






REVIEW ARTICLE

Impact of COVID-19 on post-traumatic stress symptoms in the general population: An integrative review

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ABSTRACT: *The coronavirus pandemic highlights the urgent need for increased support related to mental health concerns. This study aimed to synthesize the findings of empirical studies reporting the post-traumatic stress symptoms in the general population during the coronavirus pandemic. Whittemore and Knaff's (Journal of Advanced Nursing, 52, 546, 2005) integrative review methodology was used to analyse and synthesize the peer-reviewed studies. Five electronic databases, PubMed, CINAHL, PsychINFO, Cochrane and Google Scholar were searched using terms related to the coronavirus pandemic and post-traumatic stress symptoms. The quality of the studies was screened and evaluated using the Mixed Methods Appraisal Tool. The sample size of the 16 studies included in this review ranged from 41 to 3480 participants, with a total of 18 039 participants. The majority of the participants' ages ranged from 30 to 39 years, and 57% of the participants were female. The following factors related to post-traumatic stress symptoms during the coronavirus pandemic were identified as follows: (i) risk factors included social discrimination, fear of uncontrolled contagion and financial burden or economic instability; and, (ii) protective factors included social support and timely government action. A traumatic experience itself can trigger the onset of post-traumatic stress disorder; however, depending on the risk and protection factors, each individual can experience different post-traumatic stress symptoms. Thus, mental health nurses should comprehensively understand how to reduce the influence of risk factors and enhance protective factors when dealing with the pandemic and related trauma. This study's findings are beneficial for identifying, preventing and managing post-traumatic stress symptoms associated with the coronavirus and future pandemics.*

KEY WORDS: *COVID-19, mental health, pandemics, post-traumatic stress disorders, psychological adaptation.*

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INTRODUCTION

The increasing global morbidity and mortality due to the coronavirus disease 2019 (COVID-19) have become a considerable concern for public health (World Health Organization [WHO] 2020a). In general, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the virus that causes acute respiratory illness (Valencia 2020). However, a new coronavirus was first recognized in Wuhan, China, in December 2019 (WHO 2020b), and the WHO declared the COVID-19 outbreak a pandemic in March 2020 (WHO 2020a). As of 11 October 2020, there are more than 37 million COVID-19 cases confirmed, and there have been about 1 million deaths worldwide (WHO 2020c). Currently, the WHO and the government of several countries have implemented strict surveillance and infection control, such as isolation of COVID-19-infected individuals, tracking those who have tested positive for COVID-19, public campaigns requesting the general public to wear masks in public places and the development of effective treatments and vaccinations against COVID-19 (WHO 2020c).

During these precautions, many of us have experienced psychological distress and significant disruption to our daily lives during the COVID-19 pandemic (Usher *et al.* 2020a). Losing a family member, limited mobility, physical social isolation, losing one's job and fear of contagion may increase the vulnerability to mental health concerns (WHO 2020d). The experience of the COVID-19 pandemic may be associated with post-traumatic stress disorder (PTSD) or post-traumatic stress symptoms (PTSS) (Centers for Disease Control & Prevention 2020). PTSD is defined as a mental health disorder triggered by witnessing or experiencing a traumatic event, while PTSS is defined as a wide range of stress response symptoms that occur three months up to several years after the traumatic event (American Psychiatric Association 2013). PTSS may include flashbacks, avoidance of memories that cause distress, nightmares, feelings of guilt, sleep disturbances and unpleasant physical sensation (American Psychiatric Association 2013). In fact, it is reported that 26% of the general population had PTSD or PTSS during the COVID-19 pandemic in the United States (Centers for Disease Control & Prevention 2020). However, the number of PTSD patients is expected to increase significantly due to the global impact of COVID-19 (Centers for Disease Control & Prevention 2020). Thus, the COVID-19 pandemic increases the rate of PTSD as a traumatic

event itself and may increase the secondary impact of risk factors overall.

The emerging focus on the relationship between COVID-19 and PTSD requires an evidence-based understanding of the factors associated with PTSD (WHO 2020d). Several studies (Preti *et al.* 2020; Usher *et al.* 2020b; Xiong *et al.* 2020) have explored the psychological effects of the COVID-19 pandemic. This review specifically focused on PTSD-related factors in the general population. COVID-19 is a highly contagious disease, and daily direct or indirect exposure to the virus might cause physical and mental stress, making individuals more vulnerable to mental health disorders (WHO 2020d). However, most studies have a limited understanding of the mental health problems suffered during the COVID-19 pandemic because these studies were not conducted among diverse populations and countries. The WHO emphasizes global cooperation and action against COVID-19 due to its rapid transmissibility among humans (WHO 2020a). To minimize the negative impacts of the present COVID-19 pandemic and prevent those of possible future pandemics, it is essential to examine and integrate the findings of various empirical studies to expand the understanding of new infectious diseases. Therefore, it is necessary to understand the relevant factors influencing PTSD from an integrative perspective and develop effective interventions related to those factors.

A traumatic experience itself can trigger the onset of PTSD; however, there may be additional risk and protective factors to consider (Kobayashi *et al.* 2019; Tang *et al.* 2017). Even when faced with the same traumatic event, each individual can experience different PTSS (Tedeschi & Calhoun 2004). PTSD is associated with sociodemographic factors such as age, gender, lower household income, and lower education levels (Kobayashi *et al.* 2019; Tang *et al.* 2017). A previous study found that women are twice as likely to be diagnosed with PTSD compared to men, after having experienced a traumatic event (Hu *et al.* 2017). In addition, insufficient social support is frequently reported as a risk factor (Dworkin *et al.* 2018).

According to the uncertainty reduction theory (Berger & Calabrese 1974), in unpredictable situations, people may feel unpleasant and experience cognitive stress (Berger & Calabrese 1974). The COVID-19 pandemic may increase physical social isolation and self-isolation, rendering the perception of belonging uncertain (Centers for Disease Control & Prevention 2020). This can help explain COVID-19 as a traumatic event that causes emotional damage and traumatic stress.

Uncertainty about COVID-19 can increase levels of anxiety and stress, and prolonged periods of experiencing the same stress can cause mental health problems such as depression (Centers for Disease Control & Prevention 2020; Khademi *et al.* 2020). In addition, the uncertainty reduction theory emphasizes the provision of information to reduce people's uncertainty (Berger & Calabrese 1974). Thus, the current study is theoretically based on the uncertainty reduction theory: to address the risks and protective factors of mental health problems caused by uncertainties associated with the COVID-19 pandemic.

