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Effects of COVID-19 Pandemic and Earthquake on the Mental Health of Adults in Croatia

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Abstract: Since the beginning of the coronavirus pandemic, research around the world has found that psychophysical health has been affected: elevated levels of depression, anxiety, stress and trauma due to social isolation, economic instability, and restrictions on previously common daily activities. In the world population, loneliness is continuously increasing, as well as economic stressors. During the COVID-19 pandemic in 2020., Croatia was hit by a series of devastating earthquakes in which thousands of people were temporarily or permanently homeless. The aim of this study was to examine the role of the coronavirus pandemic and earthquake on mental health, life satisfaction, psychological resilience and social support, and the severity of psychopathological symptoms in adults in Croatia. The study involved 562 participants from all counties in Croatia, who voluntarily entered study that consisted of: Questionnaire for testing general psychopathological difficulties CORE-OM, Short Resilience Scale, Short Mental Health Questionnaire, Social support scale and Life satisfaction measured in one particle. Research has shown a high level of psychopathological symptoms and a low level of mental health. Participants rated social support as high. Lower levels of mental health and lower life satisfaction were associated with a higher degree of pandemic and earthquake impact on life, and a higher degree of pandemic impact on life correlated with severity of psychopathological difficulties. Participants were asked two open-ended questions. One was about the most difficult for them during the pandemic and lockdown, and other one was asking what made the pandemic and lockdown period easier for them. The most significant stressors were social isolation, uncertainty, anxiety, fear of infection, challenges, and limitations of working from home and online classes, loosing job threats and financial insecurity, and excessive exposure to information about the pandemic, and protective factors include family and social support. The level of psychological difficulties confirmed by this research is worrying and indicates the need to develop effective ways to actively deal with the pandemic and all its implications on life.

Keywords: Mental Health, Life Satisfaction, Resilience, Social Support, COVID-19, Earthquake

1. Introduction

Coronavirus pandemic has caused abrupt changes in various aspects of people's lives around the world [1, 2]. With the possibility of severe health status and complications in patients, a significant number of authors indicate a high probability of negative implications of the coronavirus pandemic on mental health [3]. From the very beginning of the COVID-19 pandemic, research confirmed an increasing level of depression, anxiety, stress, and trauma in people around the world [4, 5]. Main pandemic stressors have been identified that increase the risk of mental health disorders in the general population, especially in the population at risk: limited mobility, economic difficulties, stigmatization and discrimination of infected persons, dysfunctional family relationships marked by partner violence or child abuse and neglect, and workplace characteristics associated with high risk of infection, high levels of stress and compromised psychophysical health [3].

1.1. Social Isolation and Mental Health During COVID-19 Pandemic

It has been often heard in the media that certain social or age groups are particularly affected by COVID-19 pandemic, but research showed that pandemic found a devastating path to almost everyone in different aspects of life and in different ways. Thus, for example, immediately after the first rigid measures and closures in the early spring of 2020, research found emotional difficulties, problems with concentration, dissatisfaction with reduced social contacts and dissatisfaction with online teaching in children and adolescents, high levels of loneliness, economic stress in middle-aged people, and a significant association of social isolation and feelings of loneliness with reduced quality of life and symptoms of depression in the elderly person [6-10].

Wearing a mask, physical distance, complete lockdown, vaccination, isolation, self-isolation, financial instability are just some of the changes that have occurred as a direct product of this pandemic. These changes have significantly affected the daily routine of the individual, which is extremely important for everyday functioning. [11 - 14].

Routine change itself and adjustment to change can have a negative impact on mental health [14] that can have negative impact on quality of metal health (increasing level of depression symptoms, anxiety, higher level of stress, loneliness, and posttraumatic stress disorder) [15].

