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Effects of the Coronavirus pandemic on mental health: a possible model of the direct and indirect impact of the pandemic on PTSD symptomatology COVID-19 related

Renata Tambelli[a], Giuseppe Forte[b], Francesca Favieri[a], Maria Casagrande[a]

[a]*Department of Dynamic and Clinical Psychology, and Health Studies, Sapienza University of Rome, Rome, Italy*
[b]*Department of Psychology, Sapienza University of Rome, Rome, Italy*

Article info

Abstract

The COVID-19 pandemic had a severe impact on the worldwide population in the last year, affecting psychological well-being. Several studies defined that COVID-19 diagnosis, the fear of contagion, and the infection in loved ones directly affected psychological distress and PTSD symptomatology. However, no study underlined the mediation role of psychological aspects in this relation. This study aimed to assess the direct and indirect consequences of some common aspects of the COVID-19 spread on PTSD symptomatology due to the pandemic. According to this aim, we adopted a mediation analysis involving anxiety, depression, sleep disturbance, general psychological well-being, and psychopathological symptomatology.

Two thousand two hundred and nineteen-one respondents completed an online survey focused on the experience with the COVID-19 pandemic. Different questionnaires assessing sleep quality, anxiety, depression, psychological well-being, and general psychopathology were administered. COVID-19-PTSD was evaluated. A mediation analysis was conducted to estimate the possible direct and indirect effects of the considered variables COVID-19 related to PTSD symptoms.

Statistical analysis evidenced a direct effect of the dimension ascribable to the pandemic (COVID-19 diagnosis, the fear of the contagion, and the diagnosis of COVID-19 in loved ones). Moreover, a total indirect effect of COVID-19 diagnosis and fear of contagion emerged. In particular, the fear of contagion was significantly mediated by psychological well-being, sleep disturbance, psychopathological symptomatology, and anxiety. Furthermore, the COVID-19 diagnosis was significantly mediated by general psychological well-being and psychopathological symptomatology. Although no significant general indirect effect of sleep quality was highlighted, sleep disturbance was reported as a possible mediator of the relationship between the diagnosis of COVID-19 in loved ones and PTSD symptomatology.

This study confirmed the possible mediating role of some psychological aspects in the relationship between some aspects directly associated with the diffusion of the COVID-19 pandemic and the PTSD symptomatology, specifically referred to COVID-19 as a traumatic event. These findings should be adopted as a starting point for further studies aimed to develop psychological interventions to minimize the long-term consequences of the COVID-19 pandemic.

Keywords: COVID-19 pandemic; Post-Traumatic Stress Disorder; PTSD; Well-being, Anxiety.

*Corresponding author.
Renata Tambelli
Department of Dynamic and Clinical
Psychology, and Health Studies
Sapienza University of Rome
Via degli Apuli, 1, 00185, Rome, Italy
Phone: + 39 0649917638
E-mail: renata.tambelli@uniroma1.it
(R. Tambelli)

Introduction

Since the Coronavirus (COVID-19) was first identified (World Health Organization, 2020), it has been over a year. By early 2021, a large slice of the world population was infected by the virus (more than 10%), and most of the countries adopted stringent measures to contain the infections (WHO, 2021). During the overall period of virus diffusion, worldwide habits have profoundly changed. Substantially, the spread (Mattioli et al., 2020; Garre-Olmo et al., 2021) and fear of contagion (Ahorsu et al., 2020), as well as the infection of COVID-19 in loved ones (Casagrande et al., 2020; Forte et al., 2020b; Chew et al., 2020) generated concerns in the general population profoundly, with consequences on mental health. In fact, many studies documented increased levels of anxiety (Lee, 2020; Lee et al., 2020b), perceived threat (Conway et al., 2020), stress (Taylor et al., 2020), psychopathological symptomatology (Forte et al., 2020a; Favieri et al., 2020), sleep disturbance (e.g., Casagrande et al., 2020; Casagrande et al., 2021), and post-traumatic symptomatology in both at-risk populations (e.g., health care professionals, Blekas et al., 2020; Caramassi et al., 2020) and in the general population (e.g., Forte et al., 2020b; Casagrande et al., 2020; Liu et al., 2020; Tang et al., 2020).

