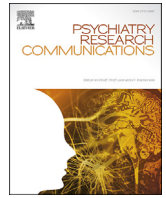




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# Social connectedness and resilience post COVID-19 pandemic: Buffering against trauma, stress, and psychosis



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## ABSTRACT

The present study investigated psychosocial predictors of psychosis-risk, depression, anxiety, and stress in Croatia two years after the onset of the COVID-19 pandemic. Given the existing transgenerational war trauma and associated psychiatric consequences in Croatian population, a significant pandemic-related deterioration of mental health was expected. Recent studies suggest that after an initial increase in psychiatric disorders during the pandemic in Croatia, depression, stress, and anxiety rapidly declined. These findings highlight the role of social connectedness and resilience in the face of the global pandemic. We examined resilience and psychiatric disorder risk in 377 Croatian adults using an anonymous online mental health survey. Results indicate that there was an exacerbation of all mental ill health variables, including depression, anxiety, stress, and a doubled risk for psychosis outcome post-COVID pandemic. Stress decreased levels of resilience, however, those exposed to previous traumatic experience and greater social connectedness had higher resilience levels. These findings suggest that individual differences in underlying stress sensitization of Croatian population due to past trauma may continue to influence mental health consequences two years after COVID-19 pandemic. It is essential to promote the importance of social connectedness and resilience in preventing the development of variety of mental health disorders.

## 1. Introduction

The COVID-19 pandemic has severely disrupted every aspect of daily life, resulting in countless economic, social, and behavioral changes. Two years after the outbreak of the COVID-19 pandemic, research has primarily focused on elucidating the effects of the first pandemic wave on general and mental health (Orfei et al., 2022; Taylor et al., 2021; Penninx et al., 2022). Numerous studies have reported substantial increases in psychiatric morbidity, including anxiety, depression, insomnia, and post-traumatic stress disorder (PTSD) (Wang et al., 2020; Goldberg et al., 2022; Raina et al., 2021), as well as a dramatic increase in loneliness and psychosis prevalence (Carvalho et al., 2020), which has further elucidated the role of loneliness as a significant and important risk factor for psychosis-risk (Gizdic et al., 2022; Tso and Park, 2020). The development of psychotic symptoms, depression, stress, and anxiety symptoms in individuals with no history of psychiatric disorders is supported by evidence indicating an increased incidence of first-case psychopathology in

COVID-19 patients (Taquet et al., 2021; Desai et al., 2021; Cao et al., 2022). One year post-pandemic, an increased prevalence of fatigue, sleep problems, memory loss, and concentration difficulties was reported globally (Boscolo-Rizzo et al., 2021; Liu et al., 2022; Han et al., 2022), as well as a persistent increase in anxiety, stress, and depression (Lakhan et al., 2020; Brooks et al., 2020; Shah et al., 2021; Joshi et al., 2021; Pierce et al., 2020; Meaklim et al., 2023), and psychotic-like symptoms (Lim et al., 2020; Taquet et al., 2021; Brown et al., 2020; Wu et al., 2021). Even after the lockdown restrictions were eased, general physical and mental health has deteriorated since the beginning of COVID-19 (Patel et al., 2022; Vadivel et al., 2021).

Furthermore, a number of studies across the globe have also identified a variety of risk factors for psychosis during the COVID-19 pandemic, including younger age, female gender identity, unemployment, loneliness, and a history of trauma (Tso and Park, 2020; Dean et al., 2021; Bauer et al., 2021; Lee et al., 2021; Proto and Quintana-Domeque, 2021). Previous exposure to trauma, in particular, is predicted to increase the

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prevalence of psychopathology and mental disorders during COVID-19 (Gizdic et al., 2022), given that trauma is widely predictive of nearly all subclinical and clinical psychopathology and negative outcomes (Lu et al., 2013; Auxéméry, 2012). Although the intensity of trauma triggers may diminish over time (Howell et al., 2015), it is important to consider their continued association with poor wellbeing, particularly among Croatians who have experienced war and natural disasters (e.g., earthquakes). War-related trauma and post-traumatic reminders have had a devastating and lasting effect on the mental health and quality of life of this population (Babić-Banaszak et al., 2002; Vukojević et al., 2020; Jeftić et al., 2021). Specifically, the first wave of the COVID-19 pandemic increased the prevalence of nearly all psychopathology symptoms in Croatia (Jokić Begić et al., 2020; Gizdic et al., 2022). Surprisingly, these rates decreased after a few months (from May to July 2020), when restrictions were partially relaxed (Ajduković et al., 2020). In comparison to other European countries (and parts of Asia), Croatia seemed to have a relatively lower incidence of depression, stress, and anxiety (Newby et al., 2020; Park et al., 2020; Rossi et al., 2020). Although continuous increases in symptoms were anticipated through 2020, these results are suggestive of high levels of resilience and adaptability among this population throughout the pandemic.

