

# Psychological Well-Being During the Second Wave of COVID-19 Pandemic: The Mediation Role of Generalized Anxiety

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**Introduction:** The outbreak of the COVID-19 has largely impacted individuals' health and lifestyles. This study aimed to investigate people's psychological well-being during the second phase of the COVID-19 pandemic.

**Methods:** We selected six indicators of psychological well-being: fear of COVID-19, loneliness, social interaction anxiety, generalized anxiety, PTSD, and depression. A sample of 231 Italian participants (56.3% women), with a mean age of 32.7 ( $SD=12.61$ ), completed an online survey from February to March 2021, during the so called "second wave". It included the Fear of COVID-19 Scale (FCV-19S), the UCLA Loneliness Scale- Version 3, the Generalized Anxiety Disorder 7-item Scale (GAD-7), the Patient Health Questionnaire-9 (PHQ-9), the Impact of Event Scale-Revised (IES-R), and the Social Interaction Anxiety Scale (SIAS).

**Results:** Apart from loneliness, women reported lower levels of psychological well-being than men. Fairly good associations between all the detected variables were found. Based on a mediation model evaluation (in which generalized anxiety was introduced as a mediator in the relationship between fear of COVID-19, PTSD, loneliness, social interaction anxiety, and depression), except for social interaction anxiety, total and partial mediation effects suggested that generalized anxiety played a crucial role in exacerbating depressive symptoms during the pandemic.

**Conclusion:** Our outcomes may expand the knowledge about the psychological well-being during the pandemic experience, with a focus on the mediating role of generalized anxiety.

**Keywords:** pandemic, psychological well-being, mediation model, fear, loneliness, generalized anxiety

## Introduction

In December 2019, a new respiratory illness caused by a new Coronavirus (simply called COVID-19) was first identified in the city of Wuhan, China. The spread of the virus early became a global health problem<sup>1</sup> and the World Health Organization<sup>2</sup> declared a pandemic on March 12th, 2020. Even in Europe, first in Italy, the governments resorted to nationwide lockdown to slow down the virus transmission and reduce the pressure on the healthcare system for both physical and mental health (e.g., depression pandemic effects).<sup>3,4</sup> Beyond the consequences on general health, the spread of the pandemic and the following restrictive measures had a great impact on the world economy and on all people's daily life in all countries<sup>5-9</sup> as well as on developing countries.<sup>10</sup> As a result, social distancing – in association with personal risk (e.g., being female, above 44 years old, with many children, unemployed, etc.)<sup>11</sup> and protection factors (e.g., loneliness, mindfulness, and use of facemasks)<sup>12,13</sup> – has more frequently caused negative psychological effects,<sup>14-16</sup> such as fear of illness, fear of death, anxiety, depression, post-traumatic stress, and insomnia.<sup>3,5,17-19</sup>

Some scholars claimed that in Italy the prevalence of anxiety and depression doubled during the first lockdown and, in particular, depression symptoms increased from 33.6% (before the pandemic) to 38.9% (in the early stage of the pandemic).<sup>20,21</sup> In addition, women – who also before the pandemic showed higher emotional expressivity, especially for

negative emotions,<sup>22</sup> such as depression<sup>23</sup> – were more exposed to the risks of negative psychological symptoms during pandemics, confirming their greater vulnerability than men.<sup>10,22,24–26</sup>

Some aspects of the COVID-19 disease, especially the high-speed contamination and the relatively high mortality,<sup>27</sup> have determined the fear of COVID-19.<sup>28</sup> Ahorsu et al.<sup>29</sup> highlighted that fear is a pandemic's specific characteristic; with high levels of fear, people may not think/ behave clearly and rationally regarding personal protective actions for the COVID-19.<sup>30</sup> Indeed, fear is an adaptive feeling which activates the needed energies to face danger, but only if it does not become excessive.<sup>3</sup> In these cases, according to an empirical tested model,<sup>9</sup> the physical symptoms — mediated by the need for health information and perceived impact on pandemic — can improve adverse mental health outcomes, such as anxiety and depression symptoms.<sup>3,31,32</sup>

Loneliness and social isolation frequently co-occur with negative effects on psychological well-being.<sup>33</sup> As a generally accepted definition, «loneliness is defined as the subjective feeling of being alone, while social isolation describes an objective state of individuals' social environments and interactional patterns».<sup>35</sup> Likewise, social anxiety and generalized anxiety disorder (GAD) frequently co-occur.<sup>34,36</sup> Moreover, the lockdown restrictive measures – which invited people to stay at home and not to meet other people – had buffer effects on social anxiety and mental health,<sup>37,38</sup> also increasing the levels of generalized anxiety disorder<sup>37</sup> and depression.<sup>14,40</sup> Previous research documented a significant association between social interaction anxiety, depression, and anxiety.<sup>39</sup>

In this climate of concern for one's own health, post-traumatic stress disorder (PTSD) is a common experience, to the point of being considered as a widely shared experience during the pandemic.<sup>40,41</sup> The core of PTSD's symptoms – as described by the American Psychiatric Association (APA, 2013)<sup>69</sup> – are intrusion, negative alterations in mood and cognition, avoidance of trauma-related stimuli, and hyperarousal. Previous research showed a significant association between PTSD, anxiety, and depression, especially during the COVID-19 pandemic.<sup>3,26</sup>

Indeed, depression symptoms were a widespread experience during mass traumatic events, such as the COVID-19 pandemic,<sup>42,44</sup> with no significant differences among countries.<sup>45</sup> Rodríguez-Hidalgo et al.<sup>3</sup> showed that experiencing epidemic or natural disaster events may increase levels of long-term depression. They also reported depression as frequently linked to other negative feelings: stress predicted depression, depression and anxiety were frequently related to each other, and people with PTSD showed high levels of anxiety and depression.

