) on psychological status of population was statistically significant, but rather small.

The bivariate correlation coefficients between DASS-21 subscales

**Table 2**

The prevalence: normal, mild, moderate, severe and extremely severe depression, anxiety and stress measured by DASS-21 (N = 2813–2818).

DASS 21 subscales scores <sup>a</sup>	Depression		Anxiety		Stress	
	N	%	N	%	N	%
Normal	1820	64.7	2024	71.9	1357	48.2
Mild	266	9.5	230	8.2	296	10.5
Moderate	279	9.9	260	9.2	427	15.2
Severe	251	8.9	199	7.1	448	15.9
Extremely severe	197	7.0	102	3.6	290	10.3

<sup>a</sup> Classification of intensities according recommended severity thresholds.

scores, age, gender, and experience of the exposure to the earthquake, personality traits, the main coping styles and FSSQ scores are shown in Table 4.

As shown, symptoms of depression, anxiety, and stress were more intensive in women and younger participants and those exposed to the earthquake, though the correlations were rather weak. Among personality traits, Emotional Stability showed the strongest negative correlation with psychological distress (all three subscales) and avoidant coping styles, while Agreeableness showed the strongest correlation with problem-focused coping.

Respecting the contribution of gender, age, exposure to the earthquake, personality, coping styles and social support three hierarchical regression analysis were computed (Table 5). Age, gender and earthquake exposure were entered in a first step, personality dimensions in a second step, and social support and coping strategies in a third step. All parametric assumptions for multiple regression were met and multicollinearity was not a limiting factor (in all analysis Tolerance was >0.7, dominantly >0.9; Tabachnick & Fidell, 2013). As shown, the regression analysis revealed a very similar relationship among predictor variables and three criterion variables of psychological distress. Personality dimension, Emotional Stability explained the most significant incremental variance in adverse emotional outcomes.

Social support, coping styles, and personality trait, agreeableness additionally increased the percentage of variance for depression (51.4%), anxiety (35.2%), and stress (45.5%).

Results of correlation analysis (Table 4) revealed that women and younger persons had higher DASS-21 subscales' scores. However, in regression analyses, age made a significant independent contribution in predicting the depression subscale scores only, while the independent effect of gender could not be confirmed.

**4. Discussion**

This study examined how personality traits, coping strategies, perception of social support and some socio-demographic characteristics may account for the level of psychological distress in the Croatian population during the COVID-19 outbreak and after Zagreb (Croatia's capital) was hit by an earthquake.

The main difference between this and the two previous studies (Ozamiz-Etxebarria et al., 2020; Wang et al., 2020) that used DASS-21 scores for measuring the distress, was in the rates of more intensive forms.

The prevalence of severe to extreme psychological problems

measured by the DASS-21 were in study by Wang et al. (2020) 4.3% for depression, 8.4% for anxiety, and 2.6% for stress and in study by Ozamiz-Etxebarria et al. (2020) these rates were even lower. In our study, the prevalence of severe to extreme psychological problems was 15.9% for depression, 10.7% for anxiety, and 26.2% for stress. How to explain these differences?

We expected that participants who “felt” the earthquake also had more traumatic experiences and consequently had higher levels of negative emotions. In this regard, our analysis also showed that “the earthquake” was a significant though a weak predictor of negative emotions in the studied population. Yet, an important difference between our results and the studies mentioned above is that we collected the data between April 4th and April 27th 2020. This means that the study started about three weeks after lock-down was implemented, while other studies started the assessment practically in parallel with initiation of the lock-down. Thus, our participants were in traumatic conditions for a prolonged period of time. With a longer period of traumatic conditions and accumulation of stress would the risk for developing negative emotions increases (Kandler & Ostendorf, 2016). Certainly, this was not only due to the lock-down or social distancing, but also of job insecurity or information on an increasing number of deaths caused by the virus. A logical consequence could be higher rates of negative emotions in more intensive forms in our sample. Some would not be able to tolerate the frustration. Thus, the question is who was not able to tolerate frustrations?