Social isolation during the COVID-19 pandemic had a tremendous global impact, with significant psychological consequences. Changes in daily life, feelings of loneliness, job loss, financial difficulties, and grief over the death of loved ones because of coronavirus infection, affect the mental health. This is not exclusively a direct consequence of the pandemic but is largely determined by the effects of prolonged social isolation or lack of interaction with other people [16]. A period of social isolation, even shorter than ten days, has long-term consequences that can last up to three years and lead to the development of psychiatric symptoms and difficulties [17].

Qualitative research showed that citizens could experience positive events during isolation, such as higher and better spending time with family members, but at the same time they were exposed to everyday experience of isolation and lack of real social life [18]. These negative events are accompanied by negative emotional arousal, and individuals who have a higher perception of the dangers of COVID-19 disease and a sense of less control over the possibility of infection show higher levels of worry and anxiety [19].

1.2. Resilience

Resilience plays an important role in overcoming the adverse effect of stressful situations. [20]. Previous research has shown that resilience is a protective factor for mental health, preventing development depression and anxiety and allows faster recovery from stressful situations and reduces development of many psychopathological responses caused by stress or disasters [21 - 23]. Some studies have focused on resilience as a self-perceived trait that enables individuals to cope with adversity or stressful life events [24]. Resilience has been seen as a strategy to cope with the mental health challenges derived from COVID-19 [25]. It is found that higher scores in resilience were related to lower levels of worry about COVID-19 effects, and individuals with less resilience expressed greater difficulty in coping with the situation's emotional challenges [26].

It must be mentioned that psychological resilience varies widely from person to person and depends on environmental as well as personal factors [27]. Psychological factors, such as optimism, self-efficacy, and the use of adaptive emotional regulation strategies have all been shown to positively contribute to resilience [28 - 30]. If psychological resilience is not effective enough in the face of adversity, it can lead to the extreme of mental illness [31].

1.3. Impact of Earthquakes During the COVID-19 Pandemic on Mental Health

During the pandemic, Croatia was hit by a series of devastating earthquakes, starting with a magnitude 5.5 earthquake that occurred in Zagreb on March 22, 2020, and then a strong magnitude 5.0 earthquake with an epicentre near Petrinja that occurred on December 28, 2020. The latter was preceded by a devastating magnitude 6.2 earthquake on December 29, 2020, which was felt throughout Croatia and the surrounding countries, and is one of the two strongest instrumentally recorded earthquakes in the Republic of Croatia since the beginning of measurements in 1909. Seven people lost their lives in the earthquakes, hundreds were injured, and several thousand people were temporarily or permanently left homeless [32, 33]. High levels of insecurity, fear and anxiety have significantly increased the need for psychiatric and psychological help, which, in addition to the extraordinary conditions caused by the pandemic itself, has led to overburdening of health professionals. The earthquakes put the people in an ambiguous position because they were advised to keep social distance, but they were too afraid to remain inside their homes, and It was a time of great distress and fear. It is known that the prevalence of anxiety, depression and post-traumatic stress disorder is higher after an earthquake, even one year after the exposure [34] and the Croatian population has now been affected by more than one acute stressful situation. Although, natural disaster brings the risk of mental health problems with short-term and long-term effects some studies state that stress reaction following trauma is due not only to the exposure but is also connected with the ways of coping [35].

In such challenging times, preventive and therapeutic work is key to controlling the long-term adverse effects on mental health [36]. Therefore, the aim of this study was to examine the levels of impact of the coronavirus pandemic and earthquake on participants lives, self-assessment of mental health, psychological resilience and social support, and the severity of psychopathological symptoms in adults in Croatia.

2. Methods

2.1. Participants and Procedure

The survey, conducted in September and October 2021, involved 562 participants, 458 (81.5%) women and 104 (18.5%) men. The mean age was M = 36.49 years; SD = 13.31. The youngest participant was 18 and the oldest 75 years old. 38% (N = 211) of participants lived in the counties affected by the earthquake, while the remaining 62% of respondents (N = 351) had no experience of earthquakes in that period. Participants joined the survey voluntarily, based on an invitation to participate in an extended social media survey. According to the level of education, most participants have a university degree (49.6%), followed by a high school diploma (27.1%), 10.2% of respondents are studying, 11.8% have a bachelor's degree, while 1.3% of respondents have completed primary school.