Ultimately, during the first part of the pandemic experience (e.g., approximately from February to May 2020, when the governments introduced the restrictive measures for the first time) some research<sup>42</sup> highlighted the risk for developing negative psychological responses to COVID-19 pandemic, which led to an increase of depressive symptoms. In fact, each of the selected indicators of psychological well-being showed strong associations with depression and generalized anxiety (e.g., fear of COVID-19,<sup>3,31,32</sup> loneliness,<sup>39</sup> PTSD,<sup>3,42</sup> depression,<sup>3</sup> and social interaction anxiety<sup>39</sup>). Based on previous studies,<sup>46,47</sup> according to which anxiety disorders tended to temporally precede depression, we hypothesized a mediation model that could explain the direct and indirect influence of the selected indicators of psychological well-being on depression.

## Objectives and Hypotheses

This study aimed to explore Italian general population's psychological well-being during the COVID-19 pandemic. Based on literature findings, we studied the association between loneliness, fear of COVID-19, PTSD, social anxiety, and depression, also testing a mediation model.

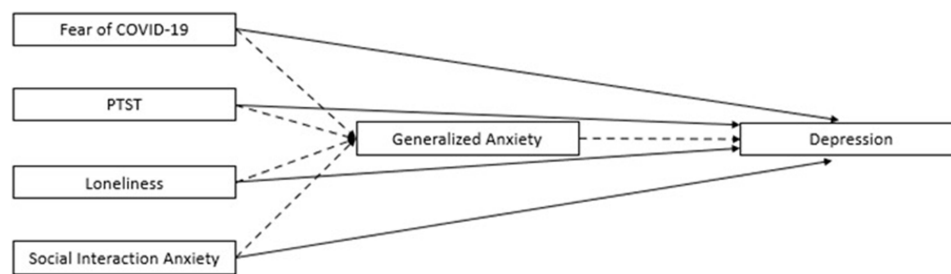
Based on the literature findings reported above, we derived the following research hypotheses:

Hypothesis 1 (H1): We expect gender differences for loneliness, social anxiety, generalized anxiety, fear of COVID-19, PTSD, and depression, with women showing higher levels than men;

Hypothesis 2 (H2): We expect all the detected variables (loneliness, social anxiety, generalized anxiety, fear of COVID-19, PTSD, and depression) to be positively intercorrelated;

Hypothesis 3 (H3): We expect that generalized anxiety acts as a mediator in the relationship between fear of COVID-19, PTSD, loneliness, social interaction anxiety, and depression.

The hypothesized model is shown in Figure 1.



**Figure 1** Hypothesized mediation model.

**Note:** Dotted lines represent indirect effects; solid lines represent direct effects.

## Materials and Methods

### Participants

Participants ( $N = 231$ ) were all Italian people. They were fairly balanced across gender (56.3% women), aged from 18 to 69 ( $M = 32.7$ ,  $SD = 12.61$ ). Most of them (78.4%) declared neither to have contracted the virus nor to have had direct contacts with someone infected, 13.4% affirmed to have had close contacts with individuals affected by the virus, 6.1% stated to have been infected by the virus with mild symptoms, and 2.2% were individuals who have contracted the virus in a serious mode with hospital admission.

### Measures

#### Fear of COVID-19

The Fear of COVID-19 Scale (FCV-19S)<sup>29</sup> is a 7-item Self-Report instrument (e.g., “I am most afraid of Coronavirus19”, “I am afraid of losing my life because of Coronavirus19”). It assesses the fear of COVID-19 with a five-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*), with a total score calculated by summing all items and ranging from 7 to 35. High scores indicate great fear of COVID-19. The internal consistency of the FCV-19S (Cronbach’s alpha) was 0.87.<sup>29</sup> In this study, we used the Italian version.<sup>46</sup> The Cronbach’s alpha for the present sample was 0.86.

#### Loneliness

The UCLA Loneliness Scale- Version3<sup>48</sup> was used to measure one’s own subjective feelings of loneliness as well as feelings of social isolation, in its Italian version.<sup>49</sup> It is a 20-item scale on a 4-point Likert scale from 1 (*I never feel this way*) to 4 (*I often feel this way*) (e.g., “I am unhappy doing so many things alone”, “I feel isolated from others”). This measure has high internal consistency (Cronbach’s alpha = 0.96)<sup>48</sup> and a test-retest correlation over two-month of 0.73. The Cronbach’s alpha for the present sample was 0.83.

#### Generalized Anxiety

Symptoms of generalized anxiety were measured by using the Generalized Anxiety Disorder 7-item Scale (GAD-7).<sup>50</sup> Participants indicated how often they experienced each symptom in the past 2 weeks on a four-point Likert scale from 0 (*Not at all*) to 3 (*Nearly every day*) (e.g., “Feeling nervous, anxious, or on edge”, “Trouble relaxing”). Higher scores are indicative of greater levels of anxiety. The GAD-7 has shown reliable and valid scores (Cronbach’s alpha = 0.83).<sup>50</sup> The Cronbach’s alpha for the present sample was 0.91.

#### Depression

Nine symptoms of depression were measured by using the Patient Health Questionnaire-9 (PHQ-9; e.g., “Little interest or pleasure in doing things”, “Trouble concentrating on things, such as reading the newspaper or watching television”).<sup>51</sup> It is a Self-Report scale which assesses the past two-week depressive symptoms on a 4-point Likert scale from 0 (*Not at all*) to 3 (*Nearly every day*). Higher scores represent problematic levels of depression (the total score ranges from 0 to 27). The Cronbach’s alpha value for the scale was 0.90.<sup>51</sup> In this study, we used the Italian version.<sup>52</sup> The Cronbach’s alpha for the present sample was 0.87.

## Post-Traumatic Stress Disorder

The Impact of Event Scale–Revised (IES-R)<sup>53</sup> in its Italian version<sup>54</sup> was used to evaluate the psychological traumatic impact of past epidemics (SARS, H1N1) during previous lockdown.<sup>55</sup> It was validated in various countries<sup>56–60</sup> during the COVID-19 pandemic and it was also widely used in Italian research on this topic.<sup>61,62</sup> It assesses the intensity of 22 post-traumatic symptoms of intrusion, avoidance, and hyper-arousal on a Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). It shows good test–retest reliability ( $r = 0.89–0.94$ ) and internal consistency (Cronbach’s  $\alpha$ ) for each subscale (intrusion =  $0.87–0.94$ , avoidance =  $0.84–0.97$ , hyper-arousal =  $0.79–0.91$ ).<sup>63</sup> The IES-R consists of three PTSD dimensions: intrusion (e.g., “Any reminder brought back feelings about it”), agitation (e.g., “I felt irritable and angry”), and avoiding (e.g., “I avoided letting myself get upset when I thought about it or was reminded of it”). The Cronbach’s alpha for the present sample was 0.95 (intrusion = 0.90, avoidance = 0.88, hyper-arousal = 0.88).