AIMS

The purpose of this study was to explore and synthesize empirical studies that reported the symptoms of PTSD and PTSS in the general population during the COVID-19 pandemic. The following research questions guided the review: (i) what is the relationship between COVID-19 and pandemic-related psychological outcomes including PTSS? and (ii) what are the risk and protective factors associated with PTSS in the general population?

METHODS

Whittemore and Knaff's (2005) integrative review methodology was used to analyse and synthesize the literature. Whittemore and Knaff's methodology (2005) revised and extended the work of Ganong (1987), a rigorous and widely used approach to summarizing and analysing literature with various methodologies. This methodology recommends that all relevant studies be included in the review; however, quality scores can be used to support data interpretation of the literature (Whittemore & Knaff 2005).

Search methods

A literature review was conducted with the assistance of medical research librarians (specializing in literature search) and two researchers. The initial screening was conducted using EndNote library (version X9). An electronic keyword search was conducted using PubMed, CINAHL, PsychINFO and Cochrane databases from journal inception to October 2020. A manual search on Google Scholar was conducted based on a retrieved reference list. The search included a combination of MeSH terms, CINAHL Headings and Index Terms. We used the following search terms: (COVID

OR COVID-19 OR Coronavirus* OR Coronavirus Infections) AND (posttraumatic* OR post-traumatic stress* OR posttraumatic stress disorder OR posttraumatic stress disorder symptoms OR Stress Disorders, Post-Traumatic OR PTSD OR PTSS OR trauma). All electronic databases used syntax search as detailed in Table 1. We modified the search terms for each database as needed and selected eligible studies based on the inclusion and exclusion criteria (Table 2). The final references from the selected articles were manually examined, and the manual search of Google Scholar was conducted. This review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) framework (Moher *et al.* 2015) as shown in Figure 1.

Quality appraisal

The Mixed Methods Appraisal Tool (MMAT, version 2018) was used for quality assessment of the included studies. This tool was developed to evaluate the methodological quality of qualitative, quantitative and mixed methods studies (Hong *et al.* 2018). Two researchers independently appraised the articles for the methodology criteria and five quality criteria on the MMAT. The scores meeting one criterion were represented by (*), and those meeting all criteria were represented by (*****). In cases of score discrepancies, consensus was reached through discussion. Overall, the

TABLE 1 Search syntax for electronic databases

Database	Syntax
PubMed	(COVID-19) OR (Coronavirus Infections[MeSH Terms]) AND (posttraumatic stress*[Title/Abstract]) OR (post traumatic stress*[Title/Abstract]) OR (PTSD[Title/Abstract]) OR (PTSS[Title/Abstract]) OR (Stress Disorders, Post-Traumatic[MeSH Terms])
CINAHL	"covid-19" OR (MH "Coronavirus Infections") OR (MH "Coronavirus") AND AB (ptsd or post traumatic stress or trauma) OR AB (ptsd or post traumatic stress disorder or posttraumatic stress disorder or post-traumatic stress disorder) OR AB post traumatic stress disorder symptoms OR (MH "Stress Disorders, Post-Traumatic")
PsycINFO	(covid-19 OR Coronavirus*) AND (ab(posttraumatic stress*) OR ab(post traumatic stress*) OR ab(PTSD) OR ab(PTSS) OR ab(stress disorders, post-traumatic) OR ab(post-traumatic stress*) OR ab(stress disorders, posttraumatic)
Cochrane	COVID-19 OR Coronavirus* OR Coronavirus Infections AND (post-traumatic stress*):ti,ab,kw OR (posttraumatic stress*):ti,ab,kw OR (post traumatic stress*):ti,ab,kw OR (PTSD):ti,ab,kw OR (Stress Disorders, Post-Traumatic):ti,ab,kw

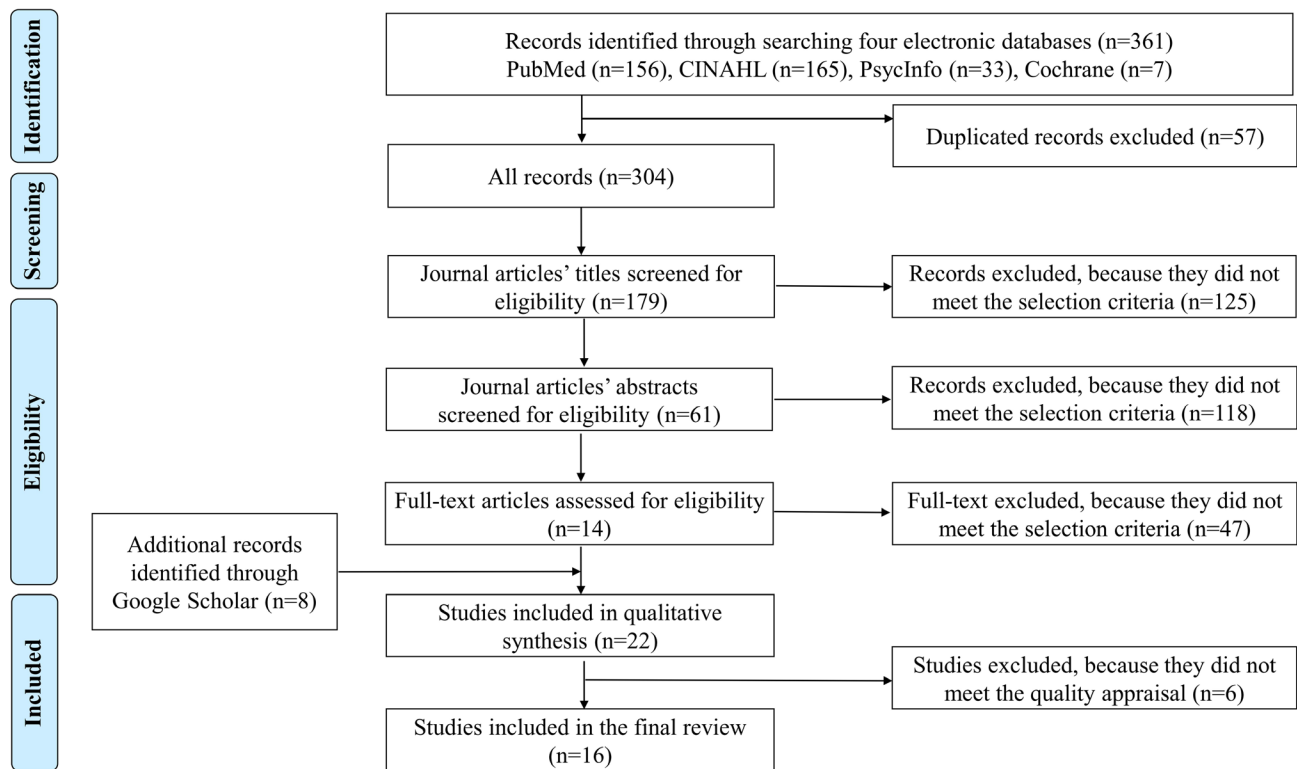


FIGURE 1 PRISMA flow diagram.