Early findings from all over the world suggested that more than one-quarter of the general population have experienced moderate to severe levels of post-traumatic stress symptoms, general distress, anxiety, and suicidality ascribable to epidemic-related events (Chong et al., 2004; Wheaton et al., 2012; Wu et al., 2009; Yip et al., 2010; Qiu et al., 2020; Wang et al., 2020). The traumatic role of the pandemic impacted the individuals' quality of life and psychological well-being (Casagrande et al., 2020; 2021; Forte et al., 2020a; 2020b; Favieri et al., 2020). These effects were ascribed to the sudden and unexpected outbreak of the virus and the different measures taken to counteract the spread of the virus (e.g., social distancing, quarantine measures, WHO, 2021). At the current stage of the pandemic, to understand not only the direct contribution of COVID-19 spread on post-traumatic symptomatology (i.e., fear of the infection, the effect of the infection on personal health and of the loved ones) but also the mediator role of the psychological conditions that have been demonstrated to be associated with the pandemic appears relevant from a clinical point of view. Recent studies and reviews have identified some vulnerability factors associated with the virus spread that constitute a health risk for individuals, such as anxiety, depression, sleep disturbance, psychological well-being (Brooks et al., 2020; Hossain et al., 2020). According to these findings, this study was aimed at understanding the mediating role of these vulnerability factors in determining the relationship between COVID-19 related aspects (i.e., fear of the infection, the effect of the infection on personal health, and the consequences of the infection of the loved ones) and post-traumatic symptomatology COVID-19 related.

Material and Methods

Study design and participants

A web-based cross-sectional survey, broadcasted through different platforms and mainstream social media between March and April 2020, collected data from the general Italian population (minimum age of 18 years). Participation in the study was voluntary, and electronic informed consent was requested from each participant. To guarantee anonymity, no identification data was collected. Demographic and COVID-19 related information were collected through an ad-hoc questionnaire. General psychological well-being, psychopathological symptomatology, sleep disturbances, and COVID-19 PTSD symptomatology were assessed through standardized questionnaires. The survey lasted about 30 minutes, and all the data from respondents who completed the survey in less than 20 min were excluded (Casagrande et al., 2020). Ninety-eight percent of the total respondents (2.291 participants out of 2.332) completed the survey and were considered for the statistical analyses.

Outcomes

Demographic information: to collect data on gender, age, education, occupation, and region of origin, a questionnaire including demographic questions was administered.

Covid-19 Related Information: A section aimed at evaluating the personal experience with COVID-19 infection was included. Specifically, the respondents indicated the presence of COVID-19 diagnosis (options: 0= "no"; 1= "I don't know"; 2= "yes"), the fear of contagion due to the contact of people with COVID-19 infection (0= "no"; 1= "I don't know"; 2= "yes"), and the diagnosis of COVID-19 in loved ones (0= "no"; 1= "yes").

COVID-19 PTSD related symptoms: the Post-Traumatic Stress Disorder related to COVID-19 (COVID-19-PTSD; Forte et al., 2020a) was adopted. The questionnaire includes 19 items structured on a 5-point Likert scale (from 0= not at all to 4= extremely), assessing the direct effect of the COVID-19 pandemic on PTSD symptomatology. The cut-off score of 26 indicates a high risk of PTSD occurrence, with a sensitivity of 0.91, a specificity of 0.92, and a Cronbach's α of 94.

Psychological Variables

Psychological Well-Being: the Psychological General Well-Being questionnaire *(PGWB)* was adopted (Dupuy, 1984). The questionnaire consists of 22 items (6-point Likert scale) assessing six dimensions: Anxiety, Depressed mood, Positive well-being, Self-control, General health, and Vitality, and a global score of well-being. Higher scores indicating greater well-being and lower distress. To verify the hypothesis of the study, the subscales of Anxiety and Depression and the Global score of well-being were considered. An adequate internal consistency of the questionnaire was reported (alpha value higher than 0.74)

Psychopathological symptomatology: the Symptom Checklist-90 (SCL-90; Derogatis & Cleary, 1977; Derogatis, 1997) was administered. The items are on a 5-point Likert scale, ranging from "not at all" (0) to "extremely" (4). The SCL-90 includes nine scales, evaluating Somatization, Obsessive-Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Anger-Hostility, Phobic Anxiety, Paranoid Ideation,

and Psychoticism were evaluated. According to the aim of the study, the Global Severity Index (GSI), providing measures of the overall psychological distress, was adopted. Higher scores indicate greater distress and psychopathological symptomatology. Internal consistency of SCL-90 was good for all subscales (α values ranging between 0.70 and 0.96).

Sleep Quality: sleep characteristics have been assessed through the *Pittsburgh Sleep Quality Index (PSQI;* Buysse et al., 1989; Curcio et al., 2013), an 18-item questionnaire used to measure sleep quality and sleep disturbance. The global score, indicating general sleep quality/sleep disturbance, was adopted in the study. Higher scores indicate lower poor sleep quality. The tool reported high internal consistency (Cronbach's α = 0.835).

Statistical Analysis

Descriptive statistics of the variables are reported. A mediation analysis was conducted considering: (1) age and gender as background confounder variables; (2) the COVID-19 diagnosis, fear of the contagion, and the diagnosis of COVID-19 in loved ones as predictors; (3) the psychological variables (anxiety, depression, general psychological well-being, sleep disturbance, psychopathological symptomatology) as mediators; (4) the PTSD symptomatology COVID-19 related as the outcome. The robust maximum likelihood estimator (MRL) was adopted as a parameters estimator. Both total and independent direct and indirect effects were evaluated. Parameters were estimated considering a confidence interval (CI) of 95%. Finally, to test the association between variables, Pearson's r correlations were adopted.