## Social Interaction Anxiety

The Social Interaction Anxiety Scale (SIAS)<sup>64</sup> is a 19-item measure used to assess anxiety when engaging in social interactions (e.g., “It makes me uncomfortable to meet an acquaintance on the street”, “It’s hard for me to chat with other people”). Respondents were required to answer on a 5-point Likert-type scale, from 0 (*not at all*) to 4 (*extremely*); the total score reflects the severity of social interaction anxiety (Cronbach’s  $\alpha = 0.86$ ).<sup>64</sup> The Italian version of the SIAS was used in this study.<sup>65</sup> The Cronbach’s alpha for the present sample was 0.90.

## Procedure

Participants completed an online survey through Google Forms, from February to March 2021, during the so called “second wave” of the COVID-19 pandemic. The survey was disseminated through social networks (e.g., Facebook, Instagram, and WhatsApp). After explaining the purposes of the study, participants who met our eligibility criteria (being Italian and older than 18) signed the informed consent. We avoided missing data using a mandatory response format in our google form. The online survey methodology was useful to overcome the problems of administration in-person during social distancing restrictions. However, it did not allow us to assess the response rate.

The study was conducted according to the 1964 Helsinki Declarations and its later amendments. The research project proposal was approved by the Internal Review Board of the psychological research of the UKE – University Kore Enna with the Code UKE-IRBPSY-03.21.01. The administration of the measures was carried out in compliance with the privacy guarantee regulations according to the Legislative Decree n. 196/2003, and the GDPR (EU Regulation n.2016/679). Data were collected individually for research purposes only and treated in an aggregated and anonymous form.

## Data Analysis

After performing standard descriptive statistical analyses of data, a General Linear Model analysis was applied to test the gender differences in psychological well-being during the second wave of COVID-19 pandemic (H1). We also tested the associations between all the observed variables (e.g., fear of COVID-19, PTSD, loneliness, social interaction anxiety, generalized anxiety, and depression), using Pearson’s correlations (H2).

To test H3, a mediation model was performed using jamovi (version 1.2) GLM package (JAMM module). The model investigated the direct and indirect effects (mediated by generalized anxiety) of fear of COVID-19, PTSD, loneliness, and social interaction anxiety on depression. Multivariate distribution was first checked to verify whether the assumption of multivariate normality was met. By comparing Mardia’s coefficient (60.11) with the critical value associated with six-degrees-of-freedom (48), there was clear evidence that our data violated the assumption of multivariate normality. Bootstrapping is a non-parametric resampling procedure, recognized as a powerful and rigorous method for mediation analysis<sup>67</sup> and the best suited procedure to be applied when data are not normally distributed. Therefore, in this study, the bootstrapping procedure (percentiles) was applied to test the mediation hypothesis using 1000 bootstrap samples and 95% confidence intervals. Finally, in order to verify whether the tested mediation model was invariant across gender, the mediation analysis was also performed separately for men and women.

## Results

### General Linear Model: Does Gender Lead to Differences in Psychological Well-Being?

A General Linear Model analysis was applied to verify the hypothesized effect between gender and fear of COVID-19, loneliness, social interaction anxiety, generalized anxiety, PTSD, and depression (see [Tables 1](#) and [2](#) for descriptive statistics). Univariate tests of between-subjects effects with gender as a between-participants variable were conducted as follow up tests to determine whether levels of psychological well-being differed across the two groups (males vs females).

Overall, results showed that gender significantly affected psychological wellness, Wilks'  $\Lambda = 0.894$ ,  $F(6, 215) = 4.242$ ,  $p < 0.001$ , partial  $\eta^2 = 0.106$ . Tests of between-subjects effects showed that women scored significantly higher on fear of COVID-19,  $F(1, 220) = 12.938$ ,  $p < 0.001$ , partial  $\eta^2 = 0.056$ , generalized anxiety,  $F(1, 220) = 20.115$ ,  $p < 0.001$ , partial  $\eta^2 = 0.084$ , depression,  $F(1, 220) = 10.475$ ,  $p < 0.001$ , partial  $\eta^2 = 0.045$ , social interaction anxiety,  $F(1, 220) = 5.113$ ,  $p < 0.05$ , partial  $\eta^2 = 0.023$ , and PTSD,  $F(1, 220) = 9.659$ ,  $p < 0.01$ , partial  $\eta^2 = 0.042$ , than men. Only loneliness did not show statistically significant results in relationship with gender,  $F(1, 220) = 0.372$ ,  $p = 0.543$ , partial  $\eta^2 = 0.002$ . [Figure 2](#) presents means of the psychological well-being variables for the two gender groups.

### Correlations Between the Selected Indicators of Psychological Well-Being

We also explored the associations between all the detected variables. We considered fear of COVID-19, loneliness, social interaction anxiety, generalized anxiety, PTSD, and depression as indicators of psychological well-being during the COVID-19 pandemic. Our results showed statistically significant correlations between all of them (mostly  $p < 0.001$ ; only the association between fear of COVID-19 and loneliness was  $p < 0.01$ ) (see [Table 3](#)). Moreover, we performed a