2.2. Measures

2.2.1. The CORE Outcome Measure (CORE-OM)

CORE-OM is self-report questionnaire, consist of 34 questions organized into four dimensions: subjective well-being (four items), problems/symptoms (twelve items), life-functioning (twelve items) and risky behaviour (six items). Each dimensions have clusters: Problem/symptom dimension have four clusters: depression, anxiety, physical problems, and trauma; The Functioning dimension encompasses three clusters: general functioning, social functioning, and closeness; Risky behaviour have two clusters: risk for self and risk for other [37]. Participants rate on a five-point scale (0 to 4) how they have felt over the past two weeks.

2.2.2. Brief Resilience Scale (BRS)

Brief Resilience Scale [38] consists of six items (three positive and three negative). The agreement with individual item is expressed on a five-point scale (1 - I do not agree at all, 5 - I completely agree). With the reversed scoring of three negatively worded items, the result is formed as an average result on all items, with a higher result referring to a higher level of resistance.

2.2.3. Mental Health Inventory – 5 (MHI-5)

MHI-5 is a five-question subscale of the general health measure and questions are referring to depression, anxiety, general positive affect, and behavioural/emotional control. For each of questions, participants rate their degree of agreement on a scale of 1 to 6. The total score is formed as the sum of scores on all items. Theoretical score ranges from 5 to 30, and a higher score indicates a higher level of general mental health [39].

2.2.4. Social Support Scale

The one-factor scale for assessing the level of social support contains eight items with which participants express agreement on a four-point scale (never, sometimes, often, always). The total score is formed as a linear combination of responses to all items, with the lowest possible score being 8 and the highest 32 [40].

2.2.5. Life Satisfaction

Life satisfaction was measured by one question "*How satisfied are you with your overall life*?", by choosing a value on a scale from 0 (completely dissatisfied) to 10 (completely satisfied). The measure was selected based on a ratio of simplicity and efficiency, in accordance with a validation study which showed that the use of one item to assess life satisfaction is psychometrically justified [41].

2.3. Statistical Analysis

Data were analysed in the IBM SPSS Statistics program (version 25). To determine if there were differences in observed variables (mental health, social support, subjective well-being, psychopathological problems, behavioural problems) between participants who lived in county affected by earthquake and those who didn't live in mentioned counties, ANOVA was conducted. In order to determine the relationship between general psychopathological difficulties, resilience, mental health, social support, satisfaction with life, COVID-19 pandemic influence on life and earthquake influence on life the values of Pearson's correlation coefficient were observed. To examine the contribution of earthquake, COVID-19 pandemic, social support, and resilience on mental health linear regression analyses were conducted.

3. Results

The results on Mental Health Inventory show a higher level of lack of behavioural and emotional control (M = 4.35, SD = 1.42) and depression (M=3.71, SD = 1.31) compared to the standards obtained from the general population survey. Overall mental health in this study was also lower (M = 18.39, SD = 5.22) compared to the population results (M = 21.51). The results on Social support scale show a relatively high result (M = 22.26, SD = 5.62).

Results on CORE-OM questionnaire and its dimension - dimensions of subjective well-being (M = 1.74, SD = 0.99), problems / symptoms (M = 1.67, SD = 0.99) and functioning (M = 1.97, SD = 0.36) are higher than the critical values for the non-clinical population and indicate a high severity of symptoms of psychopathological difficulties (*Table 1*).