TABLE 2 Eligible criteria to select the analysed studies

Inclusion criteria	Exclusion criteria
Direct or indirect exposure to COVID-19 general population	Specific group (i.e. health worker, patient with a chronic disease)
Focus on post-traumatic stress symptoms	Measure other types of trauma
Adult aged ≥ 18 years old	Children and adolescents (age < 18 years)
English language	Languages other than English
Quantitative peer-reviewed articles	Thesis, dissertation, conferences' abstracts, review, book chapters, policy, guidelines, editorials, commentaries, qualitative research and case study

methodological quality of the review articles was acceptable, and six studies that did not meet two or more criteria were excluded. The quality scores are shown in Table 3.

Data abstraction and synthesis

This study extracted relevant data from the included articles, for the analysis using Whittmore and Knaff's (2005) methodology. Researchers extracted and coded

data from each article. Key concepts were collected by comparing and contrasting codes. The extracted data were discussed by the researchers until consensus was reached. The results of this study integrated the key categories and subcategories of the data. The data were included only if there was a consensus. The total number of articles finally included for the review was 16 (Appendix S1).

RESULTS

Study characteristics

The characteristics and main findings of the studies are summarized in Table 3.

The sample size of the 16 studies included in this review ranged from 41 to 3480 participants with a total of 18 039 participants. All participants were adults aged 18 years or older. Ten studies ($n = 15\ 202$) included general citizens (Di Crosta *et al.* 2020; Forte *et al.* 2020; González-Sanguino *et al.* 2020; Guo *et al.* 2020a; Karatzias *et al.* 2020; Li 2020; Liu *et al.* 2020a; Liu *et al.* 2020b; Wang *et al.* 2020; Wytrychiewicz *et al.* 2020). Four studies ($n = 1636$) included patients diagnosed with COVID-19 (Bo *et al.* 2020; Guo *et al.*

TABLE 3 *Characteristics and analytic of included studies (N = 16)*

Author(s), year (country)	Study aim	Study design	Time of measurement	Participants	Quality rating
Bo, 2020 (China)	To examine the pattern of PTSS and patients' attitude towards crisis mental health services	Cross-sectional	Online assessment prior to their discharge from quarantine facilities	714 adult patients diagnosed with clinically stable COVID-19	MMAT**
Di Crosta, 2020 (Italy)	To examine the prevalence of high psychological impact due to the COVID-19 on the general population	Cross-sectional	During the COVID-19 outbreak	1253 Italian adults between 18 and 64 years old	MMAT****
Forte, 2020 (Italy)	To examine the psychological impact of the COVID-19 and the psychopathological outcomes related to the first phase of this emergency	Cross-sectional	During the COVID-19 outbreak	2286 citizens aged ≥18 years old	MMAT****
González-Sanguino, 2020 (Spain)	To examine the psychological impact of the COVID-19 in the Spanish population	Cross-sectional	During the COVID-19 outbreak	3480 citizens aged ≥18 years old	MMAT****
Guo, 2020a (China)	To examine sleep problems, depression, and PTSS among the general population during the COVID-19, and coping behaviours	Cross-sectional	During the COVID 19 outbreak	2441 citizens aged ≥18 years old	MMAT****
Guo, 2020b (China)	To examine the psychological impact of hospitalized patients with COVID-19 and how it relates to the presence bio-markers of peripheral inflammation	Cross-sectional methods approach Mixed-method triangulation design	During the COVID-19 outbreak	206 patients diagnosed with mild cases of COVID-19	MMAT***
Hamam, 2020 (Israeli)	To examine the relation between PTG and PTSS attributed to prior exposure	Cross-sectional	During the COVID-19 outbreak	528 Israeli trauma survivors	MMAT***
Karatzias, 2020 (Ireland)	To examine the level of comorbidity with depression and anxiety and the sociodemographic risk factors associated with COVID-19 related PTSD in the general population	Cross-sectional	31 days after the first confirmed case of COVID-19 in the Republic of Ireland was reported	1041 citizens aged ≥18 years old	MMAT****
Li, 2020 (China)	To examine the psychological impact and PTSD and association with the coping strategy types	Cross-sectional	During the COVID-19 outbreak	1109 citizens aged ≥18 years old	MMAT****
Liu, 2020a (USA)	To examine factors associated with depression, anxiety, and PTSS in young adults	Cross-sectional	1 month after the United States declared a state of emergency due to COVID-19	898 citizens 18–30 years old	MMAT***
Liu, 2020b (China)	To examine the prevalence, predictors, gender difference existing of PTSS in China hardest hit areas during COVID-19	Cross-sectional	COVID-19 outbreak of announced by World Health Organization	285 citizens aged >18 years old	MMAT***
Liu, 2020c (China)	To examine the prevalence and risk factors for mental health problems among discharged COVID-19 patients	Cross-sectional	Hospital discharged COVID-19 patients	675 adult patients diagnosed with COVID-19	MMAT****
Qi, 2020 (China)	To examine the prevalence and associated risk factors for psychological impact and fatigue in COVID-19 patients	Cross-sectional	During the COVID-19 outbreak	41 patients diagnosed with non-severe types of COVID-19	MMAT**
Tan, 2020 (China)	To examine the psychological impact and psychoneuro immunity prevention measures of a workforce returning to work	Cross-sectional	During the COVID-19 outbreak	673 workforce	MMAT***

(Continued)

TABLE 3 (Continued)

Author(s), year (country)	Study aim	Study design	Time of measurement	Participants	Quality rating
Wang, 2020 (China)	To examine risk and protective factors, and the temporal psychological impact and adverse mental health status during the initial outbreak and peak of COVID-19 pandemic	Longitudinal study	During the initial outbreak and peak of COVID-19 outbreak	1738 citizens	MMAT****
Wytrychiewicz, 2020 (Poland)	To examine the psychological impact in coping context, and beliefs related to the pandemic situation, and stressors arising from the risk of infection, and lifestyle changes	Cross-sectional	2 weeks after the first case occurred in Poland	671 citizens aged >18 years old	MMAT***

COVID-19, coronavirus disease 19; MMAT, mixed methods appraisal tool; PTG, post-traumatic growth; PTSD, post-traumatic stress disorder; PTSS, post-traumatic stress symptoms.