Results

Demographic characteristics

Some characteristics of the respondents are reported in Table 1. The more specific information of participants can be found in previous studies (see Casagrande et al., 2020; Favieri et al., 2020; Forte et al., 2020a; 2020b).

Tab. 1. Demographic characteristics of the sample

	Total Sample (N= 2.286)
Sex, n (%)	
Man	580 (25.4)
Woman	1706 (74.6)
Age, n (%)	
18-29 years old	1568 (68.6)
30-49 years old	485 (21.2)
>50 years old	233 (10.2)
Education, n (%)	
Until middle School	97 (4.2)

	Total Sample (N= 2.286)
High School	1135 (49.6)
Undergraduate	
Health care	246 (10.8)
Other	658 (28.8)
Post-graduated	
Health care	63 (2.8)
Other	87 (3.8)
Occupation, n (%)	
Student	1071 (46.8)
Employed	687 (30.1)
Unemployed	278 (12.2)
Self-Employed	222 (9.7)
Retired	28 (1.22)
Territorial Areas	
North Italy	540 (23.6)
Centre Italy	571 (25.0)
South Italy	1175 (51.4)
Number of inhabitants in own city, n (%)	
< 2.000	124 (5.4)
2.000-10.000	451 (19.7)
10.000-100.000	936 (50.0)
> 100.000	775 (33.9)
Quarantine Experience, n (%)	
Alone	2054 (89.9)
Others	232 (10.1)
Infection by the virus	
Yes	9 (0.4)
No	1703 (74.5)
Do not know	574 (25.1)
Direct contact with people infected by COVID-19	
Yes	40 (1.7)
No	1438 (63.0)
Do not know	808 (35.3)
Knowledge of people infected by COVID-19	
Yes	549 (24.0)
No	1737 (76.0)
Knowledge of people in ICU for COVID-19	
Yes	177 (7.7)
No	2109 (92.3)
Knowledge of people died for COVID-19	
Yes	112 (4.9)
No	2174 (95.1)

Note. ICU: Intensive Care Unit

Mediation analysis

The mediation analysis, adjusted for gender and age, underlined a direct effect of COVID-19 diagnosis (estimate: 1.43; 95 % CI[0.59, 2.26]; p< 0.001), the fear of the contagion (estimate: 1.77; 95 % CI[0.010, 1.54]; p< 0.05), and the diagnosis of COVID-19 in loved ones (estimate: -0.94; 95 % CI[- 1.85, -0.04]; p< 0.05) on COVID-19-PTSD symptomatology (see Table 2).

Considering the total indirect effects of the COVID-19 variables, via psychological dimensions, the COVID-19 diagnosis (estimate: 1.40; 95 % CI[0.06, 2.74]; p< 0.05) and the fear of the contagion (estimate: 1.47; 95 % CI[0.31, 2.62]; p< 0.01) affected the COVID-19-PTSD symptomatology through the significant mediation of the overall psychological dimensions considered. However, this results was not confirmed for the diagnosis of COVID-19 in loved ones (estimate: 0.79; 95 % CI[- 0.45, 2.03]; p= 0.21) (see Table 3).

Specifically, considering all psychological variables, the effect of the COVID-19 diagnosis on PTSD symptomatology was mediated by the general psychological well-being (estimate: 0.29; 95 % CI[0.01, 0.57]; p< 0.05) and the psychopathological symptomatology (estimate: 0.84; 95 % CI[0.16, 1.52]; p< 0.01). The effect of fear of the contagion was mediated by general psychological well-being (estimate: 0.26; 95 % CI[0.02, 0.51]; p< 0.05), sleep disturbance (estimate: 0.14; 95 % CI[0.01, 0.26]; p< 0.05), psychopathological symptomatology (estimate:

0.53; 95 % CI[0.04, 1.12]; p< 0.05) and anxiety (estimate: 0.55; 95 % CI[0.15, 0.94]; p< 0.01). The diagnosis of COVID-19 in loved ones affected COVID-19-PTSD symptomatology through the mediation role of sleep disturbance (estimate: 0.14; 95 % CI[0.003, 0.30]; p< 0.05) (see Table 4).