Table 1. *Descriptive data of psychopathological difficulties, mental health, social support, and resilience.*

	N	Min.	Max.	*M*	SD
Anxiety	562	1.00	6.00	3.42	1.22
Depression	562	1.00	6.00	3.71	1.31
General positive affect	562	1.00	6.00	3.42	1.02
Behavioural/emotional control	562	1.00	6.00	4.35	1.42
Mental health	562	5.00	30.00	18.39	5.22
Social support	562	8.00	32.00	22.26	5.62
Resilience	562	1.00	5.00	3.07	0.81
Subjective well-being	562	0.00	4.00	1.74	0.99
Problems/symptoms	562	0.00	4.00	1.67	0.99
Functioning	562	0.00	3.17	1.97	0.36
Risky behaviour	562	0.00	3.50	0.35	0.60

Impact of the pandemic on life was significantly negatively

associated with mental health (r = -.47, $p < .01$), psychological resilience (r = .28, $p < .01$), life satisfaction (r = -.26, $p < .01$), and subjective well- being (r = 0.42, $p < .01$), and positively associated with problems / symptoms (r = 0.40, $p < .01$) and risky behaviour (r = 0.15, p < .01). Earthquake impact assessment was associated with lower scores on the mental health questionnaire (r = -.14, $p < .01$). Mental health positively correlated with social support (r = .38, $p < .01$), psychological resilience (r = .59, $p < .01$), and negatively with all dimensions of psychopathological difficulties: subjective well-being (r = -.83, $p < .01$), problems / symptoms (r = .81, $p < .01$), functioning (r = -.15, p < .01) and risky behaviours (r = -.54, p < .01) (*Table 2*).

Conducted one-way ANOVA did not find differences in the mental health ($p > .05$), social support (p > .05), subjective well-being ($p > .05$), psychopathological problems ($p > .05$), behavioural problems ($p > .05$) between earthquake-affected and non-earthquake-affected participants.

Table 2. *Coefficient of correlations among observed variables.*

	Impact of earthquake	Mental health	Social support	Resilience	Life satisfaction	Subjective well-being	Problems/ Symptoms	Functioning	Risky behaviour
Impact of COVID-19	.206**	-.467**	-0.03	-.283**	-.262**	-.426**	.401**	0.045	.150**
Impact of earthquake		-.138**	-0.02	-0.011	-0.003	0.076	.087*	0.079	0.031
Mental health			.382**	.585**	.688**	-.827**	-.813**	-.149**	-.537**
Social support				.259**	.471**	-.366**	-.344**	0.016	-.376**
Resilience					.504**	-.595**	-.583**	-0.047	-.376**
Life satisfaction						-.684**	-.660**	-.103*	-.556**
Subjective well-being							.880**	.160**	.592**
Problems/ Symptoms								.308**	.623**
Functioning									.206**

Note: * - $p < .05$; ** - $p < .01$.

The conducted hierarchical analysis pointed out the importance of predictor variables (earthquake impact, pandemic impact, social support, and resilience) in the explanation of mental health, with all these predictors explaining 51% of mental health. Resistance proved to be the best predictor (β = 0.428) and then the impact of the pandemic on everyday life (β = -0.323) (*Table 3*).

Table 3. *Regression analysis in predicting mental health.*

	Correlation with mental health	*β*	*t*	*p*
Earthquake impact	-0.138**	-0.061	-1.947	0.052
COVID-19 impact	-0.467**	-0.323	-9.880	0.000
Social support	0.382**	0.263	8.295	0.000
Resilience	0.585**	0.428	12.915	0.000
$R = 0.714$				
$R^2 = 0.510$				
$F(4.521) = 135.83$; p=0.000				

Second part of this survey included two open ended questions: What was the most stressful and difficult during pandemic and lockdown and What helped you the most during pandemic and lockdown.

On the first question participant mostly pointed out social isolation (46.7%), uncertainty and anxiety, most often associated with fear of infection (26.3%). This was followed by work from home or online classes (9%), job insecurity and financial insecurity (10.2%) and constant exposure to information about the pandemic (7.8%). Participants also cited the inability to travel (4.6%), deaths or serious illnesses in the family (2.8%), wearing a mask (2.8%), earthquake (1.9%) and overloading the health system due to which certain medical tests or examinations were delayed 0.9%).