**Table 1** Descriptive Statistics of All the Study Variables

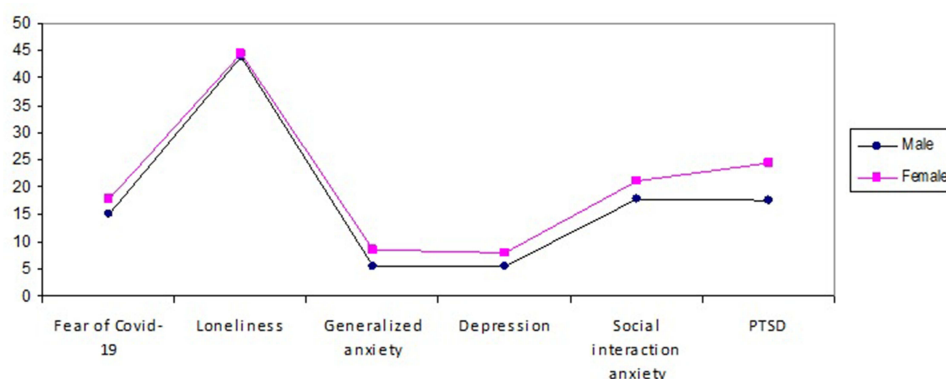
Variable	M	SD	Min	Max	Skewness	Kurtosis
FCV-19S	16.69	5.69	7	32	0.34	-0.49
UCLA-LS	44.38	7.96	23	63	-0.21	-0.37
GAD-7	7.23	5.24	0	21	0.81	0.08
PHQ-9	6.93	5.19	0	26	1.14	1.48
SIAS	19.98	11.32	4	60	1.35	1.70
IES-R	21.53	16.56	0	76	0.95	0.81

**Abbreviations:** FCV-19S, Fear of COVID-19 Scale; GAD-7, Generalized Anxiety Disorder 7; PHQ-9, Patient Health Questionnaire 9; SIAS, Social Interaction Anxiety Scale; IES-R, Impact of Event Scale-Revised; UCLA-LS, UCLA Loneliness Scale.

**Table 2** Descriptive Statistics of All the Study Variables Disaggregated by Gender

Variable	Male		Female	
	M	SD	M	SD
FCV-19S	15.15	4.60	17.86	6.21
UCLA-LS	43.93	7.45	44.58	8.32
GAD-7	5.47	4.30	8.52	5.51
PHQ-9	5.62	4.99	7.87	5.26
SIAS	17.91	10.58	21.29	11.40
IES-R	17.49	15.27	24.34	16.99

**Abbreviations:** FCV-19S, Fear of COVID-19 Scale; GAD-7, Generalized Anxiety Disorder 7; PHQ-9, Patient Health Questionnaire 9; SIAS, Social Interaction Anxiety Scale; IES-R, Impact of Event Scale-Revised; UCLA-LS, UCLA Loneliness Scale.



**Figure 2** Means of the psychological well-being variables for the two gender groups.

correlational analysis between all the study variables disaggregated by gender (see Table 4). For both groups, the relationships between the study variables were statistically significant, except for the association between loneliness and PTSD with fear of COVID-19 in men.

## Mediation Analysis

Table 5 displays the results of the proposed mediation model considering the whole sample. The total and direct effect of fear of COVID-19 on depression did not show significant results ( $\beta=0.097$ ,  $p=0.065$ , 95% CI  $[-0.006, 0.183]$  and  $\beta=-.009$ ,  $p=0.854$ , 95% CI  $[-0.096, 0.089]$ , respectively). With the introduction of generalized anxiety as a mediator, the indirect effect was significant ( $\beta=0.106$ ,  $p=0.002$ , 95% CI  $[0.044, 0.162]$ ), providing evidence of a fully mediated effect. PTSD had a significant direct relationship on depression ( $\beta=0.216$ ,  $p=0.032$ , 95% CI  $[0.001, 0.126]$ ) and the magnitude of its effect increased when generalized anxiety was included as a mediator ( $\beta=0.231$ ,  $p<0.001$ , 95% CI  $[0.043, 0.114]$ ). Generalized anxiety accounted for the 51.361% of the total effect of PTSD on depression ( $\beta=0.447$ ,  $p<0.001$ , 95% CI  $[0.102, 0.181]$ ). The association between loneliness and depression was also partially mediated by generalized anxiety, which explained the 52.469% of the total effect ( $\beta=0.210$ ,  $p<0.001$ , 95% CI  $[0.68, 0.210]$ ). As a matter of fact, it showed a significant direct ( $\beta=0.099$ ,  $p=0.038$ , 95% CI  $[0.001, 0.124]$ ) and indirect effect ( $\beta=0.110$ ,  $p=0.005$ , 95% CI  $[0.029, 0.130]$ ) on depression. Lastly, social interaction anxiety showed a significant direct effect on depression ( $\beta=0.142$ ,  $p=0.040$ , 95% CI  $[0.002, 0.133]$ ), whereas generalized anxiety did not act as a mediator ( $\beta=0.011$ ,  $p=0.762$ , 95% CI  $[-0.031, 0.040]$ ).

In addition, to test whether the proposed mediation model was invariant across gender, the associations among the selected variables were analysed separately for men and women.

**Table 3** Intercorrelations Between the Study Variables

Variable	1	2	3	4	5	6
1. FCV-19S	-					
2. UCLA-LS	0.21**	-				
3. GAD-7	0.46***	0.43***	-			
4. PHQ-9	0.35***	0.42***	0.72***	-		
5. SIAS	0.29***	0.47***	0.50***	0.55***	-	
6. IES-R	0.38***	0.26***	0.64***	0.64***	0.60***	-

Notes: \* $p<0.05$ , \*\* $p<0.01$ , \*\*\* $p<0.001$ .

Abbreviations: FCV-19S, Fear of COVID-19 Scale; GAD-7, Generalized Anxiety Disorder 7; PHQ-9, Patient Health Questionnaire 9; SIAS, Social Interaction Anxiety Scale; IES-R, Impact of Event Scale-Revised; UCLA-LS, UCLA Loneliness Scale.

**Table 4** Intercorrelations Between the Study Variables Disaggregated by Gender

	Male						Female					
Variable	1	2	3	4	5	6	1	2	3	4	5	6
1. FCV-19S	-						-					
2. UCLA-LS	0.14	-					0.23*	-				
3. GAD-7	0.30**	0.45**	-				0.47**	0.42**	-			
4. PHQ-9	0.22*	0.49**	0.71**	-			0.37**	0.71**	0.71**	-		
5. SIAS	0.28**	0.46**	0.56**	0.56**	-		0.26**	0.48**	0.56**	0.53**	-	
6. IES-R	0.13	0.26**	0.56**	0.67**	0.67**	-	0.47**	0.68**	0.66**	0.54**	0.54**	-

**Notes:** \* $p < 0.05$ . \*\* $p < 0.01$ . \*\*\* $p < 0.001$ .

**Abbreviations:** FCV-19S, Fear of COVID-19 Scale; GAD-7, Generalized Anxiety Disorder 7; PHQ-9, Patient Health Questionnaire 9; SIAS, Social Interaction Anxiety Scale; IES-R, Impact of Event Scale-Revised; UCLA-LS, UCLA Loneliness Scale.



