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Systematic Review

Global View of the Psychological Impact of the COVID-19 Outbreak: A Systematic Review

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Abstract

Introduction: As previous pandemics, the COVID-19 outbreak has been inflicting different mental disorders upon people. Such significant effects have led to a novel psychological pandemic that makes the COVID-19 pandemic management more difficult. The objective of this systematic review was to explore the global view of the psychological impact of the COVID-19 pandemic in its earlier stage.

Methods: A systematic search of PubMed, EMBASE, and Google Scholar databases was performed up to June 20th, 2020. Full-text articles were evaluated by three authors regarding predefined criteria. A modified version of the Newcastle-Ottawa Scale for observational studies was used to assess the risk of bias. The review protocol is registered and available online in PROSPERO.

Results: Overall, the analysis from this review suggested that there is a lack of sufficient robust evidence to confirm the association between the COVID-19 pandemic and mental impact. However, most of the studies pleaded for the assumption that the pandemic affected the mental health of the population throughout the world.

Conclusion: Governments and decision-makers are required to respond promptly to any eventual outbreak to ensure the population's mental health well-being through some strategic planning and prevention.

Keywords: Systematic Review, COVID-19, Mental Health, Psychological Impact, Psychological Symptoms

Introduction

From China in December 2019, the outbreak of a new coronavirus has rapidly spread in the entire world. It was declared as a Public Health Emergency of International Concern in late January and characterized as a pandemic in March by the World Health Organization (WHO).[1] This pandemic has affected people of all nations, and over two persons out of three were impacted by the pandemic through different situations such as hospitalization, quarantine, closure of public places and so forth.[2] Regarding the population, none of the general population, medical personnel, patients, female, male, children, teenagers, adults, or the old were unscathed.[3-5] As the coronavirus knowledge on its origin, way of transmission, mortality rate, and so forth had risen, an increase in fear among people was shown. Compared with any previous infectious disease pandemic causing panic germ that spreads in the population,[6] COVID-19 was susceptible to have a high impact on mental health. Chinese studies were even expecting a psychological crisis throughout the whole world.[7] As expected, several studies carried out during the pandemic reported a panel of psychological disorders such as anxiety, depression, stress, sleep disorders, posttraumatic distress, and obsession-compulsion. Then, a novel psychological pandemic emerged. The WHO Department of Mental Health and Substance Use has developed a series of messages that can be followed in order to support and enhance mental and psychosocial well-being in the different target groups during the pandemic.[1] Several misplaced reactions due to the COVID-19 pandemic caused harm to people, as reported by the literature.[8] A high psychological impact

on the population including health professionals and patients is regarded as a handicapping factor of the pandemic management.[9-10] That is the reason why Holmes et al. launched a call for mental health science.[11]

In light of the reasons mentioned herein and acknowledging the need for information about the ongoing pandemic, this systematic review aimed to explore the global view of the psychological impact of the COVID-19 pandemic in its earlier stage on individuals through the examination of the literature.

Materials and Methods

Study Design and sample

This review used the methodological approach by using the PRISMA statement.[12] The protocol review is registered with PROSPERO (no. CRD42020193580) and is available at https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020193580.

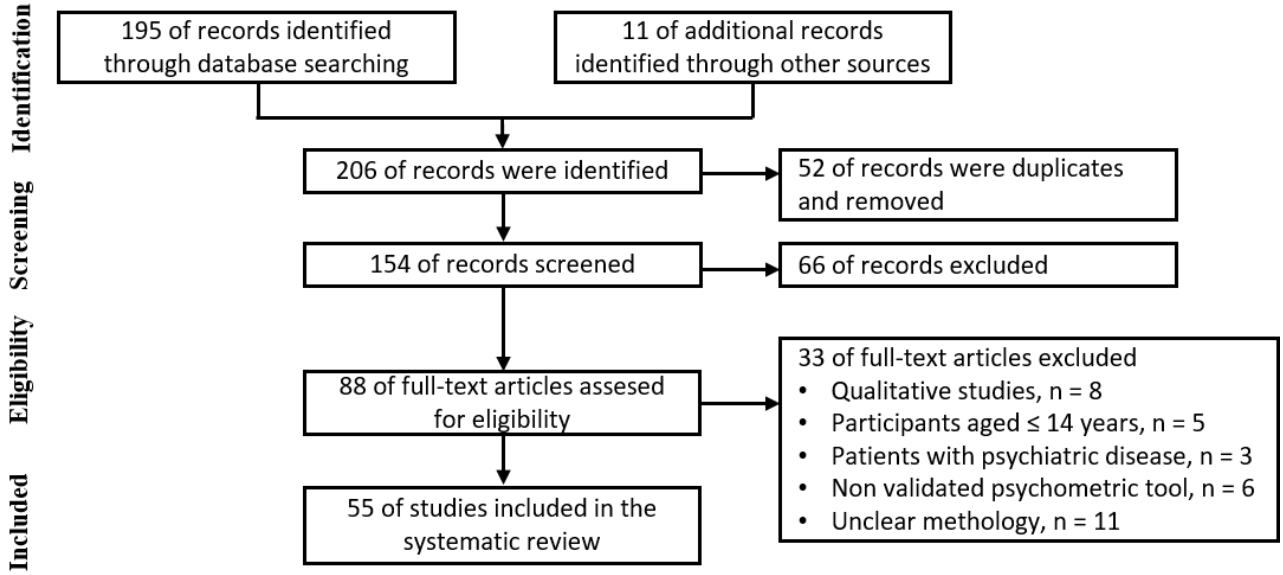

Figure 1. PRISMA Flow-Chart for the Systematic Review of Studies

Search Strategy and Selection Criteria

Two authors (H.C., F.H.) used three online databases to search for relevant literature. PubMed, EMBASE, and Google Scholar databases were searched to identify relevant articles published until June 20th, 2020. The following keywords were used: COVID-19, coronavirus, SARS-CoV-2, mental health, mental diseases, mental disorders, psychological symptoms, psychological distress, fear, psychosis, sleep disturbances, stress, traumatisms, obsession, depression, and anxiety. Each search term combination included at least one keyword related to COVID-19 and at least one related to mental health. Moreover, due to the rapid spread of information during the ongoing COVID-19 outbreak, we also included preprint articles published on Medrxiv and SSRN servers. No place restriction was applied. A manual search of published meta-analyses and relevant articles was performed to identify additional articles.