The scores meeting one criterion were represented by (*), and those meeting all criteria were represented by (****).

2020b; Liu *et al.* 2020c; Qi *et al.* 2020). Hamam *et al.* (2020) ($n = 528$) included survivors who were previously exposed to other trauma. Tan *et al.* (2020) ($n = 673$) included full-time employees. The majority of participants in these studies were aged between 30 and 39 years, and approximately 57% of the participants were female. Fifteen studies followed a cross-sectional design, and one study had a longitudinal design. These 16 studies were conducted in seven different countries, including China ($n = 9$), Italy ($n = 2$), Ireland ($n = 1$), Israel ($n = 1$), Poland ($n = 1$), Spain ($n = 1$) and the USA ($n = 1$). The main outcomes chosen in the included studies varied across them. Twelve studies included measures of PTSD, while four studies included measures of PTSS. Seven studies evaluated the psychological impact of COVID-19, while seven studies assessed psychological distress, not specifying COVID-19. Though one study did not explicitly report the overall response rates of PTSD, the associated risk and protective factors were identified and reviewed.

Instruments used to assess PTSS and PTSD

A wide variety of instruments were used in the studies ($n = 16$) to assess PTSS and PTSD. Six articles (38%) used the PTSD Checklist from the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5) (PCL-5, Weathers *et al.* 2013). The PCL-5 comprises 20 items assessing past-month experiences such as arousal, avoidance, intrusions and negative alterations in mood. Each item is assessed on a five-point Likert-type scale, with values ranging from 0 to 4 (0 = *not at all* to 4 = *extremely*). Five articles (31%)

used the Impact of Event Scale-Revised (IES-R) (Weiss & Marmar 1997). The IES-R comprises 22 items to assess 3 domains (hyperarousal, avoidance and numbing and symptoms of intrusion). Each item is rated on a five-point Likert-type scale, with values ranging from 0 to 4 (0 = *not at all* to 4 = *extremely*). Three articles (19%) used the PTSD Checklist–Civilian version (PCL-C, Weathers *et al.* 1993). The PCL-C comprised 17 items, and each item was assessed on a five-point Likert-type scale, with values ranging from 0 to 4 (1 = *not at all* to 5 = *extremely*). One article used the Civilian version of the Post-Traumatic Stress Disorder Checklist-Reduced version (PCL-C-2, Lang & Stein 2005; Weathers *et al.* 1993). The PCL-C-2 comprises two items that measure the presence of specific phenomena related to a traumatic experience on a five-point Likert-type scale ranging from 0 to 4. One article used the International Trauma Questionnaire (ITQ, Cloitre *et al.* 2018). The ITQ initially measures index trauma and comprises six PTSS-related items measured on a five-point Likert-type scale ranging from 0 to 4 (0 = *not at all* to 4 = *extremely*).

Rate of PTSS and PTSD

PTSS were examined in four studies (Bo *et al.* 2020; Guo *et al.* 2020a; Guo *et al.* 2020b; Liu *et al.* 2020b). Table 4 shows detailed descriptions of the psychological outcomes included in each study and their findings. The rate of PTSS was between 1% and 96.2% depending on study samples. Bo *et al.* (2020) reported the highest rate, because 96.2% of the discharged COVID-19 patients having met the PCL-C criteria (≥ 50) after

TABLE 4 Description of PTSS and PTSD results by COVID-19 (N = 16)

Author(s), year	Item	Measurement & criterion	Rates	Risk factors	Protection factors
Bo, 2020	PTSS	PCL-C \geq 50	96.2% PTSS	(a) Demeaning news coverage in communication programmes, (b) social discrimination	
Di Crosta, 2020	PTSD	IES-R \geq 33	35.6% high-PTSD	(a) Fear of contagion, (b) female, (c) higher neuroticism, (d) lower levels of education, (e) lower perceived economic stability	(a) Neuroticism
Forte, 2020	PTSD	IES-R \geq 33	27.7% PTSD	(a) Aged 18 to 49, (b) female, (c) fear of contagion, (d) information of people infected by COVID-19, (e) information of people in ICU for COVID-19, (f) information of people died for COVID-19	
González-Sanguino, 2020	PTSD	PCL-C-2	15.8% moderate to extreme PTSD	(a) COVID-19 symptoms/diagnosis, (b) discrimination, (c) employment during COVID-19, (d) female, (e) living with someone infected, (f) loneliness, (g) previous illness	(a) Aged 60 to 80, (b) good economic situation, (c) retired from work, (d) satisfaction with health information, (e) sense of belonging, (f) self-compassion, (g) social support, (h) spiritual well-being
Guo, 2020a	PTSS	PCL-5	79.6% PTSS	(a) Emotion-focused coping, (b) lower perceived economic stability	(a) Problem-focused coping
Guo, 2020b	PTSS	PCL-5 \geq 33	1.0% PTSS	(a) Blaming others, having strong negative feelings (i.e. fear, guilt, and helplessness), (b) blaming of others, health authorities, (c) emotion-focused coping	
Hamam, 2020	PTSD	PCL-5 \geq 33	13.4% PTSD	(a) Female, (b) living alone, (c) lower levels of education, (d) poor health status, (e) younger age	
Karatzias, 2020	PTSD	ITQ	17.7% PTSD	(a) Anxiety, (b) depression, (c) fear of contagion, (d) living in a city, (e) living with children, (f) male, (g) younger age	
Li, 2020	PTSD	IES-R \geq 20	67.1% PTSD	(a) Problem-focused coping, (b) risk of psychiatric disorders	
Liu, 2020a	PTSD	PCL-C \geq 45	31.8% PTSD	(a) Distress tolerance, (b) loneliness, (c) fear of contagion	(a) Family social support, (b) instrumental social support
Liu, 2020b	PTSS	PCL-5 \geq 33	7% PTSS	(a) Female, (b) living in a city, (c) poorer sleep quality (d) susceptible to infection	
Liu, 2020c	PTSD	PCL-5	12.4% PTSD	(a) Discrimination, (b) family member died, (c) living with children, (d) severity level of COVID-19 pneumonia	
Qi, 2020	PTSD	PCL-C \geq 50	12.2% PTSD	(a) Emotion-focused coping, (b) social discrimination	(a) Social support
Tan, 2020	PTSD	IES-R \geq 24	10.8% PTSD	(a) Divorced, separated, widowed, (b) poor health status	(a) Always covered their mouths while coughing
Wang, 2020	PTSD	IES-R $>$ 24		(a) Poor health status, (b) history of chronic illness	(a) Avoidance of sharing utensils during meals, (b) confidence doctor's ability to diagnose or recognize COVID-19, (c) likelihood of survival, (d) observing better hygiene practices, (e) perceived likelihood of contracting COVID-19, (f) satisfaction with health information
Wytrychiewicz, 2020	PTSD	PCL-5 \geq 33	22.7% PTSD	(a) Concern about prolong isolation, (b) dyspnoea (c) fatigue, (d) fear, (e) fear of contagion, (f) headache	(a) Assessment of government actions to reduce the risk of infection, (b) food fully prepared