Tab. 2. Direct effects of COVID-19 related variables to COVID-19-PTSD

			Estimate	Std. Error	z-value	p<
COVID-19 diagnosis	→	COVID-19-PTSD	-0.94	0.46	-2.05	0.04
Fear of Infection	→	COVID-19-PTSD	0.77	0.40	1.94	0.04
Diagnosis if COVID-19 in loved ones	→	COVID-19-PTSD	1.43	0.43	3.35	0.001

Tab. 3. Total indirect effects of COVID-19 related variables to COVID-19-PTSD

			Estimate	Std. Error	z-value	p
COVID-19 diagnosis	→	COVID-19-PTSD	1.40	0.68	2.05	0.04
Fear of Infection	→	COVID-19-PTSD	1.47	0.59	2.50	0.01
Diagnosis of COVID-19 in loved ones	→	COVID-19-PTSD	0.79	0.63	1.25	0.21

Tab. 4. Indirect effects of COVID-19 related variables to COVID-19-PTSD

	Estimate	Std.Err	z-value	p
COVID-19 diagnosis → Anxiety → COVID-19-PTSD	0.23	0.23	0.99	0.32
COVID-19 diagnosis → Depression → COVID-19-PTSD	0.01	0.02	-0.49	0.62
COVID-19 diagnosis → PGWB → COVID-19-PTSD	0.30	0.14	2.06	0.04
COVID-19 diagnosis → Global PSQI → COVID-19-PTSD	0.05	0.08	0.61	0.54
COVID-19 diagnosis → SCL Global → COVID-19-PTSD	0.84	0.35	2.42	0.01
Fear of Infection → Anxiety → COVID-19-PTSD	0.55	0.20	2.70	0.01
Fear of Infection → Depression → COVID-19-PTSD	0.01	0.01	-0.41	0.68
Fear of Infection → PGWB → COVID-19-PTSD	0.27	0.13	2.13	0.03
Fear of Infection → Global PSQI → COVID-19-PTSD	0.13	0.07	1.74	0.08
Fear of Infection → SCL Global → COVID-19-PTSD	0.54	0.30	1.80	0.07
Diagnosis if COVID-19 in loved ones → Anxiety → COVID-19-PTSD	0.12	0.21	0.56	0.57
Diagnosis if COVID-19 in loved ones → Depression → COVID-19-PTSD	0.01	0.02	-0.49	0.62
Diagnosis if COVID-19 in loved ones → PGWB → COVID-19-PTSD	0.11	0.12	0.89	0.37
Diagnosis if COVID-19 in loved ones → Global PSQI → COVID-19-PTSD	0.15	0.08	1.92	0.04
Diagnosis if COVID-19 in loved ones → SCL Global → COVID-19-PTSD	0.43	0.32	1.33	0.18

Note. Abbreviations: PGWB: Psychological General Well-Being questionnaire; PSQI: Pittsburgh Sleep Quality Index; SCL: Symptom Checklist.

Figure 1 reports the path diagram.

Fig. 1. Path Model
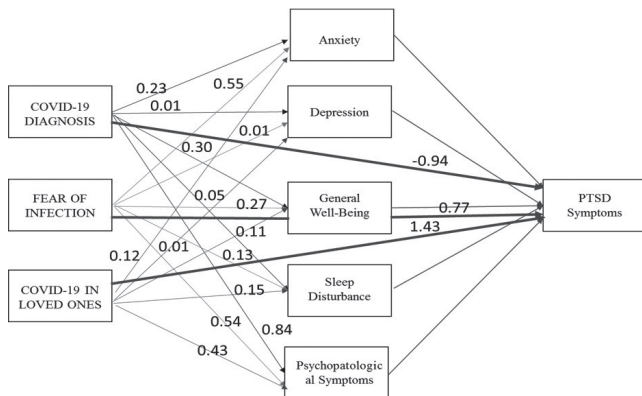
Correlations

All the psychological variables were significantly correlated with the COVID-19-PTSD score (see Table 5).

Discussion

The main aim of this study was to evaluate whether some COVID-19 related aspects (i.e., fear of the infection, the effect of the infection on personal health and of the loved ones) could represent possible determinants of post-traumatic symptomatology directly or indirectly through the mediating role of some vulnerability psychological aspects. Previous findings showed the serious effects of the COVID-19 pandemic on mental health. Generally, higher levels of anxiety, fear, distress, psychosomatic symptoms, sleep disorders were reported (for a review: Xiong et al., 2020; Kontoangelos et al., 2020) in the first weeks of the virus outbreak, and the consequent lockdown adopted to counteract it (Casagrande et al., 2020; 2021; Forte et al., 2020a; 2020b; Favieri et al.,