The process of article selection was based on the PRISMA flowchart (Figure 1). (1) Studies measuring psychiatric symptoms/morbidity/mental health during the COVID-19 in infected, uninfected, or not known to be infected participants by the coronavirus. (2) Quantitative studies. (3) Participants aged ≥14 years. (4) English language.

The following studies were excluded: Studies assessing qualitatively mental health, studies enrolling individuals < 14 years, studies with unclear methodology, studies on patients with psychiatric disease, studies reporting outcomes on new version tool validation, comments, viewpoints, editorials, or letters to the editor without sufficient qualitative results and systematic reviews.

Two hundred and six articles were selected from the initial search from which 52 duplicates were removed using Mendeley Desktop.[13] After the first selection phase, 88 studies were selected. Among them, 33 articles did not meet the inclusion criteria, resulting in a total of 55 articles, which were included in the review.

Data Extraction

A data extraction sheet was performed and unanimously validated by all authors. Three authors (H.C., D.B., N.M.) independently screened all abstracts and extracted the following data from the included articles: study design, dates of start and end of the survey, population type, the total number of participants, response rate, region, number of male and female participants, age, assessment methods used and their cut-offs as well as the total number and percentage of participants that screened positive for mental symptoms. In the case of missing data, necessary calculations were done, if possible. Collection sheets of the three authors were compared to ensure the correctness of the extracted or calculated data.

Assessment of Study Quality

After completing the literature search, article selection, and data extraction, two authors (H.C, F.H) independently evaluated the quality of the methodology of included studies using a modified version of the Newcastle-Ottawa Quality Assessment Scale for observational studies.[14] Discrepancies were resolved by discussion. Potential disagreements were resolved by a third author (R.K.). The Newcastle-Ottawa scale of each study is shown in Table 1. This tool comprised seven items from three subscales assessing various aspects of the quality of the study: selection (representativeness of sample, sample size, non-respondents, and ascertainment of the risk factor), comparability, and outcome (ascertainment of the outcome and statistical test). The total quality score ranged between 0 and 10. The study quality was categorized as very good (9-10), good (7-8), satisfactory (5-6), and unsatisfactory (0-4).

Results

From all articles, 38 were exclusively from Asia (30 from China, 4 from Iran, 1 from China, Hong Kong, Macau, and Taiwan, and each of the remaining studies from Iraq, India, and Oman), 14 were from Europe (7 from Italy, 1 from the United Kingdom and Austria, each of the remaining from Spain, German, Denmark, Greece, Swiss and Turkey, and the only two American studies were from the United States of America. One study was carried out all over the world whose majority of participants were from the Philippines (43%), Spain (30%) and Colombia (11%). Africa and Oceania were not visibly represented in this review. The study types included 54 cross-sectional studies and one longitudinal study.[18]

Population

Most of the studies exclusively included the general public (29) and healthcare workers (17). Four of them mixed the general public and healthcare workers, and two included students. One study included recovered patients, quarantined and the general public and each of the remaining included young people, patients, and quarantined.

Table 1. The Scales Used in the Articles for the Collection of Data Regarding Mental Health and Psychological Disorders

Scales — Number of studies (NS)		
AIS — 3	HAI — 1	PSS — 7
ASQ — 1	HAMA — 1	SAS — 4
BSCS — 1	HAMD — 1	SCL — 4
CDRISC — 1	IADQ — 1	SDS — 2
CERQ — 1	IES — 10	SF — 2
CES-D — 1	ISI — 9	SHAI — 2
CPDI — 3	IUS — 1	SOS — 1
CSS — 1	JGLS — 1	SRQ-20 — 2
DASS — 9	K6:10 — 2	STAI — 1
ECQ — 1	MHLSS — 1	TEMPS-A — 1
FESS — 1	NRS — 1	ULS — 1
GAD — 15	PCL — 3	VTS — 1
GHQ — 2	PHQ — 14	WHO-5 — 6
GPS — 3	PID-5-BF — 1	WHO-QOL — 1
HADS — 2	PSQI — 2	

NS – Number of studies using the instrument; AIS – Athens Insomnia Scale; ASQ – Attachment Style Questionnaire; BSCS – Brief Self-Control Scale; CDRISC – Connor-Davidson Resilience scale; CERQ – Cognitive Emotion Regulation Questionnaire; CES-D – Center for Epidemiology Scale for Depression; CPDI – COVID-19 Peritraumatic Distress Index; CSS – Cyberchondria Severity Scale; DASS – Depression, Anxiety and Stress Scale; ECQ – Existential Concerns Questionnaire Scale; FESS – Family Economic Strain Scale; GAD – Generalized Anxiety Disorder; GHQ – General Health Questionnaire; GPS – Global Psychotrauma Screen; HADS – Hospital Anxiety and Depression Scale; HAI – Health Anxiety Inventory; HAMA – Hamilton Anxiety Scale; HAMD – Hamilton Depression Scale; IADQ – International Adjustment Disorder Questionnaire; IES – Impact of Event Scale; ISI – Insomnia Severity Index; IUS – Intolerance to Uncertainty Scale; JGLS – De Jong Gierveld Loneliness Scale; K (6/10) – Kessler 6/10-item Psychological Distress Scale; MHLSS – Mental Health Lifestyle Scale; NRS – Numeric Rating Scale; PCL – Posttraumatic Stress Disease Checklist for DSM-5; PHQ – Patient Health Questionnaire; PID-5-BF – Personality Inventory for DSM-5–Brief Form; PSQI – Pittsburgh Sleep Quality Index; PSS – Perceived Stress Scale; SAS – Self-Rating Anxiety Scale; SCL-90 – Symptom Checklist; SDS – Self-Rating Depression Scale; SF-12 – Short Form-12; SHAI – Short Health Anxiety Inventory; SOS – Stress Overload Scale; SRQ-20 – Self-Report Questionnaire; STAI – State-Trait Anxiety Inventory; TEMPS-A – Temperament Evaluation of Memphis, Pisa, Paris and San Diego-Autoquestionnaire; ULS – UCLA Loneliness Scale; VTS – Vicarious Traumatization Questionnaire; WHO-5 – WHO-Five Well-Being Index; WHO-QOL – WHO-Five Well-Being Index-Quality of Life.