On the second questions most participants mentioned spending time with family (34.9%), more time for hobbies and daily activities (19.4%), the Internet due to the possibility of communicating with physically distant close people - video calls, social networks, but also listening to music and watching movies (14.4 %), physical activity and staying in nature (13%) and the possibility of working from home or participating in classes online (10.1%). Other answers were that pets helped a lot (5.3%), religion, prayer, hope and optimism (3.2%), vaccines (0.9%) and availability of information (0.9%).

4. Discussion

Psychological and emotional well-being are essential for the effective functioning every person and society, enabling individuals to cope with common life stress, to be productive, and to contribute to their community [42]. Previous research has shown that unexpected events, such as pandemics or natural disasters, produce significant emotional effects on people, which are detrimental to their mental well-being [43, 44]. Recent research shows that circumstances caused by the COVID-19 pandemic such as social distance, isolation, insecurity, fear increase stress-related symptoms, and negatively affecting mental well-being [3, 5, 45].

The results of this research, conducted on Croatian sample already at a descriptive level indicate a worryingly high incidence and severity of symptoms of depression and anxiety.

Participants indicated feelings of loneliness, anxiety and tension, lethargy, overwhelmed with problems, and pessimism. The highest average score was recorded on the dimension of functioning, which justifies the initial expectations of loneliness and lack of intimacy as a pronounced reaction to the current situation. Expectations are in line with other studies conducted during the pandemic, which warn of the association of found symptoms with the risk of high blood pressure and coronary artery disease even in healthy middle-aged individuals [46] and identify high levels of loneliness as a major risk factor for the development of anxiety and depression [47]. On the other hand, participants in this study rated their social support as relatively high. On average, people close to them were good at showing that they cared, providing encouragement, willingness to listen when the need arose to talk, providing direct help, and providing useful information. The result is understandable and expected in the context of reduced social network and lack of communication and social exchange with a wider wire of people who were an unquestionable part of everyday life before the pandemic, but at the same time relying on family and close friends with whom contact was maintained during the pandemic. In similar studies, support of friends, and especially family member, were increased compared to the period before the coronavirus pandemic [48].

Furthermore, research has shown that pandemic, earthquake, social support, and resilience have a great impact on mental health (R^2 = 51%), with the most significant predictor being resilience in maintaining mental health, followed by a pandemic that greatly affects mental health. The prevalence of stress, anxiety, and depression in the general population because of the pandemic in the general population is around 30% [49]. Research demonstrated an inverse relationship between psychological resilience and psychological distress, particularly in the case of natural disasters, such as the 2010 Haiti Earthquake or the 2005 Hurricane Katrina [50, 51], and our research found negative relationship only between mental health and earthquake.

On the other hand, significant relationships were found between COVID-19 pandemic and mental health, psychological resilience, psychological difficulties. Moreover, significant positive relationships were found between psychological resilience and mental health, as well as social support.

Psychological resilience is dynamic process of adaptation to challenging life situations and research showed that is protective against mental problems and disorders [52]. It means that resilience enables regaining the former mental stability after a stressful period or event, and it also relies on functional, supporting, and meaningful social networks and positive bonds [26, 27, 31].

At the beginning of this survey, participants were asked to provide answers to two open-ended questions: *What was the most stressful and difficult during pandemic and lockdown* and *What helped you the most during pandemic and lockdown.*