As a result, researchers have examined the concept of resilience and discovered that it may serve as a protective factor not only against trauma exposures but also against the development of psychopathology symptoms (Pietrzak et al., 2011), despite the fact that patterns of vulnerability levels vary among individuals (Sominsky et al., 2020). Psychological resilience is an active, process-oriented defense mechanism that appears to be derived in part from having meaningful, supportive, and functional social networks. For instance, individuals with a higher degree of social connectedness and a lower level of loneliness tend to have a higher level of general wellbeing and are better protected against mental health issues during the COVID-19 pandemic (Lee et al., 2021; Killgore et al., 2020; Groarke et al., 2020). However, social connectedness appears to be an especially important protective factor among trauma survivors. In some cases, individuals within a traumatized group become more resilient to adversity to the extent that their functioning is sometimes enhanced following exposure to adversity (Ayed et al., 2019; Finstad et al., 2021). During stressful and uncertain events, for instance, people tend to imitate the behavior and emotions of those around them (Duan et al., 2019), indicating that there is a collective social impulse that protects us. The 2020 study by Vukojević et al. suggested that, when people are together in a catastrophic situation, the catchphrase "we are in this together" has a deeper meaning due to the protective effect of crowd influence on our psyche. A possible explanation can be found in the Croatian experience of war (as well as the recent earthquake). Shared pain during a shared experience of disaster can unite people and inspire them to help each other, which promotes solidarity and increases social resilience, ultimately resulting in better mental health outcomes (Bastian et al., 2014; Garcia and Rime, 2019). According to Bastian et al. (2014) study, shared pain can increase cooperation and social bonding by acting as "social glue."

In this study, we investigated a) psychosocial predictors of general and mental health in the Croatian population two years after the COVID-19 pandemic, and b) the role of mental health status and social connectedness in influencing resilience among Croatian individuals. We hypothesized based on our previous research (Gizdic et al., 2022), mental health symptomatology and social connectedness would play a significant role in resilience levels, particularly among those who had experienced trauma in the past.

## 2. Methods

### 2.1. Participants and procedures

All participants were Croatian adults (aged 18 and above) who completed an online survey created via Survey Monkey in Croatian that

was distributed via online platforms and channels (such as the university emailing lists, social media platforms etc.) and in person. Before starting the survey, participants were informed of the study goals and aims, introduced to the type of questions and amount of time for completion of the study, as well as their ability to stop at any time. Participation was anonymous, voluntary, and open to everyone aged 18 and up (detailed in Gizdic et al., 2022). The survey took an average of 17 min to complete (74%). Data collection occurred between February and May 2022, following two peak waves of the COVID-19 pandemic (1.7 years after data collection during the first wave; survey 1 ran from July to September 2020; Gizdic et al., 2022). This study received exempt status from the Vanderbilt University Institutional Review Board (Vanderbilt IRB exempt #200337).

### 2.2. Measures

Following the previous survey (Gizdic et al., 2022), we repeated the same patterns of questions with slight modifications and addition of new scales. The present survey consisted of 159 questions regarding participant demographics, COVID-19 concern, general and mental health, including well-validated mental health measures of depression, anxiety, stress, psychosis, social connectedness, and social isolation. We also inquired about COVID-19 vaccination hesitancy, resilience, and exposure to trauma.

General information regarding COVID-19 diagnosis, concern, vaccination, and dosage, was requested to examine the overall effects of the pandemic on participants' daily lives. Ratings were given with appropriate responses to each item (i.e., for level of COVID concern, questions were scored on a 4-point Likert scale, ranging from 0=*not at all concerned* to 4=*extremely concerned*). Participants self-reported the changes in their current living situation, employment, number of days feeling positive emotions (love, happiness, and hope), as well as changes in their general health. To better understand previous trauma exposures, we included questions asking about adversity in childhood—emotional, physical, and sexual abuse; emotional and physical neglect; and included the Brief Trauma Questionnaire (BTQ; Schnurr et al., 2002)—a 10-item, self-report questionnaire that asks general trauma questions (e.g., *Have you ever been in an active war zone or served in a job that exposed you to war-related casualties?*) with follow up questions rating the severity of each traumatic event endorsed (e.g., *If so, did you think your life was in danger or were you possibly seriously injured?*).