Generally speaking, the most robust predictors of psychological distress were low Emotional Stability and the use of avoidant emotional coping. In fact, our analyses revealed that decreased scores of Emotional Stability from the IPIP 50 were the main predictor of the development of perceived psychological distress. Among personality traits, higher Agreeableness could also predict higher scores of all three DASS subscales, and lower Extraversion could predict the development of depression.

In regard to Emotional Stability and avoidant coping, results were expected and in accordance with previously published literature. Lower scores of Emotional Stability indicate proneness to distress, negative feelings (e.g., Schneider, 2004; Suls et al., 1998), the use of maladaptive coping styles (e.g., Bolger & Zuckerman, 1995; Carver & Connor-Smith, 2010). As expected, in this population Emotional Stability was also strongly correlated with maladaptive coping styles (Table 4). Nevertheless, results regarding the coping were not fully predicted. As mentioned, active emotional and problem-focused coping are both assumed to be adaptive (Schneider et al., 2007). Here, regression analysis revealed that only the use of active emotional coping was independently associated with better emotional conditions, while the use of problem-focused coping was weakly associated with worse outcomes. It is logical that the lock-down may limit possibilities of using the certain problem-focused coping styles and that these limitations may influence the results.

Results on Agreeableness were not expected. High Agreeableness indicate proneness toward trust, understanding needs of others, readiness to act in compliance with others, and altruistic tendencies. Contrary, people with low Agreeableness tend to be manipulative, ruthless, uncooperative, rude and irritable (Cervone & Pervin, 2013).

In regard of Agreeableness results of previous studies are rather inconsistent or even contradictory. A Meta-Analysis by Kotov et al.

**Table 3**

Earthquake exposure. t-Test results for the differences between those who were or were not exposure to the earthquake.

	Yes			No			Difference	t	p	d
	M	SD	n	M	SD	n				
DASS depression	13,21	11,01	1235	12,23	11,38	1565	0,98	2,29	0,02	0,08
DASS anxiety	11,32	10,42	1234	9,61	9,94	1568	1,71	4,43	<0,001	0,16
DASS stress	17,74	11,47	1238	15,96	11,50	1567	1,77	4,06	<0,001	0,15

d = Cohen's d.

**Table 4**  
Correlation coefficients among gender, age, experience of earthquake exposure, depression, anxiety, stress, personality.  
Correlation coefficients among all predictors and criteria variables.

Variables	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Gender	-0.02	0.03	-0.003	0.20**	0.06**	-0.11**	0.01	0.06**	0.13**	0.12**	0.03	0.06**	0.06**	0.07**
2. Age		-0.05**	0.03	0.01	0.04*	0.16**	-0.08**	-0.06**	-0.03	-0.04*	-0.07**	-0.10**	-0.07**	-0.12**
3. Earthquake exposure			-0.05**	-0.05**	0.01	-0.01	-0.02	-0.06**	-0.05*	-0.05*	-0.01	-0.04*	-0.08**	-0.08**
4. Extraversion				0.33**	0.14**	0.34**	0.31**	0.29**	0.21**	0.31**	-0.22**	-0.29**	-0.21**	-0.22**
5. Agreeableness					0.21**	0.12**	0.23**	0.21**	0.33**	0.25**	-0.08**	-0.02	-0.01	-0.19**
6. Conscientiousness						0.29**	0.09**	0.17**	0.19**	0.06**	-0.24**	-0.22**	-0.14**	-0.02
7. Emotional stability							0.10**	0.38**	0.12**	0.25**	-0.53**	-0.64**	-0.53**	-0.64**
8. Intellect								0.10**	0.22**	0.29**	-0.08**	-0.09**	-0.06**	-0.07**
9. FSSQ score									0.25**	0.37**	-0.34**	-0.39**	-0.30**	-0.30**
10. Problem-focused coping										0.48**	-0.04	-0.12**	-0.04	-0.03
11. Active emotional coping											-0.09**	-0.27**	-0.18**	-0.18**
12. Avoidant emotional coping												0.54**	0.46**	0.47**
13. DASS depression													0.75**	0.79**
14. DASS21 anxiety														0.78**
15. DASS21 stress														

Gender: male = 1, female = 2; Earthquake exposure: 1 = exposed; 2 = not exposed; Age: 1 = 18-24, 2 = 25-34, 3 = 35-44, 4 = 45-54, 5 = 55-64, 6 = ≥65.