Table 2. Newcastle-Ottawa Scale of the Studies Included in the Systematic Review

Studies	Representativeness	Sample Size	Non-respondents	Ascertainment of the Risk Factor	Comparability	Ascertainm. of Outcome	Statistical Test	Total
Wang et al.[15]	1	0	1	2	1	1	1	7
Liu et al.[16]	0	1	0	2	1	1	1	6
Huang & Zhao[17]	1	0	0	2	1	1	1	6
Wang et al.[18]	1	0	0	1	1	1	1	5
Tian et al.[19]	1	0	1	2	1	1	1	7
Gao et al.[20]	1	0	0	2	1	1	1	6
Y. Zhang & Ma[21]	0	1	0	2	1	1	1	6
Li et al.[22]	1	0	0	2	1	1	1	6
Y. Wang et al.[23]	0	0	1	2	1	1	1	6
Rossi et al.[24]	1	0	0	2	1	1	1	6
Rossi et al.[25]	1	0	0	2	1	1	1	6
Mazza et al.[26]	1	0	0	2	1	1	1	6
Moccia et al.[27]	0	0	0	2	1	1	1	5
Costantini & Mazzotti [28]	0	0	0	2	1	1	1	5
Mostafa et al.[29]	0	0	1	2	1	1	1	6
Moghanibashi-Mansourieh[30]	0	0	1	2	1	1	1	6
Adams-Prassl et al.[31]	1	1	0	2	1	1	1	7
Tull et al.[32]	0	0	0	2	1	1	1	5
Ꮮlzdin & Ꮮlzdin[33]	1	1	1	2	1	1	1	8
Jungmann & Witthuft [34]	1	0	0	2	1	1	1	6
Jahanshahi et al.[35]	1	0	0	2	1	1	1	6
Voitsidis et al.[36]	1	0	0	2	1	1	1	6
Sɯnderskov et al.[37]	1	1	0	2	1	1	1	7
de Quervain et al.[38]	1	0	0	2	1	1	1	6
Sajid et al.[39]	1	0	0	2	1	1	1	6
Pieh et al.[40]	1	1	0	2	1	1	1	7
Qiu et al.[41]	1	0	0	2	1	1	1	6

Limcaoco et al.[42]	1	0	0	2	1	1	1	6
W. Zhang et al.[43]	1	0	0	2	1	1	1	6
Li et al.[44]	0	0	0	1	1	1	1	4
Simione & Gnagnarella[45]	0	0	0	2	1	1	1	5
Ozamiz-Etxebarria et al.[46]	0	0	0	2	1	1	1	5
Kang et al.[47]	0	0	0	2	1	1	1	5
Tan et al.[48]	0	0	0	2	1	1	1	5
Sun et al.[49]	0	0	0	2	1	1	1	5
C. Zhang et al.[50]	1	1	1	2	1	1	1	8
Chen et al.[51]	0	0	0	2	1	1	1	5
Lai et al.[52]	1	1	0	2	1	1	1	7
Cai et al.[53]	1	0	0	2	1	1	1	6
Lu et al.[54]	1	1	1	2	1	1	1	8
X. Li et al.[55]	0	0	0	2	1	1	1	5
Xing et al.[56]	0	0	1	2	1	1	1	6
Z. Zhu et al.[57]	1	1	0	2	1	1	1	7
Mo et al.[58]	0	0	0	2	1	1	1	5
Xu et al.[59]	0	0	0	2	1	1	1	5
S. X. Zhang et al.[60]	0	0	0	2	1	1	1	5
Rossi et al.[61]	1	0	0	2	1	1	1	6
Abdulah et al.[62]	0	0	0	2	1	1	1	5
Badahdah et al.[63]	0	0	0	2	1	1	1	5
Bo et al.[64]	0	1	1	2	1	1	1	7
Zhang et al.[65]	0	0	0	2	1	1	1	5
Zhu et al.[66]	1	0	0	2	1	1	1	6
Liang et al.[67]	0	0	1	2	1	1	1	6
Cao et al.[68]	1	1	1	2	1	1	1	8
Wang et al.[69]	1	0	0	2	1	1	1	6

The total quality score ranged between 0-10. The study quality was categorized according to the overall score. Very good for 9-10; Good for 7-8; Satisfactory for 5-6; and Unsatisfactory for 0-4.

Scales

To assess mental health, the Generalized Anxiety Disorder (GAD), the Patient Health Questionnaire (PHQ), the Impact of Event Scale (IES), the Depression, Anxiety and Stress Scale (DASS), and the Insomnia Severity Index (ISI) were the most used instruments in the literature. Table 1 shows different scales that have been used in different studies. Table 3 presents the different studies, the methodology used, the sample size, country of origin, and main findings.

Discussion

Fifty-five studies met the inclusion criteria for this systematic review. Several psychometric tools were used in the literature, which make it a delicate task to interpret the results. Overall, the evidence is not sufficiently robust to confirm that the COVID-19 pandemic had either a positive or negative impact through this review. A part of our results suggested that social behaviors developed in response to the fear due to the COVID-19 pandemic made people more confident and helped them enhance their mental status.