**Table 5** Total, Direct, and Indirect Effects of the Hypothesized Mediation Model (Whole Sample)

			95% CI				
Effect	Estimate	SE	LL	UP	$\beta$	z	p
Indirect							
FCV-19S $\Rightarrow$ GAD-7 $\Rightarrow$ PHQ-9	0.098	0.031	0.044	0.162	0.106	3.169	0.002
UCLA-LS $\Rightarrow$ GAD-7 $\Rightarrow$ PHQ-9	0.073	0.026	0.029	0.130	0.110	2.805	0.005
SIAS $\Rightarrow$ GAD-7 $\Rightarrow$ PHQ-9	0.005	0.018	-0.031	0.040	0.011	0.303	0.762
IES-R $\Rightarrow$ GAD-7 $\Rightarrow$ PHQ-9	0.073	0.018	0.043	0.114	0.231	4.107	<0.001
Direct							
FCV-19S $\Rightarrow$ PHQ-9	-0.008	0.048	-0.096	0.089	-0.009	-0.185	0.854
UCLA-LS $\Rightarrow$ PHQ-9	0.065	0.032	0.001	0.124	0.099	2.071	0.038
SIAS $\Rightarrow$ PHQ-9	0.067	0.033	0.002	0.133	0.142	2.058	0.040
IES-R $\Rightarrow$ PHQ-9	0.068	0.032	0.001	0.126	0.216	2.146	0.032
Total							
FCV-19S $\Rightarrow$ PHQ-9	0.089	0.048	-0.006	0.183	0.097	1.844	0.065
UCLA-LS $\Rightarrow$ PHQ-9	0.139	0.036	0.068	0.210	0.210	3.863	<0.001
SIAS $\Rightarrow$ PHQ-9	0.072	0.031	0.012	0.133	0.154	2.335	0.020
IES-R $\Rightarrow$ PHQ-9	0.142	0.019	0.102	0.181	0.447	7.134	<0.001

**Abbreviations:** CI, confidence interval; LL, lower limit; UL, upper limit; FCV-19S, Fear of COVID-19 Scale; GAD-7, Generalized Anxiety Disorder 7; PHQ-9, Patient Health Questionnaire 9; SIAS, Social Interaction Anxiety Scale; IES-R, Impact of Event Scale- Revised; UCLA-LS, UCLA Loneliness Scale.

Regarding men, we found that general anxiety fully mediated the relationship between fear of COVID-19 and depression ( $\beta=0.096$ ,  $p=0.027$ , 95% CI [0.011, 0.197]); both loneliness and PTSD directly affected depression ( $\beta=0.175$ ,  $p=0.022$ , 95% CI [0.169, 0.217] and  $\beta=0.193$ ,  $p=0.036$ , 95% CI [0.004, 0.122], respectively), and the magnitude of their associations increased when generalized anxiety was introduced as a mediator ( $\beta=0.154$ ,  $p=0.003$ , 95% CI [0.036, 0.170] and  $\beta=0.191$ ,  $p=0.002$ , 95% CI [0.023, 0.102]). Lastly, social interaction anxiety was neither directly nor indirectly associated with depression ( $\beta=0.106$ ,  $p=0.275$ , 95% CI [-0.039, 0.140] and  $\beta=0.011$ ,  $p=0.847$ , 95% CI [-0.049, 0.060]).

As far as it concerns the mediation model tested for women, a fully mediation was evaluated in the association between fear of COVID-19 and depression ( $\beta=0.075$ ,  $p=0.027$ , 95% CI [0.007, 0.119]) and between loneliness and depression ( $\beta=0.092$ ,  $p=0.009$ , 95% CI [0.015, 0.102]); PTSD directly affected depression ( $\beta=0.256$ ,  $p=0.004$ , 95% CI [0.026, 0.132]) and by introducing general anxiety as a mediator, a stronger significant association was estimated ( $\beta=0.234$ ,  $p<0.001$ , 95% CI [0.038, 0.107]); social interaction reported a statistical direct effect on depression ( $\beta=0.158$ ,  $p=0.035$ , 95% CI [0.004, 0.141]), whereas generalized anxiety did not function as a mediator ( $\beta=0.014$ ,  $p=0.685$ , 95% CI [0.038, 0.107]). A more detailed description of the total, direct, and indirect effects of the selected variables on depression for men and for women are shown in Tables 6 and 7, respectively. The measurement models for the whole sample, men, and women are depicted in Figures 3–5, respectively; only significant paths are reported.

## Discussion

In December 2019, the new COVID-19 was first identified in China and then spread throughout the world. As a problematic and alarming perspective, Brooks et al<sup>43</sup> have recently highlighted that periods of isolation, even less than 10 days, may improve the psychiatric symptoms, also with long-term effects. Besides, many people did not have access to mental health services – although they were increased during the pandemic<sup>55</sup> – and consequently resorted to self-care,