\*  $p < .05$ .

\*\*  $p < .01$ .

(2010) and colleagues could not confirm relations between Agreeableness and depressive, anxiety, and substance use disorders. Contrary, Malouff et al. (2005) reported that mental illnesses are generally related to low Emotional Stability, low Conscientiousness, low Extraversion and low Agreeableness. Further, it has been reported that low Agreeableness were related to threat appraisals (Schneider, 2004.), that patients with mixed anxiety and depressive disorder are characterized by lower Agreeableness (Farnam et al., 2011), or that in persons with lower Agreeableness acute psychological stress would cause smaller immediate reactions (cortisol and cardiac stress reactions) then in those with higher Agreeableness scores (Bibbey et al., 2013).

Agreeableness correlates with “problem-focused coping” and a perception of social support, both usually and in this study, which is associated with less psychological distress (Table 4). Nevertheless, in our sample higher Agreeableness was a predictor of higher DASS-21 scores (Table 5). Taking into account all the above, we may provide only a speculative explanation. Generally, social-distancing may have negative psychological effects (Brooks et al., 2020), or limit usual coping styles. However, in the situation of lock-down, when social distancing is a needed norm of behaviour, an actual lack of social relations probably would be less stressful for those with low Agreeableness. It seems understandable that people with low Agreeableness would have fewer abilities to get social support (which is protective factor) because of their characteristics, such as uncooperativeness or rudeness, but they also would not seek help and support (Connor-Smith & Flachsbart, 2007). In short, they would not suffer because they care less for others.

People high in Extraversion are active, optimistic and fun-loving. Not surprisingly, we found weak, but significant negative correlations between Extraversion and DASS-21 subscales scores. Yet, regression analyses showed that independent effect of Extraversion exists only in the case of depression. These findings are similar with some previously published (Jylhä & Isometsä, 2006).

As it was hypothesized, low level of social support perception was the predictor of psychological distress. The World Health Organization (2020) recognized social support as a potentially important protective factor against the negative psychological consequences of the pandemic. As mentioned, the FSSQ does not measure actual support in certain situation, but rather a perception that support “would or wouldn’t be available”. Accordingly, our results indicate that personal perception that support is available has a protective role. Moreover, it should be noted (Table 4) that social support was positively correlated with active coping and negatively with avoidant emotional coping. The results are logical and in accordance with dozens of previous reports (e.g., Roo-hafza et al., 2014).

Higher levels of anxiety in women during the COVID-19 outbreak were reported in a number of studies (e.g., Costantini & Mazzotti, 2020; Liu et al., 2020; Moghanibashi-Mansourieh, 2020). The recent meta-analysis showed the same (Luo et al., 2020). In our study, higher scores of psychological distress correlated with the female gender, but regression analysis could not confirm the independent effect of gender on DASS-21 scores.

It has been reported that a great majority of lethal outcomes of COVID-19 occurred in older people (Jordan et al., 2020). Thus, some would expect that older population would have more psychological problems. Yet, the higher levels of psychological distress, in all three dimensions, were present in participants of a younger age. These results are in accordance with results of recent reports (Elbay et al., 2020; Ozamiz-Etxebarria et al., 2020; Wang et al., 2020) of higher DASS-21 scores in younger populations during Covid-19 pandemic. Nevertheless, regression analysis showed that the independent effect of age existed only in the case of depression. As mentioned above, Emotional Stability is lower in women and increases in later years (Marsh et al., 2013).