On the other hand, most of our findings reinforce the notion that large-scale human disasters, like global pandemic infectious diseases such as COVID-19, cause the most significant psychological disorders in the population.[6,70] Although the literature is not consensual of the direction of the association, our results suggest that the COVID-19 pandemic had a significant impact on the population's mental well-being, which can be explained by a significant prevalence and association in every single study. In this way, some Chinese studies reported lower psychological disorder rates.[16,21,22,48] A study assessing the global mental health among the general public reported that more than 2 people out of 3 had poor mental health.[67] Another study pointed out a greater risk of depression, or greater presence of depressive symptoms when global mental health was poor.[20]

Somatization, obsessive-compulsive, and interpersonal sensitivity were regarded as the most common troubles among both the general public and healthcare workers in studies that used the SCL-90.[19,56] Depression was a risk factor to develop mental health problems and vice versa.[20,66] Few studies reported a negligible rate of anxiety and did not find out any significant association.[23,48] A survey on over eighteen thousand Italians figured out an anxiety rate of about 84%.[24]

In the contrary, a Chinese survey on patients, quarantined and general population found out that anxiety rate was not statistically different across the three groups.[65] Although Tull et al.'s study[32] showed that the COVID-19 impact and stay-at-home orders had no statistical impact on depression, this formed part of the most common psychological disorders among healthcare workers.[43,47,50-52,54,60-61] It was found that female gender and exposure to COVID-19 as a healthcare worker (HCW) were two of the factors that often predicted depressive symptoms.[48,50,54,57,60,61,65] A study reported that depression affected all of the respondents aged 70 years or above.[29]

Post-Traumatic Stress Syndrome (PTSS) was one of the commonest mental disorder screened in the population. Bo et al. found out that 96% of over 700 clinically stabilized patients were down with PTSS.[64] It was also found that stress due to COVID-19 was a major risk factor that disturbed sleep habits.[16,17,62]

Twelve studies focused on insomnia and two on sleep quality. Insomnia had a considerable prevalence in different studies, especially among medical professionals who dealt with COVID-19 patients. An Iraqi survey found that more than two-thirds of the physicians reported insomnia as the impact of COVID-19 on their work.[62] More than one person out of five had, in response to the COVID-19 pandemic, developed some adjustment disorder symptoms. Furthermore, a relationship was observed between being under quarantine due to being infected or a close contact to infected people and adjustment disorder.[24] In the United States, financial worries and loneliness were predicted by stay-at-home orders and the perceived impact of COVID-19.[32] Cyberchondria was also reported to affect mental health.[20,34]

Few studies involving COVID-19 patients and quarantined[64-66] also strengthened the suggestion that the mental impact of a major crisis had a wider and longer effect on people compared to physical injuries.[71]

This unprecedented COVID-19 pandemic has such considerable psychological impacts, which are worth to consider in their earlier stage.[7]

An increase in depression during COVID-19 may be supported by a report of Shervington and Richardson, which stated that experiencing catastrophic events entails many reactions, such as depression and some obsession attitudes.[72] Moreover, because of the fear and uncertainty of the striking problem, people's responses

Table 3. the Different Studies, the Methodology Used, the Sample Size, Country of Origin, and Main Findings

Study	Design, Sampling Strategy and Study Period (dd.mm.yy)	Country	Population	Outcome Measures	Results
			GENERAL PUBLIC		
Wang et al.[15]	Cross-sectional Anonymous online survey From 31.01.20 to 02.02.20	China	General public N=1210, 67% of female, Ages 12-59 years old.	IES-R, DASS-21	The psychological impact of the outbreak as moderate or severe was found in 53.8% of respondents; 16.5%, 28.8%, and 8.1% reported moderate to severe depressive, anxiety symptoms, and stress levels respectively. Female gender, student status, specific physical symptoms (e.g., myalgia, dizziness, coryza), and poor self-rated health status were significantly associated with a greater psychological impact of the outbreak and higher levels of stress, anxiety, and depression (all $p<.05$).
Liu et al.[16]	Cross-sectional Online-based survey From 30.01.20 to 08.02.20	China	General public N=285, 54% of female, Aged from 18 years old.	PCL-5, PSQI .	The prevalence of PTSS was 7%. Women reported higher PTSS ($p=.002$). Close contact and confirmed or suspected had by far a higher PTSS level than health care workers and the general public ($p=.006$). Individuals with bad and very bad sleep quality were prevalent to PTSS ($p<.001$). Being female (B=4.621, β=.196, $p<.001$; B=4.526, β=.192, $p<.001$; B=2.407, β=.102, $p<.05$ in the three steps) and the incapability to fall asleep within 30 minutes (B=4.178, β=.172, $p<0.01$) were the most frequent factors related to a high PTSS.
Huang & Zhao.[17]	Cross-sectional Web-based survey From 03.02.20 to 17.02.20	China	General public N= 7236, 55% of female, Mean age= 35.3±5.6	GAD-7, CES-D, PSQI	The overall prevalence of anxiety, depressive symptoms, and poor sleep quality were 35.1%, 20.1%, and 18.2%, respectively. No significant difference was observed in any prevalence among the gender (all $p>.05$). Females were more likely to have GAD (OR=1.32; AOR=1.22,) and depressive symptoms (OR=1.30; OAR=1.24) than males. Healthcare workers reported the highest rate of poor sleep quality ($p<.001$) and were more likely to report poor sleep quality (OR= 1.48; AOR=1.32).
Wang et al.[18]	Longitudinal Web-based survey. Two surveys (T1 & T2) were carried out. T1: 31.01.20-02.02.20 T2: 28.02.20-01.03.20	China	General public N=1738 (T1: 1304, 67% of female; T2: 861, 75% of female), Ages from 12 to 59.	IES-R, DASS-21	A significant reduction was found in mean IES-R scores ($p<.01$) after 4 weeks. Nonetheless, this was not clinically significant. During T1, moderate-to-severe stress, anxiety and depression were reported by 8.1%, 28.8%, and 16.5%, respectively and there was no significant difference in stress, anxiety and depression levels according to T2 (all $p>.05$). Females were highly affected by IER-S during T1 ($p<0.05$) and T2 ($p<.01$). In contrast, the male had more severe stress (t=2.33, $p<.05$), anxiety ($p<.01$) and depression ($p<.05$) during T1 and only depression ($p<.01$) during T2. The second survey respondents aged 12 to 21.4 years demonstrated a significantly higher score of IES-R as compared to respondents aged 49.6-59 years (B=0.77, $p<.05$).
Tian et al.[19]	Cross-sectional Web-based survey From 31.01.20 to 02.02.20	China	General public N=1060, 48% of female, Mean age= 35.01±12.8	SCL-90	More than 70% of them have moderate and higher levels of psychological symptoms specifically elevated scores for obsessive compulsion, interpersonal sensitivity, phobic anxiety, and psychoticism. Obsessive-Compulsion was the most prevalent symptom in the population. No significant differences were seen between males and females ($p=.72$). The Global Severity Index (GSI, mean of all 90 items in SCL-90) T-score of people under 18 was the highest.