**Table 6** Total, Direct, and Indirect Effects of the Hypothesized Mediation Model (Men)

			95% CI				
Effect	Estimate	SE	LL	UP	$\beta$	z	p
Indirect							
FCV-19S $\Rightarrow$ GAD-7 $\Rightarrow$ PHQ-9	0.104	0.047	0.011	0.197	0.096	2.208	0.027
UCLA-LS $\Rightarrow$ GAD-7 $\Rightarrow$ PHQ9	0.103	0.034	0.036	0.170	0.154	3.019	0.003
SIAS $\Rightarrow$ GAD-7 $\Rightarrow$ PHQ-9	0.005	0.028	-0.049	0.060	0.011	0.193	0.847
IES-R $\Rightarrow$ GAD-7 $\Rightarrow$ PHQ-9	0.063	0.020	0.023	0.102	0.191	3.096	0.002
Direct							
FCV-19S $\Rightarrow$ PHQ-9	0.001	0.073	-0.143	0.146	0.001	0.019	0.985
UCLA-LS $\Rightarrow$ PHQ-9	0.117	0.051	0.169	0.217	0.175	2.289	0.022
SIAS $\Rightarrow$ PHQ-9	0.050	0.046	-0.039	0.140	0.106	1.193	0.275
IES-R $\Rightarrow$ PHQ-9	0.063	0.030	0.004	0.122	0.193	2.097	0.036
Total							
FCV-19S $\Rightarrow$ PHQ-9	0.106	0.085	-0.060	0.272	0.097	1.251	0.211
UCLA-LS $\Rightarrow$ PHQ-9	0.220	0.057	0.109	0.332	0.328	3.873	<0.001
SIAS $\Rightarrow$ PHQ-9	0.055	0.054	-0.053	0.161	0.117	1.027	0.304
IES-R $\Rightarrow$ PHQ-9	0.123	0.033	0.060	0.191	0.383	3.767	<0.001

**Abbreviations:** CI, confidence interval; LL, lower limit; UL, upper limit; FCV-19S, Fear of COVID-19 Scale; GAD-7, Generalized Anxiety Disorder 7; PHQ-9, Patient Health Questionnaire 9; SIAS, Social Interaction Anxiety Scale; IES-R, Impact of Event Scale- Revised; UCLA-LS, UCLA Loneliness Scale.

self-medication, and self-help,<sup>28</sup> especially for psychiatric patients.<sup>66</sup> This study aimed to investigate people's psychological well-being (i.e., fear of COVID-19, loneliness, social interaction anxiety, generalized anxiety, PTSD, and depression) during the "second wave" of the COVID-19 pandemic.

According to our initial hypothesis (H1) and previous research,<sup>15,24,26–28</sup> our findings demonstrated that women had lower levels of psychological well-being in all the selected indicators, except for loneliness. As a viable interpretation, all people (both men and women) were affected by the same restrictive measures. In case of illness or contact with someone infected, the governments have indicated social isolation to better control the spread of the pandemic. Nevertheless, as demonstrated by previous studies, women had higher emotional expressivity than men, particularly for negative emotions;<sup>19</sup> for this reason, women might more likely recognize and declare their negative emotional experiences in self-report assessment. Additionally, some studies<sup>71,72</sup> highlighted that women experienced more psychological difficulties than men due to the schools' closures, resulting in higher domestic workload and less time for rest during COVID-19 period. The gender inequity could also be accentuated by a disproportion in responsibility for domestic duties, especially for childcare and eldercare, but also by the increase in domestic violence by the partner and a greater loss of women's jobs.<sup>72,73</sup> Based on these findings, on a practical level, it should be crucial to produce awareness-raising campaigns to generate awareness and prevent inequity.

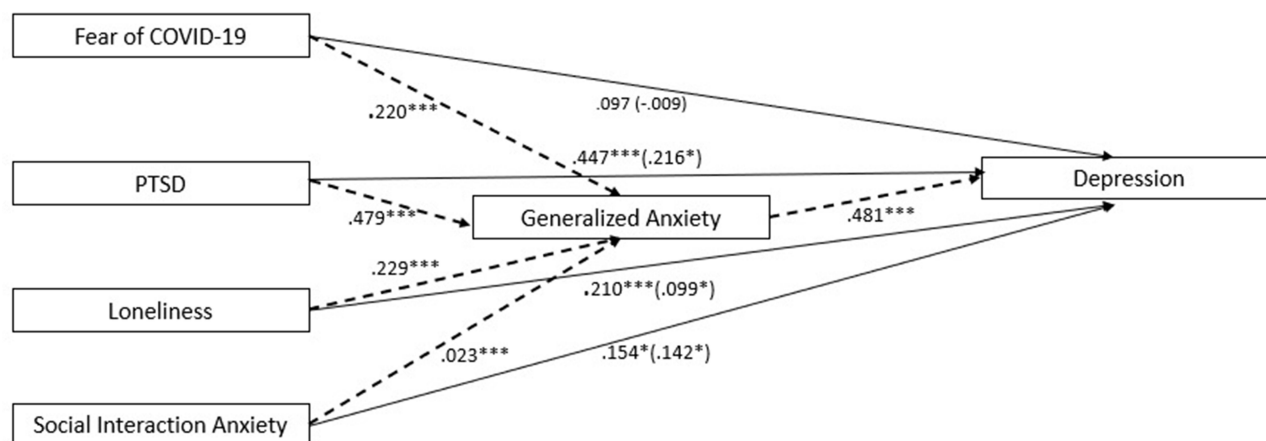
We also examined the relationship between all the study variables. According to our initial hypothesis (H2) and previous research,<sup>3,5,16,18,32,37–39,68</sup> our results showed a fairly good positive correlation between all of them. We also performed a correlation analysis disaggregated by gender to test whether the detected variables reported similar patterns of correlations. Except for the absence of correlation between loneliness and fear of COVID-19 and between PTSD and fear of COVID-19 (for men), all the relationships were positive and significant.