The analysis of the answers to the first question resulted in defining the main categories of answers: social isolation, uncertainty, anxiety and fear of infection, then working from home or online classes, job insecurity and consequent financial insecurity and constant exposure to pandemic information. The largest number of answers have focused on concern about social isolation, separation parents from children and children from parents at the time of the ban movement between counties, which particularly affected the participants during the holidays. A small proportion of responses about social isolation indirectly point to aggravating dysfunctions in families with which participants have spent more time since the beginning of the pandemic than before. Disturbed relationships and various forms of domestic abuse are a particular problem that needs to be addressed as systematically and responsibly as possible, and research shows an increase in domestic violence while reducing the availability of support since the pandemic [53]. In the answers of the participants, who pointed out fear of infection, anxiety, uncertainty, panic, and apathy as the biggest problem, dominated fear for older family members, especially if they already have other diagnoses. In addition, participants report feelings of helplessness and compulsion to do something unwanted, a feeling of being in the Holocaust, a chronic lack of motivation for work and daily commitments, and high levels of anxiety due to prolonged indoors staying. In the answers that define working from home as the greatest difficulty dominated problem of non-compliance with working hours and the need for constant availability to superiors and clients, employer pressure, overtime unpaid work and simultaneous engagement in online teaching of children, lack of concentration on learning or working. A significant number of participants also mentioned the constant exposure to information about the pandemic as a stressor, the constant topic of all conversations was pandemic, the lack of verified information and conflicts among people due to different views on the situation. Participants whose jobs and financial security were jeopardized by the pandemic included a lack of business opportunities, reduced working hours and reduced wages, fears of losing their jobs and financial problems, layoffs, and the inability to find new jobs. Problems in this area are most often interrelated because layoffs in the area affected by the pandemic and measures to prevent the spread of infection are accompanied by the inability to find new jobs in the same area due to reduced demand on market.

Answers that did not belong to any of the defined categories are related to radical life changes caused by a pandemic such as divorce, unplanned change of residence due to change or job loss, fear of earthquake recurrence, wearing a mask and difficulty to freely go to post office, bank, shops, inability to have some indoor sports activities, pregnancy and childbirth during a pandemic due to lack of social support by close family, inability to attend the funeral of a close family member.

When asked about what has helped them the most during pandemic and lockdown, most participants pointed out spending time with family, which justifies a high score on the Social Support Scale and this confirmed previous research which stressed out significant role of positive relationships,

communication, and family support in effectively dealing with pandemic stress. [54]. Also, the participants assessed the extra time for activities that are otherwise neglected and are personally important, such as prayer, meditation, creative work, reading, cooking, gardening, and a significant number of participants in this category mentioned that they were going to psychotherapy. Although the disadvantages of working from home or online classes are highlighted in terms of aggravating circumstances, the Internet has been identified as a protective factor due to the possibility of video calls and other forms of communication with physically distant people, social networks, online shopping, listening to music and watching movies, ability to listen to lectures or do work remotely. Participants also mentioned that being in nature and possibility to be physically active, and to care of pets, were an effective way of actively dealing with the new situation.

In results' interpretation, it should be considered that it is online research that carries certain risks, from the problem of unrepresentativeness of the sample, to the inability to control participants who joined the research. Future studies should consider longitudinal research to explore potential long-term effects of pandemic and earthquake on the mental health. Multiple data collection timepoints combined with the representative sample selection could provide better understanding of the mental health outcome. Nevertheless, we believe that our research provided concrete and valuable answers to asked questions, which is perhaps most obvious from the answers on open-ended questions, which indicate a worrying level of pandemic impact on their lives.

5. Conclusion

The conducted research showed an increased level of psychopathological problems, a low level of mental health and a high level of social support among the citizens in Croatia. Lower levels of mental health and lower life satisfaction are associated with a higher degree of impact of the pandemic and earthquake on life, and a higher degree of impact of the pandemic on life correlates with severity of psychopathological difficulties. The most significant stressors due to the pandemic are social isolation, uncertainty, anxiety, fear of infection, challenges and limitations of working from home and online classes, loss job threats and financial insecurity, and excessive exposure to information about the pandemic. The impact of the earthquake did not prove to be a significant predictor in explaining mental health. The level of psychological difficulties confirmed by this research is worrying and indicates the need to develop effective ways to actively deal with the pandemic and all its implications for everyday life, education, work, social relations, and life in general.

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