Gao et al.[20]	Cross-sectional Online-based survey From 31.01.20 to 02.02.20	China	General public N=4827, 68% of female, Mean age= 32.3±10.0	WHO-5, GAD-7	Depression, anxiety, and a combination of Depression-Anxiety (CDA) were 48.3%, 22.6%, and 19.4%. More than 4 out of 5 participants reported being frequently exposed to social media. Social Media Exposure (SME) was positively associated with high odds of anxiety (OR=1.72) and CDA (OR=1.91) compared with less SME. Participants with poor general health were much more at risk to face depression (OR=2.91).
Y. Zhang & Ma[21]	Cross-sectional Online-based survey and phone interviews From 28.01.20 to 05.02.20	China	General public N=263, 60% of female, Mean age= 37.7±14.0	IES, MHLSS	Only 7.6% of participants had an IES score more than the average. The overall mean IES score reflected a mild stressful impact. No difference was found in mean scores (p=.173) and percentages of participants with an IES (p=.478) between females and males. Most of the participants (53.3%) stated that they did not feel helpless due to the pandemic, while 52.1% of them stated that they felt horrified and apprehensive due to the pandemic.
Li et al.[22]	Cross-sectional Online-based survey From 02.02.20 to 09.02.20	China	General public N=4607, 73% of female, Mean age= 23.7±17.29	GHQ-12, BSCS	Participants reported a few mental health problems (9.5%), relatively high levels of perceived severity of the COVID-19 (81.8%), and medium levels of self-control (60.6%). Perceived severity of the COVID-19 and self-control was negatively and positively related to mental health problems, respectively. A significant association was found between perceived severity and self-control (B=.05, p<.001).
Y. Wang et al.[23]	Cross-sectional Online-based survey From 06.02.20 to 09.02.20	China	General public N=600, 56% of female, Mean age= 34±12	SAS, SDS	Around 6% and 17% of the sample were anxious and depressed, respectively. Regarding gender, females were significantly highly affected by anxiety (p=.011) and increased the risk to develop it (OR=3.01, p=.005) while no difference was found in depression. No difference in neither anxiety nor depression was found in age groups. The performed correlation analysis showed that SAS and SDS standard scores were statistically associated (r=.696, p<.001).
Rossi et al.[24]	Cross-sectional Online-based survey From 27.03.20 to 06.04.20	Italy	General public N=18147, 80% of female, Median age= 38 years	GPS-PTSS, PHQ-9, GAD-7, ISI, PSS-10, IADQ	Participants presenting PTSS, depression, anxiety, insomnia, high perceived stress, and adjustment disorder were 37%, 17.3%, 20.8%, 7.3%, 21.8%, and 22.9%, respectively. Quarantine because infected or in close proximity to infected people had a relation with PTSS (OR=1.74), anxiety (OR=1.52), and adjustment disorder symptoms (OR=2.28). Being a woman was associated with all of the outcomes (all p<.001). Younger age was associated with PTSS, depression, anxiety, and perceived stress (all p<.001).
Rossi et al.[25]	Cross-sectional Online-based survey From 27.03.20 to 06.04.20	Italy	General public N=18147, 80% of female, Mean age= 38±23	GPS, PHQ-9, GAD-7, ISI, PSS-10	Anxiety (83.52%), depression mood (65.1%), and insomnia (63.94%) were the most common mental disorders found in the population. Reversed age, female gender, quarantined, housewife, experienced a stressful event due to COVID-19 and people whose loved one deceased from COVID-19 formed part of the most affected subsets by negative affect, PTSS, dissociation and GPS (all p≤.01) whereas quarantined, housewife and people whose loved one deceased from COVID-19 were not associated with dissociation (all p>.05).
Mazza et al.[26]	Cross-sectional Online-based survey From 18.03.20 to 22.03.20	Italy	General public N=2766, 72% of female, Mean age= 32.94±13.2	DASS-21, PID-5-BF	Regarding DASS-21, around 33%, 19% and 27% of respondents presented depression, anxiety, and stress, respectively. Both detachment and negative effect as well as male gender and age were associated with all psychological disorders (all p<.001) but age was not related to anxiety (p=.107).
Moccia et al.[27]	Cross-sectional	Italy	General public	K10,	To begin, 19.4% and 18.6% of respondents displayed mild and moderate-to-