**Table 7** Total, Direct, and Indirect Effects of the Hypothesized Mediation Model (Women)

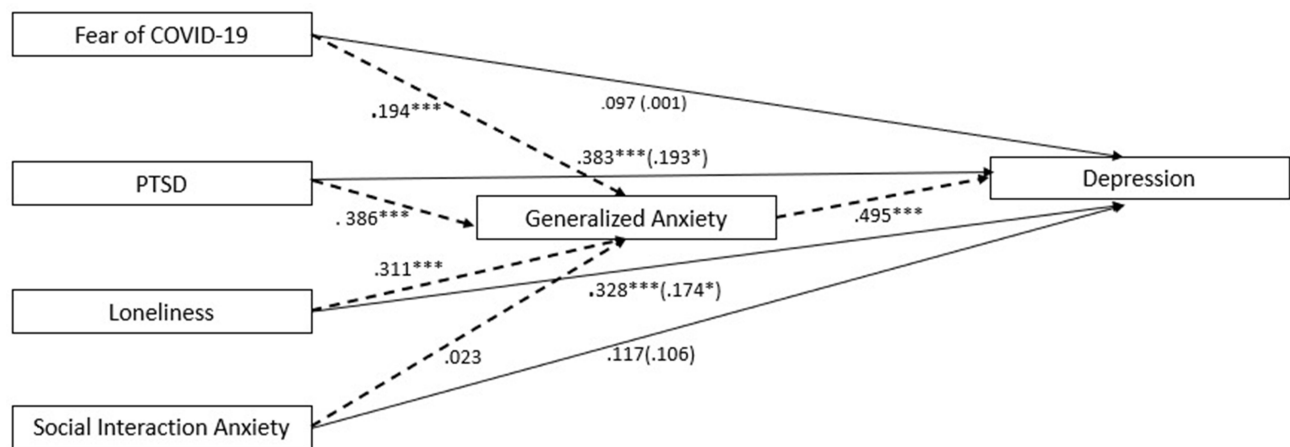
			95% CI				
Effect	Estimate	SE	LL	UP	$\beta$	z	p
Indirect							
FCV-19S $\Rightarrow$ GAD-7 $\Rightarrow$ PHQ-9	0.063	0.029	0.007	0.119	0.075	2.210	0.027
UCLA-LS $\Rightarrow$ GAD-7 $\Rightarrow$ PHQ9	0.059	0.022	0.015	0.102	0.092	2.628	0.009
SIAS $\Rightarrow$ GAD-7 $\Rightarrow$ PHQ-9	0.006	0.016	-0.025	0.038	0.014	0.406	0.685
IES-R $\Rightarrow$ GAD-7 $\Rightarrow$ PHQ-9	0.072	0.018	0.038	0.107	0.234	4.097	<0.001
Direct							
FCV-19S $\Rightarrow$ PHQ-9	-0.005	0.057	-0.118	0.107	-0.006	-0.095	0.924
UCLA-LS $\Rightarrow$ PHQ-9	0.034	0.043	-0.050	0.119	0.054	0.795	0.427
SIAS $\Rightarrow$ PHQ-9	0.073	0.035	0.004	0.141	0.158	2.104	0.035
IES-R $\Rightarrow$ PHQ-9	0.079	0.027	0.026	0.132	0.256	2.907	0.004
Total							
FCV-19S $\Rightarrow$ PHQ-9	0.058	0.062	-0.064	0.179	0.068	0.932	0.351
UCLA-LS $\Rightarrow$ PHQ-9	0.093	0.046	0.002	0.183	0.147	2.019	0.043
SIAS $\Rightarrow$ PHQ-9	0.079	0.038	0.004	0.154	0.172	2.074	0.038
IES-R $\Rightarrow$ PHQ-9	0.151	0.026	0.101	0.202	0.489	5.886	<0.001

**Abbreviations:** CI, confidence interval; LL, lower limit; UL, upper limit; FCV-19S, Fear of COVID-19 Scale; GAD-7, Generalized Anxiety Disorder 7; PHQ-9, Patient Health Questionnaire 9; SIAS, Social Interaction Anxiety Scale; IES-R, Impact of Event Scale- Revised; UCLA-LS, UCLA Loneliness Scale.

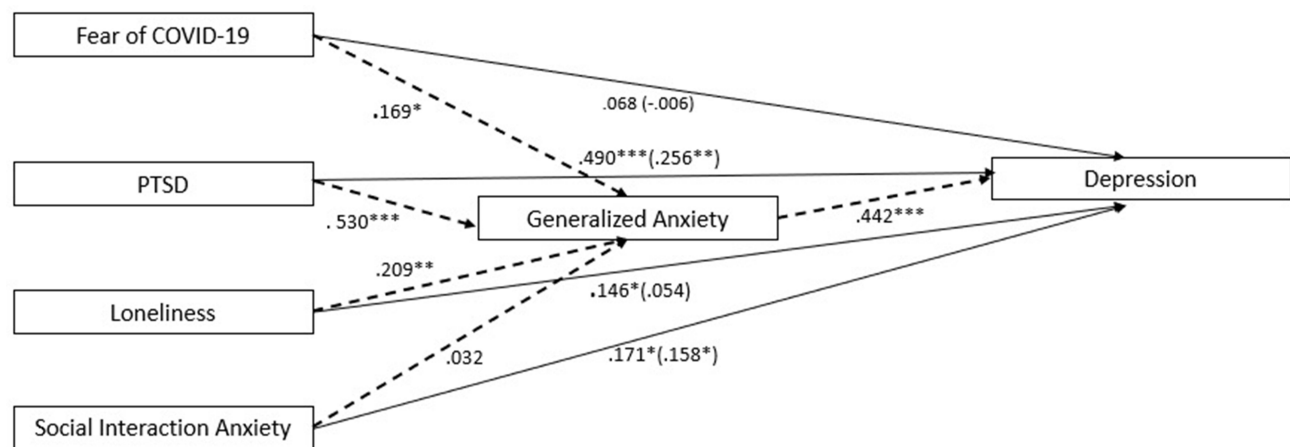
As a practical interpretation, the increase in infections, the incidence of severe symptoms, and the daily bulletin of deaths<sup>29</sup> may increase psychological symptoms such as fear, loneliness, social anxiety, generalized anxiety, depression, and PTSD in reciprocal escalation. Against this background, the psychological symptoms could be very heavy even in

**Figure 3** Measurement model testing the relationship between fear of COVID-19, PTSD, loneliness, and social interaction anxiety through generalized anxiety (whole sample).

**Notes:** Coefficients are standardized betas; dotted lines indicate components; solid lines indicate total and direct effects (direct effect are shown in parentheses). \* $p < 0.05$ ; \*\*\* $p < 0.001$ .



**Figure 4** Measurement model testing the relationship between fear of COVID-19, PTSD, loneliness, and social interaction anxiety through generalized anxiety (men).  
**Notes:** Coefficients are standardized betas; dotted lines indicate components; solid lines indicate total and direct effects (direct effect are shown in parentheses). \* $p < 0.05$ ; \*\*\* $p < 0.001$ .