**Table 5**

Hierarchical regression analysis on Depression, Anxiety and Stress considering Gender, Age, Earthquake exposure (step 1), Personality dimensions (step 2), social support and coping styles (step 3). (n = 2641).

Step	Depression		Anxiety		Stress	
	β	t	β	t	β	t
1						
Gender	0.06	3.22**	0.06	3.21**	0.07	3.80**
Age	-0.11	-5.75**	-0.07	-3.64**	-0.13	-6.56**
Earthquake exposure	-0.05	-2.70**	-0.09	-4.38**	-0.08	-4.33**
ΔR <sup>2</sup>	0.018**		0.015**		0.027**	
2						
Gender	-0.03	-1.77	-0.02	-0.99	-0.01	-0.92
Age	-0.01	-0.72	0.02	0.96	-0.02	-1.59
Earthquake exposure	-0.05	-3.46**	-0.08	-5.01**	-0.08	-5.44**
Extraversion	-0.13	-6.90**	-0.06	-2.95**	-0.02	-1.42
Agreeableness	0.10	6.29**	0.08	4.32**	0.07	4.33**
Conscientiousness	-0.05	-3.04**	0.002	0.14	-0.02	-1.28
Emotional stability	-0.61	-36.52**	-0.53	-28.92**	-0.63	-37.99**
Intellect	-0.005	-0.33	-0.002	-0.13	-0.02	-1.12
ΔR <sup>2</sup>	0.417**		0.287**		0.398**	
3						
Gender	0.003	0.19	-0.002	-0.13	-0.005	-0.33
Age	-0.04	-2.59*	0.001	0.06	-0.03	-2.25*
Earthquake exposure	-0.06	-4.39**	-0.09	-5.41**	-0.08	-5.70**
Extraversion	-0.07	-4.43**	-0.03	-1.49	-0.01	-0.34
Agreeableness	0.12	7.73**	0.08	4.30**	0.06	3.88**
Conscientiousness	-0.03	-1.75	0.02	1.03	-0.01	-0.76
Emotional stability	-0.41	-22.76**	-0.38	-18.14**	-0.52	-27.18**
Intellect	0.02	1.05	0.003	0.18	-0.02	-0.97
Social support	-0.13	-8.07**	-0.10	-5.11**	-0.06	-3.53**
Problem-focused coping	0.01	0.61	0.05	2.82**	0.07	3.82**
Active emotional coping	-0.11	-6.60**	-0.06	-2.82**	-0.05	-2.64**
Avoidant emotional coping	0.25	15.07**	0.22	11.42**	0.172	9.73**
ΔR <sup>2</sup>	0.079**		0.05**		0.030**	
Total R <sup>2</sup>	0.514**		0.352**		0.455**	

Gender: male = 1, female = 2; Earthquake exposure: 1 = exposed; 2 = not exposed.

\* p < .05.

\*\* p < .01.

**5. Limitation**

This study has a number on methodological limitations. The study was cross-sectional and without adequate information on pre-existing mental health. Data collecting was obtained during a prolonged period of time. On the other hand, official lock-down measures had not been changed throughout that period. Although the sample was not small, it was not randomly selected. In accordance with the fact that the survey was administered over the internet, users have tended to be younger and more educated than the average of the average Croatian population. A lack of elderly people in the sample could be especially important. It is known that with an increase in age, risk from COVID-19 infection also increases. Also, the sample consisted of disproportionately more women. This could be in accordance with previous findings that women show more people-oriented interests and less thing-oriented interests than men (Lippa, 2010) as well with findings that females are more prone to use online social networks (Penni, 2017).