The Short Scale for Measuring Loneliness (the UCLA Loneliness-short; Hughes et al., 2004) was used to assess subjective feelings of loneliness and social isolation; the Social Network Index (SNI; Cohen, 1997) was used to assess social connectedness including social network quality, size, and diversity (e.g., number of social high contact roles, embedded social networks, and regular people contacts); depression, anxiety, and stress subscales was assessed with Depression, Anxiety and Stress Scale – 21-item version (DASS-21; Lovibond and Lovibond, 1995), and psychosis risk and distress was assessed with the Prodromal Questionnaire-16 (PQ-16; Ising et al., 2012).

We also included a measure of vaccination hesitancy (adult Vaccine Hesitancy Scale, aVHS; Akel et al., 2022) asking participants about their own hesitancy and perceptions of effectiveness, reliability, and potential risks of vaccinations (e.g., *Vaccines are important to my health*). The responses were rated on a 5-point Likert scale ranging from *strongly disagree* to *strongly agree*. We added the 4-item Brief Resilient Coping Scale (BRCS; Sinclair and Wallston, 2004), which assesses participants' levels of resilience (i.e., successful recovery from stressful situations).

### 2.3. Statistical analysis

Descriptive statistics were used to assess participants' health, traumatic experiences, COVID-19 concern, and vaccination hesitancy. To achieve the first study goal, hierarchical linear regressions were performed that examined the role of psychosocial predictors, loneliness,

vaccination hesitancy, resilience, and social networks, in determining general and mental health. In the first step, independent variables for age, gender, social distancing adherence, childhood abuse and neglect, general traumas, and COVID-19 concern were used to form the basic model. In the second step, the full model included social network diversity, size, embedded social networks, loneliness, vaccination hesitancy, and resilience. For each dependent variable (e.g., self-reported general health, days feeling happy, feeling hopefully, and loving, DASS depression, stress, and anxiety, and PQ-scores), the change in  $R^2$  between the basic model and full model was used to examine whether adding social network variables, loneliness, and/or vaccination hesitancy and resilience explained more variance after controlling for age, gender, trauma, social distancing, and COVID concern.

To achieve the second goal of the study, we again tested the relationships between resilience, trauma, social networks, loneliness, vaccination, and mental health variables. However, to gain further clarity on the role and directionality of resilience as a factor in wellbeing, we repeated the regression analysis but used resilience as a dependent variable to examine whether psychosocial variables predict the levels of resilience. In the first step, the same independent variables as in the previous model were entered (e.g., age, gender, etc.) as a basic model. In the second step, social network diversity, social network size, and embedded social networks, as well as loneliness, vaccination hesitancy, DASS scales, and PQ total and distress, were included in the full model. After controlling for age, gender, traumas, social distancing, and COVID concern, the change in  $R^2$  between models was used to determine if adding social network variables, loneliness, vaccination hesitancy, DASS scales, and PQ total and distress explained more variance in resilience. A Bonferroni correction of  $p < 0.0045$  was applied to both analyses to minimize Type I Errors.

### 3. Results

A total of 377 Croatian adults (78% females; mean age = 29.2, SD = 12.31) participated in the study. Table 1 displays descriptive statistics for all study variables. Two years after the pandemic, participants reported overall good general health (42%), but they were still concerned with the pandemic (54%). 57% of participants received a COVID-19 vaccination, with a slight decrease in average general health before (mean = 2.31; SD = 1.02) and after vaccination (mean = 2.29; SD = 1.24). Overall, participants reported a relatively high number of days when they felt love, happiness, or hope (Table 2). Questions assessing social connectedness, levels of loneliness and social isolation, and resilience were completed by approximately 83-86% of participants, whereas the DASS was completed by 79% of participants and the PQ-16 was completed by 77% of participants, of whom 28% were at high risk for psychosis (see Table 3).