2020; Forte et al., 2020; Casagrande et al., 2020). In this period, many studies focused on post-traumatic symptoms because such a long-lasting pandemic has been considered a real traumatic event, given its potentially deadly effects, the rapid rate of transmission of the infection, the numerous hospitalizations in intensive care, the numerous deaths, but also the sudden and radical change in lifestyles, including the limitations on individual freedom introduced with the lockdown. PTSD symptomatology was evaluated in previous outbreaks of serious infectious diseases, with percentages of prevalence ranging from 4 to 41% (Torales et al., 2020). Tagliabue and colleagues (2021) underlined post-traumatic stress syndrome associated with the COVID-19 pandemic characterized by anxiety, sleep disturbances, distress, and a drop in the tone of the mood, with a decrease of positive mood and an increase of sadness or boredom. Accordingly, Chang and Park (2020) found that PTSD was prevalent in 20.3% of patients infected by COVID-19 who were discharged after a full recovery following medical treatment. Liu et al. (2020) reported that the prevalence of PTSD in young adults aged 18–30 years in the United States (US) was 31.8% (Liu et al., 2020). Our previous study reported a prevalence of PTSD symptomatology of 29.5% in the general Italian population (Forte et al., 2020a). The most striking of these disorders is the high percentage of PTSD symptoms. However, no study clarifies how much this disorder was a direct consequence of people's traumatic experiences in the COVID-19 pandemic or how much it was mediated by the worsening of some psychological conditions associated with the current pandemic.

For the first time, this study highlighted the possible mediating role of certain psychological variables in determining the severity of PTSD symptomatology associated with the perception of some consequences of the pandemic. Fear of contagion is one of the aspects primarily affected by the diffusion of the virus in the general population and specific at-risk groups (e.g., nurses, doctors) reported high levels of fear, anxiety, and stress associated with the pandemic experience (e.g., Blanco-Donoso et al., 2021; Lorente et al., 2021; Casagrande et al., 2020; Casagrande et al., 2021). This

Tab. 5. Pearson's r correlations among psychological variables and COVID-19-PTSD

Variable	COVID-19-PTSD	2.	3.	4.	5.	6.	7.	8.	9.	10.
2. Anxiety	-0.76*	—								
3. Depression	-0.66*	0.71*	—							
4. Positive well-being	-0.60*	0.68*	0.69*	—						
5. Control	-0.64*	0.67*	0.67*	0.67*	—					
6. General Health	-0.56*	0.57*	0.49*	0.46*	0.49*	—				
7. Vitality	-0.62*	0.66*	0.67*	0.74*	0.64*	0.53*	—			
8. General Well Being	-0.78*	0.90*	0.84*	0.86*	0.82*	0.68*	0.86*	—		
9. Global PSQI	0.53*	-0.49*	-0.43*	-0.42*	-0.41*	-0.41*	-0.54*	-0.55*	—	
10. SCL Global	0.78*	-0.70*	-0.70*	-0.58*	-0.68*	-0.56*	-0.64*	-0.77*	0.51*	—

Note: * p< .001.

study confirms how fear directly influences PTSD symptoms. Moreover, the mediation analysis showed the influence of psychological conditions in this relationship. (i.e., anxiety, sleep disorders, psychopathological symptomatology, and general psychological well-being). Previous evidence showed that these psychological dimensions are directly influenced by fear of infection (Casagrande et al., 2020; Forte et al., 2020b; Favieri et al., 2020). However, this is the first study to hypothesize a more complex relationship by identifying the psychological conditions as mediators of PTSD symptoms. On a behavioral level, fear of contagion, on the one hand, could influence PTSD due to exposure to a highly traumatic event (i.e., the pandemic and the rules adopted to counteract it), and on the other could affect the intra-individual aspects of the individuals, such as the psychological dimensions exponentially increasing the possibility of developing PTSD symptoms. This complex condition might indicate that all psychological treatments aimed at reducing distress symptoms associated with fear of the pandemic should also be associated with interventions directly aimed at counteracting the psychological conditions that mediate this relationship. This recommendation is prospectively relevant given the high portion of the world's population that will develop psychological distress and worse their mental health condition in the coming years. An aspect that should be highlighted is that the current study does not allow us to verify whether these psychological diseases were present before the virus spread or were exacerbated in conjunction with this traumatic event because we do not have information about the psychological state of the respondents before the emergency periods. However, the higher percentages of psychological diseases and sleep disorders recorded during the lockdown compared to normative data (see Casagrande et al., 2020; Favieri et al., 2020; Forte et al., 2020a) suggest attributing these diseases to the current pandemic.

Another frequently investigated aspect of the spread of COVID-19 is the diagnosis of contagion. Here, two deleterious effects can be highlighted in the short and long terms: the medical and physiological effects of the COVID-19 disease and the uncertainty regarding overcoming these symptoms and the prognosis. In this study, regarding effective contagion, an interesting result emerges. Although a low percentage of participants had a confirmed diagnosis of COVID-19, it appears that is not so much the claimed diagnosis, but rather the uncertainty about a possible infection, or the knowledge of never being infected and being still subject to the risk of contracting the coronavirus in the future to influence the PTSD symptoms negatively. In a condition of an exponential spread of the virus, certain psychological conditions, such as anxiety, can generate fear and increase the risk of post-traumatic symptomatology also in persons who have not contracted the virus. Our study seems to confirm this result, highlighting a mediating role between the presence or absence of an established diagnosis of COVID-19 and PTSD that includes general psychological well-being and psychopathological symptomatology. Indeed, this result would confirm how fear is associated with general symptomatology rather than specific behavioral alterations (such as sleep disturbance), as evidenced in the relationship between fear of infection and PTSD.