	Online-based survey From 10.04.20 to 13.04.20		N=500, 60% of female, Age grouped.	TEMPS-A, ASQ	severe likelihood of psychological distress, respectively. Females and younger were more affected than males (p=.029) and older (p=.004), respectively. All components of Temperament and Attachment except ASQ-Relationships as secondary were associated with psychological distress (all p≤0.01).
Costantini & Mazzotti[28]	Cross-sectional Online-based survey From 15.04.20 to 24.04.20	Italy	General public N=329, 58% of female, Mean age= 46.49±13.58	CPDI, IES-R	A third of people presented symptoms of peritraumatic distress (CPDI). COVID-19 peritraumatic distress was more prevalent among females than males regarding CPDI (31, 42% vs. 16,79%, p=.008). Use of psychotropic drugs (AOR=4.28), use of sleeping remedies (AOR=4.05), being worried about dying in case of contagion COViD-19 (AOR=3.33), female gender (AOR=2.95), and having a religious belief (AOR=1.97) were all associated with more distress.
Mostafa et al.[29]	Cross-sectional Online-based survey From 29.03.20 to 31.03.20	Iran	General public N=788, 61% of female, Mean age= 36.61±10.97	HADS	Anxiety and depression were present in 15.1% and 15.2%, respectively. Regarding the gender group, anxiety was significantly prevalent in women (18.6% vs. 9.5%, p<.001), and depression was also prevalent in women but not significantly (16.2% vs. 12.5%, p=.223). Respondents of 70 years and above were more depressed (100%, p=.049). None of the occupation groups presented more anxiety or depression levels than others (all p>.05).
Moghanibashi-Mansourieh[30]	Cross-sectional Online-based survey From 01.03.20 to 09.03.20	Iran	General public N=10754, 66% of female, No data on age	DASS-7 (anxiety)	About 51% reported anxiety symptoms and 9.8% had severe anxiety. Women (p<.001) and the 21-40-year-old group (p=<.001) were the most affected groups regarding gender and age, respectively. The degree and severity of anxiety of those who resided in a high prevalence of COVID-19 were significantly higher (p<.001). At last, the degree of anxiety was significantly higher among people who had relatives or friends with COVID-19 (p<.001).
Adams-Prassl et al.[31]	Cross-sectional Online-based survey. Two surveys (T1 and T2) were carried out. T1: 24.03.20-25.03.20 T2: 09.04.20-11.04.20	United States of America	General public N=8003 (T1: 4003, T2: 4000). No data on gender and age	WHO-5	Globally, Stay-at-home had a significant negative impact on mental health (p=.038). The authors examined whether the mental impact of state-wide stay-at-home measures differs between men and women. The estimated gender gap was not significant in states that had a lockdown in place (p=.098), which represented 66% of the increase in the estimated gender gap in mental health, compared to states which did not have lockdown measures. Finally, they figured out that being female, and living in a state with stay-at-home orders were associated with a reduction in mental health (p=.014).
Tull et al.[32]	Cross-sectional Online-based survey From 27.03.20 to 07.04.20	United States of America	General public N=500, 47% of female, Mean age= 40.0±11.6	DASS-21, SHAI, FESS, ULS	Although its rate was so low (<10%), anxiety had been affected by stay-at-home orders (p=.02) and COVID-19 impact (p<.001). Oppositely, neither stay-at-home (p=.08) nor COVID-19 impact (p=.957) was associated with depression. Analyses were done in 3 steps. In the second step, stay-at-home orders impacted depression severity (p=.045) and health anxiety (p=.01); the perceived impact of COVID-19 had an impact on only health anxiety (p<.001). Nevertheless, both stay-at-home orders and the perceived impact of COVID-19 had no significant effect on anxiety and depression (p>.1).
Özdin & Özdin[33]	Cross-sectional Online-based survey From 14.04.20 to 16.04.20	Turkey	General public N=343, 49% of female, Mean age=37.16±10.31	HADS, HAI	Prevalence of depression was 23.6%, and 45.1% for anxiety. Female gender (OR=2.478, p=.01) and previous psychiatric illness history (OR=0.363, p=.01) were found as risk factors for anxiety; living in urban areas was found as a risk factor for both depression (OR=.534, p=.036) and anxiety (OR=0.534, p=.015); and female gender (β=.105, p=.047), accompanying chronic disease