**Figure 5** Measurement model testing the relationship between fear of COVID-19, PTSD, loneliness, and social interaction anxiety through generalized anxiety (women).  
**Notes:** Coefficients are standardized betas; dotted lines indicate components; solid lines indicate total and direct effects (direct effect are shown in parentheses). \* $p < 0.05$ ; \*\*\* $p < 0.001$ .

the long term. As such, further studies should deepen any other indicator of psychological well-being connected with restrictive measures to contain psychological problems during and after the COVID-19 pandemic.

Lastly, we proposed a mediation model to explain the relationships among the detected variables (see Figure 1). Our findings supported our initial hypothesis (H3) and were consistent with many studies related to the pandemic experience.<sup>3,5,14,16–18,28,32,37–40,67</sup> We found a fully mediated effect of generalized anxiety when considering the association between fear of COVID-19 and depression, but not a direct effect. Based on our results and previous research,<sup>3,32</sup> the fear of COVID-19 alone is not enough to determine the depression symptoms. Experiencing lockdown and anxiety toward any forms of possible contamination could exacerbate fear of COVID-19 and consequently generalized anxiety. As a viable interpretation, this state of fear and anxiety together could result in depressive symptoms; these last could be secondary symptoms after the negative emotions. We also found a significant direct effect of PTSD on depression, and this association had a greater magnitude effect when we introduced generalized anxiety as a mediator. PTSD appears after traumatic experiences (e.g., actual or threatened death), such as pandemic COVID-19,<sup>41</sup> and it is characterized by typical symptoms including negative emotions.<sup>70</sup> As a possible explanation, the specific characteristics of the COVID-19 pandemic – especially the worry about contagion, which causes fear for

one's own and others' health – could lead to depressive feelings of helplessness.<sup>3,28</sup> Generalized anxiety could intensify this relationship through constant perception, and excessive tension may be exacerbated by personal characteristics.<sup>33</sup> Moreover, our results highlighted that the association between loneliness and depression had a direct effect, but it was partially mediated by generalized anxiety. Our findings were in line with previous studies<sup>68,70</sup> that showed a strong predictive association of loneliness on depression. In view of the foregoing, isolation imposed by legislative measures could be extremely unbearable. Thus, the introduction of generalized anxiety as a mediator could distance people from other people and places, by increasing frustration, low mood, and asthenia.

Lastly, social interaction anxiety had a direct effect on depression without mediation of generalized anxiety. As a possible interpretation, social interaction anxiety could play a role specifically connected to the COVID-19 pandemic. Indeed, the contagion occurs through direct contact with an infectious person (governments suggest staying at one meter away from each other).<sup>40</sup> In such conditions, social interaction anxiety would be enough to cause unhappiness and sadness, without the occurrence of generalized anxiety as a mediator.

When inspecting the hypothesized mediation model separately for men and women, no substantial differences were estimated, providing additional support to the role of general anxiety in modulating the relationship between the set of observed psychological variables and depressive symptoms. It means that, regardless of gender, general anxiety may fully or partly explain the development of depressive symptoms during the pandemic. From this perspective, it is likely that these ongoing conditions (e.g., uncertainty, unpredictability, continuous changes) may primarily increase general anxiety in individuals, who constantly receive several – and somewhat contradictory – information about the COVID-19 and its transmissibility. From this point of view, as stated by previous research,<sup>74</sup> improving public awareness of the COVID-19, through the diffusion of clear, timely, and complete messages, might prevent the spread of anxious symptoms. Accordingly, it would be desirable that governments and public policies would pay attention to the communication strategies during a global health crisis. Likewise, specific programs should be implemented to improve people's skill in handling their own anxious symptoms arising in similar circumstances. Our findings are in line with previous studies<sup>75</sup> that confirmed the presence of clinically significant symptoms even after the early stages of the pandemic. Further research should enhance a longitudinal approach and it should also pay attention to the vaccines' implications on anxiety and depression in Italian population: the acceptance to the COVID-19 vaccines could be different for general and psychiatric population.<sup>76</sup>

In conclusion, fear of COVID-19, PTSD, loneliness, and social interaction anxiety had an impact on depression, and generalized anxiety was a significant mediator in these relationships. The pandemic experience (eg, social distancing, isolation, increased contagion) seemed very debilitating for people's mental health. Further research should deepen further mental health indicators to better handle psychological disturbances also in long-term.

## Limitation

Our study has some critical limitations that require further investigation. First, we used an online survey procedure for collecting data. Therefore, it was not possible to check whether the testing conditions were optimal, but restrictive measures did not allow any other option. Also, we could not obtain balanced categories referring to the different risks of contagion, thus preventing additional related analyses. Further, we did not calculate the minimum required sample size for conducting our analyses prior to data collection. Moreover, the sample size is small relative to the number of variables included in the mediation model. Future research should replicate it with a larger sample. Lastly, the cross-sectional nature of the data did not help us to determine cause and effect associations. As a matter of fact, the applied data analyses could not address the temporal relationships among the measured variables for the identification of potential causal factors.

## Conclusion

Despite the limitations, our outcomes may expand the knowledge about the psychological well-being during the pandemic experience, with a focus on the specific role of generalized anxiety, thus guiding future research and clinical practice toward a better understanding of the psychological processes involved in similar circumstances. On a theoretical level, our findings, and especially those related to the role of generalized anxiety in modulating depressive symptoms,

may offer a deeper knowledge of the psychological mechanisms implicated when people experience negative events, also providing the basis for a longitudinal understanding of psychological well-being during potentially different COVID-19 “waves”. On a practical level, understanding how people react to a stressful event such a pandemic could facilitate clinical work on mental health also to prevent eventual long-term symptoms. The online psychotherapy, such as the cognitive behavior therapy, could offer an online setting to help individuals to counteract the pandemic psychological effects, by respecting the restrictive measures and social-distancing.<sup>77–79</sup>

## Disclosure

The authors declared no potential conflicts of interest concerning to the research, authorship, and/or publication of this article.

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