In the first goal of the study, we examined the psychosocial predictors of health two years after the first wave of the pandemic. Concern with COVID, childhood abuse and neglect, general trauma, loneliness, and vaccination hesitancy were negatively associated with general health status. On the other hand, SNI embedded social network and resilience were positively associated with overall general health. COVID concern, age, and loneliness decreased the number of days when participants felt happy. Loneliness decreased the number of days when the participants felt hopeful and loving. SNI embedded social network and resilience both increased the number of days feeling happy and hopeful. Social distancing, SNI high contact role, and resilience all increased the number of days when participants felt love. Furthermore, age and resilience were found to be negatively associated with DASS depression, DASS stress, and DASS anxiety. Childhood abuse and neglect, loneliness, and COVID concern were found to be positively associated with DASS stress. Only childhood abuse and neglect and loneliness were linked to depression and anxiety symptoms from DASS. With respect to psychosis-risk, there was a negative relationship between age and psychosis symptoms and related distress. In contrast, there was a positive association between psychosis symptoms (PQ-16 score) and the following: childhood abuse

**Table 1**  
Demographic information.

	N (Total)	M (SD)	Range	N	%
<b>Age</b>	377	29.40 (12.31)	18–78		
<b>Gender</b>					
Male				85	22.5
Female				292	77.5
<b>Education</b>					
Elementary school				1	0.3
High school				134	35.5
Technical school				15	4.0
Bachelor's degree				101	26.8
Master's degree				89	23.6
Doctoral degree				31	8.2
Other				3	0.8
Prefer not to answer				3	0.8
<b>Employment status</b>					
Full time (including full time students)				214	56.8
Part time ((including part time students)				40	10.6
Unemployed				56	14.9
Retired				8	2.1
Other				59	15.6
<b>Healthcare Worker</b>					
Yes				31	8.2
No				237	62.9
n/a				109	28.9
<b>Current Living situation</b>					
Living alone				43	11.4
Living with friends/roommates				38	10.1
Living with partner				40	10.6
Living with family				237	62.9
Homeless				1	0.3
Other				5	1.3
<b>General Health</b>					
Poor				11	2.9
Fair				37	9.8
Good				69	18.3
Very good				156	41.4
Excellent				71	18.8
n/a				33	8.8
<b>Medical Condition</b>					
Yes				23	6.1
No				321	85.1
n/a				33	91.2
<b>Mental Health Diagnosis</b>					
Yes				112	29.7
No				264	70.0
n/a				1	0.3
<b>COVID Diagnosis</b>					
Yes				192	50.9
No				137	36.3
I do not know				15	4.0
n/a				33	8.8
<b>COVID-19 concern</b>					
Not concerned				76	20.2
Somewhat concerned				203	53.8
Moderately concerned				54	14.3
Extremely concerned				11	2.9
n/a				33	8.8
<b>COVID-19 Vaccination</b>					
Yes				214	56.8
No				130	34.5
n/a				33	8.8
<b>General Health Post-vaccination</b>					
Not vaccinated				130	34.5
Poor				3	0.8
Fair				10	2.7
Good				52	13.8
Very good				84	22.3
Excellent				65	17.2
n/a				33	8.8
<b>COVID-19 Vaccination</b>					
Yes				214	56.8
No				130	34.5
n/a				33	8.8
<b>Trauma Experience</b>					

(continued on next page)

**Table 1** (continued)

	N (Total)	M (SD)	Range
<b>Childhood abuse and neglect</b>			
0 (no trauma)	133	40.1	
1 (single)	62	18.7	
2	59	17.8	
3	58	17.5	
4	20	6.0	
<b>General Trauma</b>			
0 (no trauma)	79	23.8	
1 (single)	95	28.6	
2	94	28.3	
3	48	14.5	
4	16	5.0	

Note: M = Mean; SD=Standard deviation; n/a = not answered.

**Table 2**

General health items (n = 344).

	Mean	SD	Range
Feeling happy	16.37	9.16	0–30
Feeling hopeful	12.54	9.86	0–30
Feeling love	15.39	10.84	0–30

Note: Number of days (over the past 30 days) participant felt positive emotions; SD = standard deviation.

**Table 3**

Descriptive data for the main psychosocial predictors.