**6. Conclusion**

In spite of the limitations, our findings indicate that certain personality traits and coping strategies are relevant predictors of emotional distress during the pandemic. The study also showed that not only actual help, but also personal perception that social support is available may be a protective factor against emotional distress. Importantly, the study demonstrated that the previously reported links between age and gender with psychological distress are dominantly indirect. Accordingly, findings may be of theoretical and practical importance. From a theoretical perspective, findings may improve the understanding of interactions among vulnerability and protective factors associated with developing negative emotions during the pandemic. Such knowledge could help

identify individuals at higher risk for the development of emotional distress. From a practical perspective, findings suggest that public health messages should include promoting active coping styles and social interactions (without physical contacts) as potential preventive and therapeutic actions intended for general populations.

**CRedit authorship contribution statement**

Kristina Stojanović, Tina Peraica and Branimir Margetić, designed the study and wrote the protocols. Kristina Stojanović, and Tina Peraica conducted data collection. Dragutin Ivanec undertook the statistical analysis. Branimir Margetić wrote the initial manuscript. All authors revised and have approved the final manuscript.

**References**

Bibbey, A., Carroll, D., Roseboom, T. J., Phillips, A. C., & de Rooij, S. R. (2013). Personality and physiological reactions to acute psychological stress. *International Journal of Psychophysiology*, 90, 28–36. <https://doi.org/10.1016/j.ijpsycho.2012.10.018>.

Bolger, N., & Zuckerman, A. (1995). A framework for studying personality in the stress process. *Journal of Personality and Social Psychology*, 69, 890–902. <https://doi.org/10.1037/0022-3514.69.5.890>.

Broadhead, W. E., Gehlbach, S. H., & DeGruy, F. V. (1988). The Duke-UNC functional social support questionnaire: Measurement of social support in family medicine patients. *Medical Care*, 26, 709–723. <https://doi.org/10.1097/00005650-198807000-00006>.

Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J. (2020). The psychological impact of quarantine and how to reduce it: Rapid review of the evidence. *Lancet*, 395, 912–920. [https://doi.org/10.1016/S0140-6736\(20\)30460-8](https://doi.org/10.1016/S0140-6736(20)30460-8).

Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J., & Zheng, J. (2020). The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Research*, 287, 112934. <https://doi.org/10.1016/j.psychres.2020.112934>.





- Tang, W., Hu, T., Hu, B., Jin, C., Wang, G., Xie, C., Chen, S., & Xu, J. (2020). Prevalence and correlates of PTSD and depressive symptoms one month after the outbreak of the COVID-19 epidemic in a sample of home-quarantined Chinese university students. *Journal of Affective Disorders, 274*, 1–7. <https://doi.org/10.1016/j.jad.2020.05.009>.
- Ursano, R. J., Fullerton, C. S., Weisaeth, L., & Raphael, B. (2007). Individual and community responses to disasters. In R. J. Ursano, C. S. Fullerton, L. Weisaeth, & R. Beverley (Eds.), *Textbook of disaster psychiatry* (pp. 3–28). New York: Cambridge University Press.
- Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C. S., & Ho, R. C. (2020). Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *International Journal of Environmental Research and Public Health, 17*, 1729. <https://doi.org/10.3390/ijerph17051729>.
- Wang, Z., & Gan, Y. (2011). Coping mediates between social support, neuroticism, and depression after earthquake and examination stress among adolescents. *Anxiety, Stress, and Coping, 24*, 343–358. <https://doi.org/10.1080/10615806.2010.515026>.
- Williams, L. M., Brown, K. J., Palmer, D., Liddell, B. J., Kemp, A. H., Olivieri, G., Peduto, A., & Gordon, E. J. (2006). The mellow years?: Neural basis of improving emotional stability over age. *Journal of Neuroscience, 26*, 6422–6430. <https://doi.org/10.1523/JNEUROSCI.0022-06.2006>.
- World Health Organization. (2020). Mental health and psychosocial considerations during the COVID-19 outbreak. <https://apps.who.int/iris/bitstream/handle/10665/331490/WHO-2019-nCoV-MentalHealth-2020.1-eng.pdf>. (Accessed 11 July 2003).