COVID-19, coronavirus disease 19; IES-R, Impact of Event Scale-Revised; ITQ, International Trauma Questionnaire; PCL-C, Post-traumatic Stress Disorder Checklist – Civilian version; PCL-C-2, Civilian version of the Post-traumatic Stress Disorder Checklist-Reduced version; PCL-5, Post-traumatic Stress Disorder Checklist for DSM-5; PTSD, post-traumatic stress disorder; PTSS, post-traumatic stress symptoms.

receiving inpatient treatment for COVID-19. By contrast, only 1% of the patients diagnosed with mild cases of COVID-19 met the PCL-5 criteria (≥ 33) for PTSS. However, the researchers emphasized that time constraints, geography and sociocultural context restricted the generalizability of this result (Guo *et al.* 2020b). A mixed-method study observed that COVID-19 patients showed significantly higher levels of PTSS than the non-COVID control group (Guo *et al.* 2020b).

PTSD was examined in 12 studies (Di Crosta *et al.* 2020; Forte *et al.* 2020; González-Sanguino *et al.* 2020; Hamam *et al.* 2020; Karatzias *et al.* 2020; Li 2020; Liu *et al.* 2020a; Liu *et al.* 2020c; Qi *et al.* 2020; Tan *et al.* 2020; Wang *et al.* 2020; Wytrychiewicz *et al.* 2020). During the COVID-19 outbreak, the rate of PTSD in the general population, observed in these studies, was between 10.8% and 67.1%. Li (2020) reported the highest rate of 67.1% was among Chinese adults, after the government formally announced severe interventions. In contrast, only 10.8% of the workforce living in China met the IES-R criteria (≥ 24) for PTSD. However, the researchers emphasized that return to work did not cause high levels of PTSD in the workplace (Tan *et al.* 2020). Liu *et al.* (2020c) reported a rate of 12.4% among individuals diagnosed with COVID-19 who met the criteria for PCL-5 (≥ 2). Similarly, Qi *et al.* (2020) reported that 12.4% of the patients diagnosed with non-severe types of COVID-19 met the PCL-C criteria (≥ 50). Two studies measuring the IES-R subscale (Forte *et al.* 2020; Li 2020) showed high scores related to avoidance, intrusion and hyperarousal. Most studies (Di Crosta *et al.* 2020; Forte *et al.* 2020; González-Sanguino *et al.* 2020; Hamam *et al.* 2020; Karatzias *et al.* 2020; Li 2020; Liu *et al.* 2020a; Liu *et al.* 2020c; Qi *et al.* 2020; Tan *et al.* 2020; Wang *et al.* 2020) except that of Wytrychiewicz *et al.* (2020) used the cut-off score of the screening tool to diagnose PTSD. However, these screening tools are not sufficient to assure an accurate PTSD diagnosis because they are used to classify individuals at high risk of PTSD or the probable PTSD individual. Thus, to diagnosis clinically significant PTSD and to do so accurately, the DSM-5 criteria and structured interviews by clinicians are required.

Risk and protective factors of PTSS and PTSD

We report detailed results regarding the risk and protective factors of PTSS and PTSD in terms of sociodemographic, cognitive, psychological and social levels in Table 4.

Sociodemographic level

Some studies investigated sociodemographic factors such as gender, age and economic status affecting PTSD. Five studies (Di Crosta *et al.* 2020; Forte *et al.* 2020; González-Sanguino *et al.* 2020; Hamam *et al.* 2020; Liu *et al.* 2020b) reported higher PTSD rates in women than men. PTSD is more common in younger age groups compared with the elderly (Forte *et al.* 2020; Hamam *et al.* 2020; Karatzias *et al.* 2020). Lower perceived economic stability (Di Crosta *et al.* 2020; Guo *et al.* 2020a), lower levels of education (Di Crosta *et al.* 2020; Hamam *et al.* 2020) and some living conditions were also identified as risk factors such as living alone (Hamam *et al.* 2020), living with children (Karatzias *et al.* 2020; Liu *et al.* 2020c) or living in a city (Karatzias *et al.* 2020; Liu *et al.* 2020b). However, some studies have shown protective factors with inverse relations with the risk factors associated with PTSS and PTSD, such as older age (González-Sanguino *et al.* 2020) and stable economic status (González-Sanguino *et al.* 2020); these are associated with lower levels of PTSD and PTSS.

Cognitive and psychological level

Several studies have measured psychological factors such as depression, anxiety, fear or loneliness. First, comorbidity of depression and anxiety was observed along with PTSD in 12 studies (Di Crosta *et al.* 2020; Forte *et al.* 2020; González-Sanguino *et al.* 2020; Hamam *et al.* 2020; Karatzias *et al.* 2020; Li 2020; Liu *et al.* 2020a; Liu *et al.* 2020c; Qi *et al.* 2020; Tan *et al.* 2020; Wang *et al.* 2020; Wytrychiewicz *et al.* 2020). Karatzias *et al.* (2020) suggested that anxiety or depression may be an additional risk factor for PTSD. Second, five studies (Di Crosta *et al.* 2020; Forte *et al.* 2020; Karatzias *et al.* 2020; Liu *et al.* 2020a; Wytrychiewicz *et al.* 2020) showed that a fear of contagion is associated with higher levels of PTSD in the population. Loneliness was the strongest predictor of PTSD (González-Sanguino *et al.* 2020; Liu *et al.* 2020a). Furthermore, loneliness may be particularly prevalent and distressing during the pandemic given the directives for physical social distancing and isolation. In a study of patients diagnosed with mild COVID-19, patients reported strong negative feelings towards others (i.e. healthcare professionals, neighbours and health authorities) that were associated with PTSD (Guo *et al.* 2020b). Third, lower fear of contagion (Tan *et al.* 2020; Wang *et al.* 2020; Wytrychiewicz *et al.* 2020) was negatively associated with PTSS and PTSD.