	N (%)	Mean	SD	Range
<b>DASS</b>				
Depression	298 (79%)	6.82	5.22	0–21
Anxiety		5.38	4.50	0–21
Stress		8.11	5.06	0–21
<b>PQ</b>				
Items endorsed	289 (76.7%)	4.24	3.38	0–16
Distress endorsed		5.42	6.72	0–37
<b>SNI</b>				
High-Contact Roles	311 (82.5%)	3.95	1.71	0–12
People in Social Network		15.61	8.10	1–46
Embedded Networks		3.12	1.42	0–8
<b>Loneliness</b>	309 (82%)	5.31	1.83	3–9
<b>Resilience</b>	325 (86.2%)	14.01	2.89	4–10
<b>Vaccination hesitancy</b>	340 (90.2%)	27.70	6.62	14–46

Note: DASS = Depression, Anxiety and Stress; PQ= Prodromal questionnaire; SNI=Social Network Index; Loneliness = the UCLA Loneliness scale; Resilience = BRCS Resilience scale; Vaccination hesitancy = VHS Vaccination hesitancy scale; SD=Standard deviation.

and neglect, loneliness, and vaccination hesitancy. Similarly, there was a positive association between childhood abuse and neglect, loneliness with levels of distress surrounding psychosis symptoms (PQ-16 distress). These findings suggest that greater vaccination hesitancy, childhood abuse and neglect, and increased loneliness all contribute to an increased risk of psychosis (Table 4).

A second set of analyses revealed that stress was negatively associated with levels of resilience, whereas general trauma and SNI high contact role were positively associated with resilience (Table 5). As such, although stress decreased levels of resilience, those with previous exposure to general trauma and greater social connectedness (i.e., a high number of people in their social network) had increased resilience levels.

#### 4. Discussion

The present study sought to investigate the long-term mental health consequences of the COVID-19 pandemic in the Croatian population, emphasizing the importance of psychosocial factors in determining mental wellbeing. We specifically highlighted the effects of previous traumatic experience and the important role of social connectedness in

resilience—a particularly relevant topic for the Croatian population given the country's previous transgenerational war trauma and natural disasters. Although most participants reported good general health and an increase in the number of days, they felt positive emotions compared to our previous study (Gizdic et al., 2022), the current findings show that people are still concerned about the COVID-19 pandemic, even two years after the first wave. There was a higher level of vaccination hesitancy within this population. Nonetheless, according to Think Global Health (2021), the average vaccination rate in the European Union (EU) is 65%, and in comparison, to Croatia, Bulgaria, for example, had only 22% of its population vaccinated and a very high death rate. Thus, this may appear to be a matter applicable to the global population rather than Croatia in particular.

Concern about COVID, vaccination hesitancy, but also past trauma and increased loneliness post-pandemic may have contributed to a decline in overall general health. In turn, the number of embedded social networks (i.e., the number of different network domains in which a participant is active) and resilience levels led to better general health and more days when participants felt happy and hopeful. The number of days participants felt love increased with social network diversity (i.e., the number of people with whom the participant has regular contact), resilience, and, unexpectedly, with social distancing adherence. Social distancing measures have been put in place throughout the pandemic to curb the spread of the COVID-19 virus. In many places, social distancing is seen as a pro-social behavior—one that protects the community from COVID-19 (Wider et al., 2022). Evidence suggests that widespread experience of hardship or pain increases cooperation, collaboration, and social bonding (Bastian et al., 2014). Given the history of shared trauma experienced by the Croatian population (e.g., war, earthquake), it is possible that increased social distancing adherence is viewed as extremely pro-social, collaborative, and benevolent behavior, thereby increasing feelings of love in participants' daily lives. Furthermore, Croatian social contacts are relatively reserved; for example, culturally normative public interpersonal greetings do not typically involve physical contact (such as hugging or kissing). As a result, it is possible that adherence to social distancing conforms to Croatian social norms and expectations and may involve less significant change in daily life routines than other aspects of the pandemic.

Overall, our findings are consistent with previous research on the detrimental and enduring effects of the COVID-19 pandemic on mental health, indicating that the pandemic and related social isolation, as well as past trauma, continue to have a large and pervasive impact on individual wellbeing (Patel et al., 2022; Vadivel et al., 2021). However, our results also highlight social connectedness (i.e., social network domains) and resilience as promising protective factors in preventing the further development of unfavorable mental and general health outcomes.