The least investigated aspect related to COVID-19 is the infection of COVID-19 in loved ones. In this case, a different pattern emerged. This variable had a direct effect on PTSD symptomatology, without a mediating role of the psychological conditions. This result could be due to the concern for the health of a loved one (e.g., children, parents, siblings, partners) is so strong that it is irrespective of any compromises in psychological well-being. However, there is an influence on the sleep quality, highlighting how particularly disabling situations (e.g., disturbed sleep) can amplify PTSD symptoms. Consequently, psychological treatment should consider the importance of restoring optimal sleep quality.

Finally, it is interesting to note that although PTSD symptoms correlate with all psychological variables, indicating that worse psychological conditions assessed by the tests are associated with higher PTSD symptoms, only some of these variables mediate the relationship with aspects associated with the COVID-19 experience.

Surely, the current study has a few limitations. First, the sample includes most women and young people. Future studies should include more homogeneous populations (e.g., a greater number of males or more adult respondents or a greater percentage of workers) to deepen the risk factors for PTSD in the general population. Second, the time of data collection did not allow clearly define a PTSD diagnosis but rather the presence of symptoms that may be associated with PTSD and that need attention over time. In fact, it is well known that the diagnosis of PTSD is possible when a consolidation of these symptoms even six months after the traumatic event is reported. To verify this trend, longitudinal studies and studies carried out one year after the pandemic, are important. Third, other variables associated with mental health (e.g., general anxiety, impulsivity, behavioral alteration) were not evaluated. Accordingly, further studies involving various psychological evaluation tools are necessary to investigate mental health status. Finally, several variables that could be potential risk factors for PTSD, such as a history of mental illness, risk perception, personal characteristics, and social support, were not investigated in the present study. Further studies are needed in order to overcome these limitations.

Conclusions

This study highlights the importance of possible psychological treatments in order to blunt the direct effects of the pandemic on possible psychopathological symptoms. Since it is known that exposure to a traumatic event will have long-term consequences, the results of this study highlight the necessity to treat, in altered situations characterized by high individual vulnerability, mental health that mediates the relationship and the onset of more severe consequences such as the PTSD which is more difficult to eradicate. The onset of PTSD restricts patients from living normally and could precipitate mental disorders such as depression, psychoses, and alcohol addiction (Mitchell & Wolf, 2016; Mueser et al., 2002). Thus, clinicians should be aware of the possibility of PTSD among COVID-19 patients and provide appropriate treatment to individuals who have relevant

symptoms, considering both the aspects directly associated with the pandemic event (infection, COVID diagnosis, concern for loved ones) and the psychological characteristics of the individual. This year, the worldwide population learned to accept different norms and social, economic, working, and interpersonal conditions. However, if interpreted correctly, these new lifestyles will allow the recovery of a better psychological condition and quality of sleep. For these reasons, health professionals must focus as much on the pandemic event itself as the general population's personal aspects. An integrated approach focusing on mental state and psychological health will improve the population's resilience and face the difficulties that persist and still need to be addressed in the future.

Author Contributions
The authors contributed equally to this manuscript.

Compliance with Ethical Standards

Conflict of interest
The authors declare that they have no competing interests.

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References

Blanco-Donoso, L. M., Moreno-Jiménez, J., Amutio, A., Gallego-Alberto, L., Moreno-Jiménez, B., & Garrosa, E. (2021). Stressors, job resources, fear of contagion, and secondary traumatic stress among nursing home workers in face of the COVID-19: the case of Spain. *Journal of Applied Gerontology*, *40*(3), 244-256. doi.org/10.1177/0733464820964153

Blekas, A., Voitsidis, P., Athanasiadou, M., Parlapani, E., Chatzigeorgiou, A. F., Skoupra, M., ... & Diakogiannis, I. (2020). COVID-19: PTSD symptoms in Greek health care professionals. *Psychological Trauma: Theory, Research, Practice, and Policy*, 12(7), 812-819. doi.org/10.1037/tra0000914

Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J. (2020). The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *The lancet*, *395*(10227), 912-920. doi.org/10.1016/S0140-6736(20)30460-8

Buysse, D. J., Reynolds III, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry research*, *28*(2), 193-213. . doi.org/10.1016/0165-1781(89)90047-4

Carmassi, C., Foghi, C., Dell'Oste, V., Cordone, A., Bertelloni, C. A., Bui, E., & Dell'Osso, L. (2020). PTSD symptoms in healthcare workers facing the three coronavirus outbreaks: What can we expect after the COVID-19 pandemic. Psychiatry research, 113312. doi.org/10.1016/j.psychres.2020.113312

Casagrande, M., Favieri, F., Tambelli, R., & Forte, G. (2020). The enemy who sealed the world: Effects quarantine due to the COVID-19 on sleep quality, anxiety, and psychological distress in the Italian population. *Sleep medicine*, *75*, 12-20. doi.org/ 10.1016/j.sleep.2020.05.011.