Some studies examined the coping strategies that individuals use to reduce stress; however, their findings were inconsistently reported. Three studies conducted in China during the COVID-19 pandemic (Guo *et al.* 2020a; Guo *et al.* 2020b; Qi *et al.* 2020) found that individuals who used emotional-focused coping were more vulnerable to PTSD than those using problem-focused coping. By contrast, Li (2020) found that higher problem-focused coping scores were associated with a greater vulnerability to PTSD.

Three studies found social support to be a protective factor (González-Sanguino *et al.* 2020; Liu *et al.* 2020a; Qi *et al.* 2020). These studies found that social support was associated with a decreased risk of impaired mental health such as anxiety, depression and PTSS (Guo *et al.* 2020a; Guo *et al.* 2020b; Qi *et al.* 2020). Guo *et al.* (2020b) showed that social support from family was associated with decreased risk of depression and PTSS, whereas support from friends or partners was not associated with mental health. Specifically, Guo *et al.* (2020a) found the need for greater psychological support in women, younger people and people with previous mental health diagnoses.

Interestingly, having more information related to COVID-19 is a risk factor associated with increased vulnerability to PTSD (Forte *et al.* 2020). Three types of information have been associated with vulnerability to PTSD: (i) information about individuals infected by COVID-19; (ii) information about individuals in the intensive care unit as a result of COVID-19; and (iii) information regarding individuals who have died due to COVID-19. By contrast, some studies (González-Sanguino *et al.* 2020; Wang *et al.* 2020) emphasized that satisfaction with health information was a protective factor for mental health. However, too much information increased anxiety, while an optimum amount of health information protected individuals from anxiety (González-Sanguino *et al.* 2020; Wang *et al.* 2020).

Social level

Four studies showed that the fear of social discrimination has been associated with PTSS and PTSD (Bo *et al.* 2020; González-Sanguino *et al.* 2020; Liu *et al.* 2020c; Qi *et al.* 2020). As there is some amount of blame being placed on COVID-19 patients by the news or social media, the fear of discrimination was also associated with PTSS and PTSD (Bo *et al.* 2020; Liu *et al.* 2020c; Qi *et al.* 2020). Some studies revealed that patients diagnosed with mild COVID-19 were more prone to be blamed by others including healthcare professionals, neighbours and healthcare authorities

(González-Sanguino *et al.* 2020; Guo *et al.* 2020b). Qi *et al.* (2020) found significantly higher perceived social stigma and negative coping styles among COVID-19 patients with PTSD, compared to COVID-19 patients without PTSD.

Other factors

The individual's present health conditions, specifically, a poor health status (Hamam *et al.* 2020; Tan *et al.* 2020; Wang *et al.* 2020), previous illnesses (González-Sanguino *et al.* 2020), having a history of chronic illness (Wang *et al.* 2020) and poor sleep quality (Liu *et al.* 2020b) also increased the likelihood of experiencing PTSS and PTSD.

DISCUSSION

Through this review, we systematically analysed and synthesised COVID-19 and PTSS- and PTSD-related literature, to check the impact of COVID-19 on PTSD and identify the associated risks and protective factors. The evidence reviewed clearly confirms that COVID-19 is a traumatic event that can increase the general population's vulnerability to PTSD. Differences in rates among studies may result from various study designs and measures, specifically inconsistencies in the cut-off points. Risk factors associated with PTSS and PTSD include social discrimination, fear of contagion, poor health status, living alone and lower perceived economic stability. Protective factors include social support, satisfaction with health information and an assessment of government actions that aim to reduce the risk of infection.

During the COVID-19 pandemic, in the general population, the rate of PTSS was 1–96.2% and the rate of PTSD was 10.8–67.1%. The symptoms of PTSS and PTSD were commonly observable in COVID-19 patients. The rate of PTSD found in this study was higher than its known lifetime rate (6% in men and 10% in women) (Breslau *et al.* 1999; Kessler *et al.* 1995). Moreover, the rate of PTSD during COVID-19 was higher than that reported during epidemics in the past; for example, the rate reported for SARS was 25.5% (Mak *et al.* 2009), for Ebola was 21% (Hugo *et al.* 2015), and for MERS was 26.9–42.3% (Lee *et al.* 2019). However, in previous studies, the survivors were diagnosed with PTSD at the end of the epidemic, so it might be more accurate to compare rates after the COVID-19 pandemic ends. Therefore, we predict that the COVID-19 pandemic will have a lasting psychological impact on the general population. These results

highlight the need to enhance the preparation and competence of the healthcare teams to detect and manage the psychological effects of the COVID-19 pandemic (Qi *et al.* 2020).

Since the beginning of COVID-19 pandemic, the general population has been exposed to situations that cause psychological reactions every day (Usher *et al.* 2020a). Through this study, we provide evidence of individual and situational factors that appear to influence the levels of PTSS and PTSD. As a result of reviewing research related to sociodemographic factors, such as gender, age, economic and living conditions (living alone and living with children), we found evidence that these factors can influence the psychological responses of the general population. In particular, a risk factor associated with PTSD was living with a child, which can be attributed to the parental stress related to protecting the child from COVID-19 (Centers for Disease Control & Prevention 2020). The COVID-19 pandemic can be stressful for the general population. Therefore, it is important to provide parents with information and guidelines to help protect their children from disease and to provide a medical system that can ease the parents' burden (Centers for Disease Control & Prevention 2020).

This study found that psychological factors were directly associated with PTSD in the general population. This finding is consistent with those of a systematic review that identified poor psychological factors as antecedents to poor mental health (Preti *et al.* 2020; Usher *et al.* 2020b; Xiong *et al.* 2020). Loneliness is a public health concern, relates to poor physical and mental health and can lead to extreme consequences including death (Holt-Lunstad *et al.* 2015; WHO 2020d). COVID-19 has made it difficult to maintain social relationships. Physical contact with family and friends is continuously restricted, and social and leisure activities are limited, which can cause loneliness (Groarke *et al.* 2020). In a cross-sectional online survey, 49–70% of participants reported feeling isolated or lonely and having insufficient social relationships during the COVID-19 pandemic (Groarke *et al.* 2020). The risk factors for loneliness were depression, poor sleep quality, and protective factors were marriage, living with a larger number of adults, and social support (Groarke *et al.* 2020), which is similar to the results of our study. Screening could be performed to identify individuals that are vulnerable to experiencing loneliness and priority mental health services should be provided (WHO 2020d). Specifically, those living alone and/or older adults, care providers, those in self-quarantine and people with

underlying health conditions need to be monitored with regard to their mental health, and psychological interventions using phone calls and video chat can help social closeness or connectedness (Centers for Disease Control & Prevention 2020).