In addressing the first aim of the study, we noted a drastic increase in the prevalence of stress, depression, and anxiety symptoms. Surprisingly, the rate of psychosis risk post-pandemic nearly doubled when compared to the prevalence of high-risk psychosis rates at the beginning of the pandemic (Gizdic et al., 2022). These findings reflect the impact of ongoing and continued stress caused by the COVID-19 pandemic and suggest the pandemic will continue to have long-lasting consequences on individuals' functioning and wellbeing (Goldberg et al., 2022). These results are also supported by previous findings from the Severe Acute Respiratory Syndrome (SARS) outbreak in 2003, which showed that almost 82% of SARS survivors continued to experience poor mental health and related outcomes, including stress disorders such as PTSD (Mak et al., 2010). While the effects of viral pandemics on stress around the world are clear, it is also important to consider the nuances of populations with high exposure to adversity, such as the Croatian population.

Early adversity has been shown to leave neurobiological vulnerabilities that make individuals more sensitive to future stress (Read et al., 2014; Cristóbal-Narváez et al., 2016; Russell et al., 2018; Smith and Pollak, 2020), thereby increasing the risk of developing anxiety disorders, depression, and other broad dimensions of psychopathology



**Table 4**  
Psychosocial predictors of general and mental health status.

		Model statistics				Variable statistics		
		df	$\Delta R^2$	$\Delta F$	p	$\beta$	T	p
<b>General health</b>								
<b>Step 1</b>		6	0.096	5.350	<0.001			
<b>Step 2</b>		4	0.114	2.583	0.025			
	Age					-0.087	-1.489	0.138
	Gender					0.030	0.559	0.577
	Social distancing					0.090	1.377	0.170
	COVID concern					-0.123	-2.092	0.037*
	Childhood abuse/neglect					-0.142	-2.460	0.014*
	Trauma general					-0.158	-2.867	0.004*
	SNI High contact role					-0.227	-1.942	0.053
	SNI People sum					0.031	0.373	0.709
	SNI Embedded network					0.172	2.883	0.004*
	Loneliness					-0.134	-2.258	0.025*
	Vaccination hesitancy					-0.153	-2.374	0.018*
	Resilience					0.174	3.145	0.002*
<b>Days feeling happy</b>								
<b>Step 1</b>		6	0.077	4.223	<0.001			
<b>Step 2</b>		3	0.257	12.399	<0.001			
	Age					-0.148	-2.799	0.005*
	Gender					0.051	1.033	0.302
	Social distancing					-0.024	-0.464	0.643
	COVID concern					-0.113	-2.131	0.034*
	Childhood abuse/neglect					-0.091	-1.712	0.088
	Trauma general					-0.047	-0.942	0.347
	SNI High contact role					0.078	0.728	0.467
	SNI People sum					0.066	0.863	0.389
	SNI Embedded network					0.237	4.328	<0.001*
	Loneliness					-0.377	-6.926	<0.001*
	Vaccination hesitancy					-0.106	-1.807	0.072
	Resilience					0.155	3.048	0.003*
<b>Days feeling hopeful</b>								
<b>Step 1</b>		6	0.083	4.529	<0.001			
<b>Step 2</b>		3	0.229	10.557	<0.001			
	Age					-0.052	-0.962	0.337
	Gender					0.076	1.519	0.130
	Social distancing					0.065	1.222	0.223
	COVID concern					-0.021	-0.396	0.693
	Childhood abuse/neglect					-0.087	-1.617	0.107
	Trauma general					0.012	0.231	0.818
	SNI High contact role					0.106	0.972	0.332
	SNI People sum					0.007	0.096	0.923
	SNI Embedded network					0.195	3.497	0.001*
	Loneliness					-0.320	-5.787	<0.001*
	Vaccination hesitancy					-0.066	-1.104	0.270
	Resilience					0.219	4.239	<0.001*
<b>Days feeling love</b>								
<b>Step 1</b>		6	0.090	5.004	<0.001			
<b>Step 2</b>		3	0.181	7.538	<0.001			
	Age					-0.056	-0.965	0.335
	Gender					-0.036	-0.692	0.490
	Social distancing					0.115	2.076	0.039*
	COVID concern					0.054	0.959	0.338
	Childhood abuse/neglect					-0.098	-1.771	0.078
	Trauma general					0.045	0.853	0.394
	SNI High contact role					0.190	3.152	0.002*
	SNI People sum					0.015	0.202	0.840
	SNI Embedded network					-0.109	-1.021	0.308
	Loneliness					-0.309	-5.452	<0.001*
	Vaccination hesitancy					-0.062	-1.010	0.313
	Resilience					0.165	3.110	0.002*
<b>DASS stress</b>								
<b>Step 1</b>		6	0.234	14.824	<0.001			
<b>Step 2</b>		2	0.203	13.173	<0.001			
	Age					-0.194	-4.158	<0.001*
	Gender					-0.072	-1.564	0.119
	Social distancing					-0.048	-1.002	0.317
	COVID concern					0.110	2.264	0.024*
	Childhood abuse/neglect					0.114	2.294	0.022*
	Trauma general					0.076	1.614	0.108
	SNI High contact role					0.049	0.914	0.361
	SNI People sum					-0.010	-0.205	0.838
	SNI Embedded network					-0.007	-0.142	0.887
	Loneliness					0.360	7.163	<0.001*