Casagrande, M., Forte, G. Tambelli, R. & Favieri, F., (2021). The Coronavirus Pandemic: A Possible Model of the Direct and Indirect Impact of the Pandemic on Sleep Quality in Italians. *Nature and Science of Sleep*, 13:191-199. doi.org/ 10.2147/ NSS.S285854

Chang, M. C., & Park, D. (2020). How should rehabilitative departments of hospitals prepare for coronavirus disease 2019?. *American journal of physical medicine & rehabilitation*, *99*(6), 475. doi.org/ 10.1097/PHM.0000000000001428

Chew, Q. H., Wei, K. C., Vasoo, S., Chua, H. C., & Sim, K. (2020). Narrative synthesis of psychological and coping responses towards emerging infectious disease outbreaks in the general population: practical considerations for the COVID-19 pandemic. Tropical Journal of Pharmaceutical Research, 61(7). doi.org/10.11622/smedj.2020046

Chong, P. Y., Chui, P., Ling, A. E., Franks, T. J., Tai, D. Y., Leo, Y. S., ... & Travis, W. D. (2004). Analysis of deaths during the severe acute respiratory syndrome (SARS) epidemic in Singapore: challenges in determining a SARS diagnosis. *Archives of pathology & laboratory medicine*, *128*(2), 195-204. doi.org/10.5858/2004-128-195-AODDTS

Conway III, L. G., Woodard, S. R., & Zubrod, A. (2020). Social psychological measurements of COVID-19: Coronavirus perceived threat, government response, impacts, and experiences questionnaires. doi.org/10.31234/osf.io/z2x9a

Curcio, G., Tempesta, D., Scarlata, S., Marzano, C., Moroni, F., Rossini, P. M., ... & De Gennaro, L. (2013). Validity of the Italian version of the Pittsburgh sleep quality index (PSQI). *Neurological Sciences*, *34*(4), 511-519. doi.org/10.1007/s10072-012-1085-y

Derogatis, L. R., & Cleary, P. A. (1977). Confirmation of the dimensional structure of the SCL-90: A study in construct validation. *Journal of clinical psychology*, *33*(4), 981-989. doi.org/ 10.1002/1097-4679(197710)33:4<981

Dupuy, H. J. (1984). The psychological general well-being (PGWB) index. *Assessment of quality of life in clinical trials of cardiovascular therapies*, 170-183. doi.org/ 10.1016/s0002-9149(84)80232-5

Favieri, F., Forte, G., Tambelli, R., & Casagrande, M. (2021). The Italians in the time of coronavirus: psychosocial aspects of unexpected COVID-19 pandemic. *Frontiers in Psychiatry*. doi.org/10.3389/fpsyt.2021.551924

Forte, G., Favieri, F., Tambelli, R., & Casagrande, M. (2020a). COVID-19 pandemic in the Italian population: validation of a post-traumatic stress disorder questionnaire and prevalence of PTSD symptomatology. *International journal of environmental research and public health*, *17*(11), 4151. doi.org/10.3390/ijerph17114151.

Forte, G., Favieri, F., Tambelli, R., & Casagrande, M. (2020b). The enemy which sealed the world: effects of COVID-19 diffusion on the psychological state of the Italian population. *Journal of clinical medicine*, 9(6), 1802. doi.org/10.3390/jcm9061802

Garre-Olmo, J., Turró-Garriga, O., Martí-Lluch, R., Zacarías-Pons, L., Alves-Cabratosa, L., Serrano-Sarbosa, D., ... & Vilanova, J. C. (2021). Changes in lifestyle resulting from confinement due to COVID-19 and depressive symptomatology: A cross-sectional a population-based study. *Comprehensive psychiatry*, 104, 152214. doi.org/10.1016/j.comppsych.2020.152214

Hossain, M. M., Sultana, A., & Purohit, N. (2020). Mental health outcomes of quarantine and isolation for infection prevention: a systematic umbrella review of the global evidence. *Available at SSRN 3561265*. doi.org/10.4178/epih.e2020038

Kontoangelos, K., Economou, M., & Papageorgiou, C. (2020). Mental health effects of COVID-19 pandemia: a review of clinical and psychological traits. *Psychiatry investigation*, 17(6), 491. doi.org/10.30773/pi.2020.0161