					(β=.160, *p*=.003) and previous psychiatric history (β=.176, *p*=.001) increased the risk of health anxiety.
Jungmann & Witthuft[34]	Cross-sectional Online-based survey From 15.03.20 to 22.03.20	German	General public N=1615, 80% of female, Mean age= 33.36±13.18	SHAI, CSS-15, CERQ	About half of respondents had anxiety about COVID-19. Compared to males, females experienced a higher level of anxiety (*p*<.001). No difference was found between age groups (*p*>.05). Regarding occupation, a lower level of anxiety was found in college students and health professionals (*p*=.003) than other participants. At last, the authors also reported that anxiety was correlated with cyberchondria (r=.48, *p*<.001).
Jahanshahi et al.[35]	Cross-sectional From 25.03.20 to 28.03.20	Iran	General public N=1058, 54% of female, No data on age.	CPDI	Respectively 47.0% and 14.1% of the Iranian adults experienced mild to moderate and severe peritraumatic distress. Female gender was associated with distress (β=-3.62, *p*=.000). The unemployed reported higher distress than the employed (*p*=.02) and students (*p*=.02). No difference was observed between people who were diagnosed positive to COVID-19 and those who were not (*p*>.05).
Voitsidis et al.[36]	Cross-sectional Online-based survey From 10.04.20 to 13.04.20	Greece	General public N=2363, 76% of female, No data on age	AIS, PHQ-2, IUS-12, JGLS	Insomnia was found among 37.6% of participants. Regarding gender, females were the most affected (*p*=.001). The authors performed multiple linear regression analyses to predict insomnia (AIS) resting on the significance of the positive correlation of the independent variables. They ended up with a significant equation [F (4, 2030) = 331,928 *p*<.001] with an R^2 of 0.395. Participants' predicted insomnia was equal to 3.232 + 0.398 (JGLS) + 1.338 (PHQ-2) + 0.63 (IUS) + 0.178 (COVID-19 worry).
Sønderskov et al.[37]	Cross-sectional Online-based survey From 31.03.20 to 06.04.20	Denmark	General public N=2458, 51% of female, Mean age= 49.1 years	WHO-5	A comparison of the WHO-5 well-being scale between this survey and a previous survey (DMHWBS 2016, Nielsen et al., 2017) was performed. The proportion of respondents with minimal well-being (WHO-5<50) was significantly higher than for the DMHWBS 2016 (25.4% vs. 22.5%, *p*<.001) and for females (28.8% vs. 24.6%, *p*=.005), but not for males (21.8% vs. 20.0%, *p*=.110). We found quite strong negative correlations between the reported levels of depression/anxiety and the WHO-5 scores.
de Quervain et al.[38]	Cross-sectional Online-based survey From 06.04.20 to 08.04.20	Swiss	General public N=10472, 71% of female, Ages from 14 to 92	PHQ-9, 6 point Likert scales for anxiety and stress	Around a half and 57.01% of the sample perceived an increase in stress and depression, respectively, for the time during the lockdown compared to the time before the corona crisis. None of the socio-demographic factors were related to a change in stress degrees (all r<.1). More the stress increased, the more the anxiety (r = 0.63) and the depression (r = 0.49) increased.
Kazmi et al.[39]	Cross-sectional Online-based survey Carried out in 04.20	India	General public N=1000, 62% of female, Age≥ 15 (grouped)	DASS- 21	Depression, anxiety, and stress were found among 38.9%, 43%, and 35.7% of respondents, respectively. 13.6%, 22.3%, and 15.2% of the sample were screened having moderate to severe depression, anxiety, and stress, respectively. Females were more affected by anxiety (*p*=.000) and stress (*p*=.000) and less affected by depression (*p*=.002). Regarding age, the greatest affection of all psychological disorders assessed by DASS-21 was found in the 21-25 years age group (all *p*=.000).
Pieh et al.[40]	Cross-sectional Two online-based surveys (T1 & T2)	Austria (T1) and United	General public T1: N=1009, 53% of female. T2: N=1006,	WHO-QOL, WHO-5,	Respondents from the UK were more prevalent by stress, depression, anxiety, and insomnia while those from Austria had a higher score of WHO-QOL and WHO-5 (*p*<.001). Moreover, depression, anxiety, and insomnia were more

	T1: 10.04.20-19.04.20, T2: 21.04.20-30.04.20	Kingdom (T2)	54% of female. Age ≥18 (grouped)	PHQ-9, GAD-7, PSS-10, ISI	prevalent in the UK than in Austria (p<.001). The authors stated that the situation of mental health in the UK was worse. Over 16% of respondents in the UK presented moderate and 25% severe depressive symptoms on the PHQ-9 and around 19% presented moderate and 20% severe anxiety symptoms.
Qiu et al.[41]	Cross-sectional Online-based survey From 31.01.20 to 10.02.20	China, Hong Kong, Macau, and Taiwan	General public N=52 730, 65% of female, all ages included.	CPDI	Almost 35% of the respondents experienced psychological distress. CPDI score was associated with their gender, age, education, occupation, and region. Female respondents (p<.001) and individuals older than 18 years showed significantly higher psychological distress. Migrant workers experienced the highest level of distress (p<.001) among all occupations.
Limcaoco et al.[42]	Cross-sectional Online-based survey From 17.03.20 to 01.04.20	41 countries	General public N=1091, 68% of female, Mean age= 43.1±14.2	PSS-10	Women, youth (<30 years), students, and among those who expressed concern about becoming infected with COVID-19 and those who perceived increased susceptibility to the coronavirus had a higher level of stress (all p<.001). No significant differences were found between the health professionals and the general population. Following factors predicted stress: constant (B=17.6, p<.001), age (B=-.14, p<.001), female (B=1.7, p=.001), and the sum of responses about worry (B=2.1, p<.001).
General Public and Healthcare Workers					
W. Zhang et al.[43]	Cross-sectional Online-based survey From 19.02.20 to 06.03.20	China	Healthcare workers (HCW) and non-Healthcare workers (NHCW) N=2182, 64% of female, age grouped.	ISI, PHQ-2, GAD-2, SCL-90-R	Authors found out higher prevalence rates of depression (p=.04), insomnia, anxiety, somatization, and obsessive-compulsive symptoms (all p<.01) and higher total scores of PHQ-2 (p=.01), ISI, GAD-2, and on the SCL-90-R obsessive-compulsive symptom scale (all p<.01) among HCW than NHCW. Risk of contact with COVID-19 patients in hospitals and having organic diseases were two of the most found risk factors for several disorders in both HCW and NHCW.
Li et al.[44]	Cross-sectional Online-based survey From 17.02.20 to 21.02.20	China	General public and nurses N=740, 78% of female, age grouped.	VTS	The sample was broken into three groups: general public (29%), frontline nurses (32%), and non-frontline nurses (39%). The VTS presented a statistical difference (p<.001) between the general public, front-line nurses, and non-front-line nurses. Front-line nurses had significantly lower vicarious traumatization scores than the general public and non-front-line nurses (p<.05). Moreover, no significant difference was noted in vicarious traumatization scores between the general public and non-front-line nurses (p>.05).
Simione & Gnagnarella[45]	Cross-sectional Online-based survey From 10.03.20 to 12.03.20	Italy	General public (CONTROL) & Healthcare workers (MED) N=353, 75% of female, Mean age= 38.26±12.24	PSS, STAI, ECQ	MED group's mental health was more affected than control group's regarding being in contact with people at risk of infection (p<.01) and with people positive for COVID-19 test (p<.01). Regarding gender, the estimated gender gap was not significantly established in anxiety (p>.19) compared with perceived stress (p<.01). In addition, the female gender predicted higher odds to worry about several risks, among others: being infected (OR=1.67), a global crisis (OR=2.03), people's behaviour in response to the outbreak (OR=1.01), infecting family members or love ones (OR=2.38). Older age people had higher odds to worry about their health status in case of COVID-19 infection (OR=1.03) and by people's reaction to virus spreading (OR=1.04).