(continued on next page)

Table 4 (continued)

		Model statistics				Variable statistics		
<b>DASS anxiety</b>	Vaccination hesitancy					0.050	0.908	0.364
	Resilience					-0.234	-4.933	<0.001*
	<b>Step 1</b>	6	0.217	13.421	<0.001			
	<b>Step 2</b>	2	0.193	11.710	<0.001			
	Age					-0.175	-3.668	<0.001*
	Gender					-0.045	-0.962	0.337
	Social distancing					-0.062	-1.253	0.211
	COVID concern					0.091	1.825	0.069
	Childhood abuse/neglect					0.117	2.296	0.022*
	Trauma general					0.075	1.553	0.122
	SNI High contact role					0.034	0.615	0.539
	SNI People sum					-0.015	-0.291	0.771
SNI Embedded network					<0.001	0.009	0.993	
Loneliness					0.380	7.386	<0.001*	
Vaccination hesitancy					0.094	1.673	0.095	
Resilience					-0.194	-4.003	<0.001*	
<b>DASS depression</b>								
<b>Step 1</b>	6	0.236	15.021	<0.001				
<b>Step 2</b>	2	0.198	12.735	<0.001				
Age					-0.155	-3.315	0.001*	
Gender					-0.079	-1.720	0.087	
Social distancing					-0.087	-1.807	0.072	
COVID concern					0.092	1.878	0.061	
Childhood abuse/neglect					0.149	2.998	0.003*	
Trauma general					0.069	1.457	0.146	
SNI High contact role					0.009	0.165	0.869	
SNI People sum					-0.064	-1.300	0.195	
SNI Embedded network					-0.029	-0.568	0.570	
Loneliness					0.363	7.217	<0.001*	
Vaccination hesitancy					0.065	1.183	0.238	
Resilience					-0.222	-4.684	<0.001*	
<b>PQ total</b>								
<b>Step 1</b>	6	0.218	13.090	<0.001				
<b>Step 2</b>	2	0.087	2.266	<0.001				
Age					-0.218	-4.132	<0.001*	
Gender					-0.017	-0.319	0.750	
Social distancing					-0.013	-0.210	0.834	
COVID concern					0.015	0.266	0.790	
Childhood abuse/neglect					0.250	4.433	<0.001*	
Trauma general					0.023	0.432	0.666	
SNI High contact role					-0.027	-0.452	0.651	
SNI People sum					-0.023	-0.408	0.683	
SNI Embedded network					-0.040	-0.701	0.484	
Loneliness					0.287	5.252	<0.001*	
Vaccination hesitancy					0.153	2.479	0.014*	
Resilience					-0.052	-0.981	0.328	
<b>PQ distress</b>								
<b>Step 1</b>	6	0.233	14.276	<0.001				
<b>Step 2</b>	1	0.087	35.953	<0.001				
Age					-0.192	-3.748	<0.001*	
Gender					-0.037	-0.717	0.474	
Social distancing					0.028	0.528	0.598	
COVID concern					0.068	1.263	0.208	
Childhood abuse/neglect					0.244	4.382	<0.001*	
Trauma general					0.014	0.264	0.792	
SNI High contact role					-0.069	-1.174	0.241	
SNI People sum					-0.047	-0.852	0.395	
SNI Embedded network					-0.069	-1.220	0.223	
Loneliness					0.323	5.996	<0.001*	
Vaccination hesitancy					0.084	1.379	0.169	
Resilience					-0.045	-0.843	0.400	

Note1. Predictive variables kept in the second step: age, gender, social distancing, level of concern about COVID-19, and traumatic experience (childhood abuse and neglect, and trauma general).

Note2. DASS = Depression, Anxiety and Stress; PQ = prodromal questionnaire; SNI=Social Network Index.

\*p<0.05.