Liu, C. H., Zhang, E., Wong, G. T. F., & Hyun, S. (2020). Factors associated with depression, anxiety, and PTSD symptomatology during the COVID-19 pandemic: Clinical implications for US young adult mental health. *Psychiatry research,* 290, 113172. doi.org/10.1016/j.psychres.2020.113172

Lorente, L., Vera, M., & Peiró, T. (2021). Nurses´ stressors and psychological distress during the COVID-19 pandemic: The mediating role of coping and resilience. Journal of Advanced Nursing, 77(3), 1335-1344. doi.org/10.1111/jan.14695

Mattioli, A. V., & Ballerini Puviani, M. (2020). Lifestyle at time of COVID-19: How could quarantine affect cardiovascular risk. *American Journal of lifestyle medicine*, 14(3), 240-242. doi.org/10.1177/1559827620918808

Mitchell, K. S., & Wolf, E. J. (2016). PTSD, food addiction, and disordered eating in a sample of primarily older veterans: The mediating role of emotion regulation. *Psychiatry Research*, 243, 23-29. doi.org/10.1016/j.psychres.2016.06.013

Mueser, K. T., Rosenberg, S. D., Goodman, L. A., & Trumbetta, S. L. (2002). Trauma, PTSD, and the course of severe mental illness: an interactive model. *Schizophrenia research*, 53(1-2), 123-143. doi.org/10.1016/s0920-9964(01)00173-6

Qiu, J., Shen, B., Zhao, M., Wang, Z., Xie, B., & Xu, Y. (2020). A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: implications and policy recommendations. *General psychiatry*, 33(2). doi.org/10.1136/gpsych-2020-100213

Tagliabue, F., Galassi, L., & Mariani, P. (2020). The "pandemic" of disinformation in COVID-19. *SN comprehensive clinical medicine*, 2(9), 1287-1289. doi.org/10.1007/s42399-020-00439-1

Tang, W., Hu, T., Hu, B., Jin, C., Wang, G., Xie, C., ... & Xu, J. (2020). Prevalence and correlates of PTSD and depressive symptoms one month after the outbreak of the COVID-19 epidemic in a sample of home-quarantined Chinese university students. Journal of affective disorders, 274, 1-7. doi.org/10.1016/j.jad.2020.05.009

Taylor, S., Landry, C. A., Rachor, G. S., Paluszek, M. M., & Asmundson, G. J. (2020). Fear and avoidance of healthcare workers: An important, under-recognized form of stigmatization during the COVID-19 pandemic. *Journal of Anxiety Disorders*, 75, 102289. doi.org/10.1016/j.janxdis.2020.102289

Torales, J.; O'Higgins, M.; Castaldelli-Maia, J.M.; Ventriglio, A. The Outbreak of COVID-19 Coronavirus and Its Impact on Global Mental Health. Int. J. Soc. Psychiatry 2020, 66, 317–320. doi.org/10.1177/0020764020915212

Wang, H., Xia, Q., Xiong, Z., Li, Z., Xiang, W., Yuan, Y., ... & Li, Z. (2020). The psychological distress and coping styles in the early stages of the 2019 coronavirus disease (COVID-19) epidemic in the general mainland Chinese population: A web-based survey. *PLoS One*, 15(5), e0233410. doi.org/10.1371/journal.pone.0233410

Wheaton, M. G., Abramowitz, J. S., Berman, N. C., Fabricant, L. E., & Olatunji, B. O. (2012). Psychological predictors of anxiety in response to the H1N1 (swine flu) pandemic. *Cognitive Therapy and Research*, 36(3), 210-218. doi.org/10.1007/s10608-011-9353-3

World Health Organization. Coronavirus disease (COVID-2019) situation reports. Consulted on 1st April, 2021. Available online at: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/

Wu, P., Fang, Y., Guan, Z., Fan, B., Kong, J., Yao, Z., ... & Hoven, C. W. (2009). The psychological impact of the SARS epidemic on hospital employees in China: exposure, risk perception, and altruistic acceptance of risk. *The Canadian Journal of Psychiatry*, 54(5), 302-311. doi.org/10.1177/070674370905400504

Xiong, J., Lipsitz, O., Nasri, F., Lui, L. M., Gill, H., Phan, L., ... & McIntyre, R. S. (2020). Impact of COVID-19 pandemic on mental health in the general population: A systematic review. *Journal of affective disorders, 277,* 55-64. doi.org/10.1016/j.jad.2020.08.001

Yip, P. S., Cheung, Y. T., Chau, P. H., & Law, Y. W. (2010). The impact of epidemic outbreak: the case of severe acute respiratory syndrome (SARS) and suicide among older adults in Hong Kong. *Crisis: The Journal of Crisis Intervention and Suicide Prevention*, 31(2), 86. doi.org/10.1027/0227-5910/a000015