Generally, individuals use problem- and emotion-focused coping strategies in stressful situations, such as the COVID-19 pandemic (Lazarus & Folkman 1984). Problem-focused coping refers to a direct approach to change or eliminate the source of stress, while emotion-focused coping is a response that controls stress-related emotional distress (Lazarus & Folkman 1984). The studies we reviewed reported conflicting results regarding coping strategies. Some studies found emotion-focused coping to be a risk factor associated with PTSD. In these studies, problem-focused coping was a positive strategy involving active methods, such as finding other ways to solve problems or asking for advice from relatives or friends. By contrast, emotion-focused coping tends to emphasize passivity and helplessness, strengthening anxiety and depressive feelings. These findings are consistent with a previous PTSD-related study (Snyder *et al.* 2015). However, a study found that individuals using problem-focused coping were more vulnerable to PTSD than those using emotion-focused coping strategies. It should be considered that the effect of the same coping strategy may change with time due to the COVID-19 outbreak situation (Qian *et al.* 2005). Thus, further studies should be conducted using the same instruments to identify an effective coping strategy for improving mental health. This can provide evidence of mental health interventions and develop guidelines for healthcare professionals.

The uncertainty reduction theory emphasized the importance of providing information because, in unpredictable situations, people may feel unpleasant and this may cause undue cognitive stress (Berger & Calabrese 1974). We believe this theory can be applied to the present COVID-19 pandemic. Our results showed that the feeling of receiving too much information increases anxiety while having the right amount of information protects against the existence of anxiety (Forte *et al.* 2020; González-Sanguino *et al.* 2020; Wang *et al.* 2020). These findings could help governments and health authorities around the world to modify and strengthen the current information delivery system. Therefore, the government must increase awareness of the importance of obtaining information from formal information channels and limit information from informal channels, especially too much information, uncertain information and stimulating graphics.

Limitations

This study has several limitations. First, most of the studies we reviewed are cross-sectional studies, making it difficult to draw conclusions about the long-term consequences of PTSD in individuals. Second, the rate of this study should be carefully interpreted considering the participants of different countries, the measuring instruments and the cut-off points. Third, all studies relied on self-report measures; therefore, they were more likely to identify acute symptoms than PTSD which could occur weeks or months later. Fourth, the study excluded the grey literature to focus on peer-reviewed journals. However, for future study, this could also be included as a valuable source of information for a review. Despite these identified limitations, COVID-19 is a problem causing PTSD in the general population, and there is sufficient evidence that PTSS will continue as COVID-19 persists. The results of this study may be useful for identifying, preventing and managing PTSS associated with COVID-19, at the community level.

CONCLUSIONS

This study examined the status of mental health in the general population during the COVID-19 pandemic and addressed the factors associated with PTSD and PTSS. A high and wide range of rate of PTSD was reported in most studies. It is clear that PTSS affects the general population exposed to the COVID-19 pandemic, similar to the results of studies related to other infectious diseases. COVID-19-related PTSD is associated with sociodemographic, cognitive and psychological, risk and protective factors.

RELEVANCE FOR CLINICAL PRACTICE

Our findings confirmed risk and protective factors needed to deal with negative psychological outcomes. Based on our findings, the study highlights the importance of understanding how the uncertainty about COVID-19 can explain COVID-19 as a traumatic event that causes emotional damage and traumatic stress. The study suggests that healthcare professionals should increase comprehensive intervention and prevention efforts during the COVID-19 pandemic to address associated psychological impacts. First, our findings can help healthcare professionals take steps to prevent PTSS in patients with COVID-19 who have experienced criticism or discrimination.

Specifically, optimal health information and guidelines should be shared to address social discrimination (WHO 2020e). Regular social media campaigns are needed to raise awareness of social discrimination (WHO 2020e), and long-term follow-up mental health assessments should be immediately initiated for COVID-19 patients (WHO 2020e). Second, our findings can be used by healthcare professionals to select vulnerable groups and provide mental health services and social support. For example, healthcare professionals should prioritize provide food delivery and medical services to vulnerable people such as elderly people living alone, people in poor health and people vulnerable to infection (WHO 2020f). Regular social networking through telephone, social media, emails or videos can greatly help in reducing loneliness (WHO 2020f), and healthcare professionals need to improve their coping strategies by providing virtual mental health services (WHO 2020f). Thus, the results of this study can be used in public health to address the assessment of PTSD or PTSS experienced by the general population and to make specific suggestions for improving mental health.

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REFERENCE

- American Psychiatric Association (2013). *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)*. Washington, DC: American Psychiatric Publishing.
- Berger, C.R. & Calabrese, R.J. (1974). Some explorations in initial interaction and beyond: Toward a developmental theory of interpersonal communication. *Human Communication Research*, 1, 99–112.
- Breslau, N., Chilcoat, H.D., Kessler, R.C., Peterson, E.L. & Lucia, V.C. (1999). Vulnerability to assaultive violence: Further specification of the sex difference in post-traumatic stress disorder. *Psychological Medicine*, 29, 813–821.
- Centers for Disease Control and Prevention. (2020). *Mental Health, Substance Use, and Suicidal Ideation During the COVID-19 Pandemic - United States, June 24-30, 2020*. [Cited 20 January 2021]. Available from: <https://www.cdc.gov/mmwr/volumes/69/wr/mm6932a1.htm>
- Cloitre, M., Shevlin, M., Brewin, C.R. *et al.* (2018). The International Trauma Questionnaire: Development of a self-report measure of ICD-11 PTSD and complex PTSD. *Acta Psychiatrica Scandinavica*, 138, 536–546.