(Vaessen et al., 2017; Stroud, 2020; Wade et al., 2019). The *stress sensitization* model sheds light on the link between stress and the prevalence of affective disorders (Post, 1992; Stroud, 2020). According to this model and considering previous war- and natural disaster-related trauma, the Croatian population would be expected to be more sensitive to the changes caused by the pandemic relative to other populations. As a result, it appears that childhood adversity and subsequent stress

exposure, such as the COVID pandemic, exacerbated depression, anxiety, and stress, particularly psychosis symptoms. These findings may add to the evidence of an underlying mechanism of increased stress-sensitivity. Contrary to our expectations, resilience had no effect on levels of psychosis, but it did lead to a decrease in stress levels. Thus, it may be plausible to think that building on resilience levels would lead to decreased stress levels and an amelioration of sensitivity to further stress.

**Table 5**  
Resilience and psychosocial predictors of mental health status.

	Model statistics				Variable statistics		
	df	$\Delta R^2$	$\Delta F$	p	$\beta$	T	p
<b>Resilience</b>							
<b>Step 1</b>	6	0.063	3.172	0.005			
<b>Step 2</b>	2	0.152	6.439	<0.001			
Age					-0.027	-0.419	0.675
Gender					-0.090	-1.624	0.106
Social distancing					-0.008	-0.144	0.886
COVID concern					0.040	0.665	0.507
Childhood abuse/neglect					-0.009	-0.148	0.882
Trauma general					0.119	2.103	0.036*
SNI High contact role					0.215	3.423	0.001*
SNI People sum					-0.074	-0.916	0.361
SNI Embedded network					-0.024	0.202	0.840
Loneliness					-0.108	-1.643	0.101
Vaccination hesitancy					0.039	0.202	0.840
DASS Depression					-0.136	-1.064	0.288
DASS Stress					-0.382	-6.278	<0001*
DASS Anxiety					-0.098	-0.952	0.342
PQ symptoms					0.011	0.178	0.859
PQ distress					0.059	0.862	0.390

Note1. Predictive variables kept in the second step: age, gender, social distancing, level of concern about COVID-19, and traumatic experience (childhood abuse and neglect, and trauma general).

Note2. DASS = Depression, Anxiety and Stress; PQ= Prodromal questionnaire.

SNI=Social Network Index; Vaccination hesitancy = VHS Vaccination hesitancy scale.  
p<0.05.

Loneliness is another important factor to consider in this interplay. Following our previous findings (Gizdic et al., 2022), this psychosocial factor remains a highly important risk factor in predicting a variety of symptom developments, particularly psychosis, even after two years of the pandemic, while social connectedness appears to serve as both a preventive and protective factor. As a result, strengthening social networks may have plausible effects on alleviating psychopathology symptoms, reducing levels of loneliness, and protecting against future stress.

There are several limitations to our study. First, despite the relatively large sample size, many participants did not complete the entire questionnaire, resulting in a smaller sample size for some of the measures (e.g., PQ-16 and DASS). Second, the majority of the sample consisted primarily of female participants, which may have limited its generalizability. Regardless, the study enabled a comprehensive investigation of multiple psychosocial predictors of psychopathology and psychosis-risk following two years after the COVID-19 pandemic, with evidence of long-term adverse effects of the pandemic and highlighting the significance of resilience and social connectedness.

To conclude, investigating the long-term mental health consequences of the COVID-19 pandemic and emphasizing the importance of psychosocial factors on mental wellbeing may help further detect the potential underlying mechanism of stress-sensitivity. We specifically highlighted the effects of previous traumatic experiences as well as the critical role of social connectedness in association to levels of resilience. Therefore, to mitigate the mental health consequences of large-scale traumatic events such as the pandemic in the future, it would be crucial to implement public health strategies that enhance and support social connectedness and resilience, especially for psychosis—a particularly relevant topic for the Croatian population given the lack of prodromal data and the country's history of exposure to transgenerational war trauma (including early exposures) and natural disasters.

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#### CRedit authorship contribution statement

**Alena Gizdic:** Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing – original draft, Writing – review & editing, Visualization. **Tatiana Baxter:** Methodology, Software, Writing – review & editing, Visualization. **Neus Barrantes-Vidal:** Supervision, Writing – review & editing. **Sohee Park:** Conceptualization, Methodology, Software, Resources, Writing – review & editing, Supervision, Project administration, Funding acquisition.

#### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper

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