- Dworkin, E.R., Ullman, S.E., Stappenbeck, C., Brill, C.D. & Kaysen, D. (2018). Proximal relationships between social support and PTSD symptom severity: A daily diary study of sexual assault survivors. *Depression and Anxiety*, 35, 43–49.
- Ganong, L.H. (1987). Integrative reviews of nursing research. *Research in Nursing & Health*, 10, 1–11.
- Groarke, J.M., Berry, E., Graham-Wisener, L., McKenna-Plumley, P.E., McGlinchey, E. & Armour, C. (2020). Loneliness in the UK during the COVID-19 pandemic: Cross-sectional results from the COVID-19 psychological wellbeing study. *PLoS One*, 15, e0239698.
- Holt-Lunstad, J., Smith, T.B., Baker, M., Harris, T. & Stephenson, D. (2015). Loneliness and social isolation as risk factors for mortality: A meta-analytic review. *Perspectives on Psychological Science*, 10, 227–237.
- Hong, Q.N., Fàbregues, S., Bartlett, G. et al. (2018). The Mixed Methods Appraisal Tool (MMAT) version 2018 for information professionals and researchers. *Education for Information*, 34, 285–291.
- Hu, J., Feng, B., Zhu, Y., Wang, W., Xie, J. & Zheng, X. (2017). *Gender differences in PTSD: Susceptibility and resilience*. London, UK: IntechOpen.
- Hugo, M., Declerck, H., Fitzpatrick, G., Severy, N., Gbabai, O.B.M. & Decroo, T. (2015). Post-traumatic stress reactions in Ebola virus disease survivors in Sierra Leone. *Emergency Medicine (Los Angel)*, 5, 1–4.
- Kessler, R.C., Sonnega, A., Bromet, E., Hughes, M. & Nelson, C.B. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry*, 52, 1048–1060.
- Khademi, F., Moayedi, S. & Golitaleb, M. (2020). The COVID-19 pandemic and death anxiety in the elderly. *International Journal of Mental Health Nursing*, 1–4. <https://doi.org/10.1111/inm.12824>
- Kobayashi, I., Sledjeski, E.M. & Delahanty, D.L. (2019). Gender and age interact to predict the development of posttraumatic stress disorder symptoms following a motor vehicle accident. *Psychological Trauma: Theory, Research, Practice, and Policy*, 11, 328–336.
- Lang, A.J. & Stein, M.B. (2005). An abbreviated PTSD checklist for use as a screening instrument in primary care. *Behaviour Research and Therapy*, 43, 585–594.
- Lazarus, R.S. & Folkman, S. (1984). *Coping and Adaptation*. New York, NY: Guilford.
- Lee, S.H., Shin, H.S., Park, H.Y. et al. (2019). Depression as a mediator of chronic fatigue and post-traumatic stress symptoms in Middle East respiratory syndrome survivors. *Psychiatry Investigation*, 16, 59–64.
- Mak, I.W.C., Chu, C.M., Pan, P.C., Yiu, M.G.C. & Chan, V.L. (2009). Long-term psychiatric morbidities among SARS survivors. *General Hospital Psychiatry*, 31, 318–326.
- Moher, D., Shamseer, L., Clarke, M. et al. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews*, 4, 1–9.
- Preti, E., Di Mattei, V., Perego, G. et al. (2020). The psychological impact of epidemic and pandemic outbreaks on healthcare workers: Rapid review of the evidence. *Current Psychiatry Reports*, 22, 1–22.
- Qian, M., Ye, D., Zhong, J. et al. (2005). Behavioural, cognitive and emotional responses to SARS: Differences between college students in Beijing and Suzhou. *Stress and Health: Journal of the International Society for the Investigation of Stress*, 21, 87–98.
- Snyder, C.M., Fauth, E., Wanzek, J. et al. (2015). Dementia caregivers' coping strategies and their relationship to health and well-being: The Cache County Study. *Aging & Mental Health*, 19, 390–399.
- Tang, B., Deng, Q., Glik, D., Dong, J. & Zhang, L. (2017). A meta-analysis of risk factors for post-traumatic stress disorder (PTSD) in adults and children after earthquakes. *International Journal of Environmental Research and Public Health*, 14, e1537.
- Tedeschi, R.G. & Calhoun, L.G. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Inquiry*, 15, 1–18.
- Usher, K., Durkin, J. & Bhullar, N. (2020a). The COVID-19 pandemic and mental health impacts. *International Journal of Mental Health Nursing*, 29, 315–318.
- Usher, K., Jackson, D., Durkin, J., Gyamfi, N. & Bhullar, N. (2020b). Pandemic-related behaviours and psychological outcomes; A rapid literature review to explain COVID-19 behaviours. *International Journal of Mental Health Nursing*, 29, 1018–1034.
- Valencia, D.N. (2020). Brief review on COVID-19: The 2020 pandemic caused by SARS-CoV-2. *Cureus*, 12, e7386.
- Weathers, F., Litz, B., Herman, D., Huska, J. & Keane, T. (1993). *The PTSD checklist (PCL): Reliability, validity, and diagnostic utility*. Paper presented at the Annual Convention of the International Society for Traumatic Stress Studies, San Antonio, TX.
- Weiss, D.S. & Marmar, C.R. (1997). The impact of event scale-revised. In: J.P. Wilson & T.M. Keane (Eds.), *Assessing Psychological Trauma and PTSD* (pp. 399–411). New York, NY: Guilford.
- Whittemore, R. & Knafl, K. (2005). The integrative review: Updated methodology. *Journal of Advanced Nursing*, 52, 546–553.
- World Health Organization (2020a). *WHO announces COVID-19 outbreak a pandemic*. [Cited 20 January 2021]. Available from: <https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/news/news/2020/3/who-announces-covid-19-outbreak-a-pandemic>
- World Health Organization (2020b). *Naming the coronavirus disease (COVID-19) and the virus that causes it*. [Cited 20 January 2021]. Available from: [https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-\(covid-2019\)-and-the-virus-that-causes-it](https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-(covid-2019)-and-the-virus-that-causes-it)
- World Health Organization (2020c). *Coronavirus disease (COVID-19)*. [Cited 20 January 2021]. Available from:

<https://www.who.int/docs/default-source/coronaviruse/situation-reports/20201012-weekly-epi-update-9.pdf>
World Health Organization (2020d). *Mental health and COVID-19*. [Cited 20 January 2021]. Available from: <https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/publications-and-technical-guidance/noncommunicable-diseases/mental-health-and-covid-19>
World Health Organization (2020e). *COVID-19: Addressing social stigma and discrimination*. [Cited 08 March 2021]. Available from: <https://www.who.int/westernpacific/emergencies/covid-19/information/social-stigma-discrimination>
World Health Organization (2020f). *Mental health and psychosocial considerations during the COVID-19 outbreak*. [Cited 08 March 2021]. Available from: https://www.who.int/docs/default-source/coronaviruse/mental-health-considerations.pdf?sfvrsn=6d3578af_10

Xiong, J., Lipsitz, O., Nasri, F. *et al.* (2020). Impact of COVID-19 pandemic on mental health in the general population: A systematic review. *Journal of Affective Disorders*, 277, 55–64.

SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Appendix S1. The list of articles includes Tables 3 and 4.