Ozamiz-Etxebarria et al.[46]	Cross-sectional exploratory-descriptive Online-based survey From 11.03.20 to 15.03.20	Spain	General public and nurses N=976, 81% of female, Ages from 12 to 59.	DASS-21	Though levels of psychological symptoms were generally low at the start of the alert, younger individuals with chronic diseases reported more symptoms than the rest of the population. Females had a higher score than males regarding depression, anxiety and, stress. The authors also detected greater levels of disorders after the stay-at-home order was issued. Such symptoms are predicted to increase as the confinement continues.
Healthcare Workers					
Kang et al.[47]	Cross-sectional Anonymous online survey From 29.01.20 to 04.02.20	China	Healthcare workers N=994, 86% of female, Aged from 18 to 50 years old or above. Participants were divided into 4 groups.	PHQ-9, GAD-7, ISI, IES-R	The study revealed that 22.4% and 6.2% had moderate and severe disturbances respectively according to depression. There were significant differences in the four used scales among the four groups. The authors constructed a Structural Equation Model (SEM) to explore the relationship. This showed that exposure and mental healthcare services had direct as well as indirect negative effects on mental health which can be expressed by abnormal scores. All of these three are considered to have an impact on physical health.
Tan et al.[48]	Cross-sectional Online-based survey From 24.02.20 to 25.02.20	China	Healthcare givers and staff N=673, 26% of female, Mean age= 30.8±7.4	IES-R, DASS-21, ISI	7.9% of respondents had clinically significant PTSD-like symptoms and 10.8% presented the diagnostic criteria for PTSD. Less than 10% of respondents reported anxiety, depression, stress, and clinical insomnia for each trouble separately. No differences were found between workers/technical staff and managers/ executives in the mean score and severity of PTSD symptoms, depression, anxiety, stress, and insomnia (p>.05). In addition, 34% of respondents worried about their physical health, but there was no difference between both two groups (p=.307).
Sun et al.[49]	Cross-sectional Online-based survey From 31.01.20 to 04.02.20	China	Healthcare workers N=442, 83% of female, age≥18 (grouped)	IES	Though the prevalence of general mental disorders was unavailable, no difference was found in gender (p=.087) while the oldest (≥59 years) had the highest score (p=.018). There was no significant difference in occupation (p=.189). 89% of respondents were aware of the great risk they were at and 8% of them had the idea of quitting.
C. Zhang et al.[50]	Cross-sectional Online-based survey From 29.01.20 to 03.02.20	China	Healthcare workers N=1563, 69% of female, age≥18 (grouped)	ISI, PHQ-9, GAD-7, IES-R	Separately, 36.1%, 50.7%, 44.7%, and 73.4% of respondents presented insomnia, depression, anxiety, and distress. The sample was divided into 2 groups: insomnia (36%) and non-insomnia (64%). Female gender (p=.003) and young people between 18-25 years old (p=.031) were associated with insomnia as well as doctors and nurses (p=<.001). Besides, PHQ-9, GAD-7, and IES-R were associated with insomnia as well (all p<.001).
Chen et al.[51]	Cross-sectional No data on the survey period	China	Healthcare workers N=105, 90% of female, Mean age= 32.6±6.5	SDS, SAS	Anxiety and depression were found among 36.2% and 59.1% of respondents, respectively. Most socio-demographic (gender, age, occupation, etc.) factors had no impact on anxiety and depression. However, HCW who experienced COVID-19 or exposure reported a higher rate of anxiety accompanied by depression than others (31.6% vs. 12.6%, p=.042) and were at risk to develop anxiety and depression.
Lai et al.[52]	Cross-sectional The hospital-based survey, Cluster sampling From 29.01.20 to 03.02.20	China	Healthcare workers N=1257, 77% of female, age≥18 (grouped)	ISI, PHQ-9, GAD-7, IES-R	Insomnia, depression, anxiety, and distress were reported by 34%, 50.4%, 44.6%, and 71.5% of respondents. Females were more affected by all assessed disorders (all p<.05) apart from insomnia (p=.40). Insomnia was higher in nurses than doctors (p<.01). Front-line HCW were highly affected than second-line HCW according to all disorders (p<.01).

Cai et al.[53]	Cross-sectional No data on the survey period	China	Healthcare workers N=1521, 76% of female, age≥18 (grouped)	SCL-90, CDRISC	Psychological abnormalities were found in 14.1% of participants. There was no difference in neither gender nor age (all p>.1). The fresh medical staff was commonly affected by Interpersonal sensitivity (p=.037) and Phobic anxiety (p=.17). Additionally, being female and working in the frontline formed part of the factor risks of all assessed mental troubles.
Lu et al.[54]	Cross-sectional From 25.02.20 to 26.02.20	China	Healthcare workers N=2299, 80% of female, No data on age.	NRS, HAMA, HAMD	The authors divided the sample into two groups: Medical staff (89%) and Administrative staff (11%). Fear (p=<.001) and anxiety (p=.049) were significantly more prevalent in the medical staff group than the administrative staff group. According to the average level, the medical staff group was most affected by fear (p<.001), anxiety (p=.015), and depression (p=.029). Regarding departments, working with high-risk of infection increased risks to be down with all troubles (OR=1.408, p=.034 for fear; OR=2.062, p=.001 for anxiety; OR=2.016, p=.023 for depression).
X. Li et al.[55]	Cross-sectional Online-based survey From 15.02.20 to 22.02.20	China	Healthcare workers N=948, No data on age.	AIS, SRQ-20	Compared to Ningbo, Wuhan had a higher prevalence of insomnia (58.9% vs. 24.97%, p=.001) and general psychological symptoms (13.24% vs. 8.64, p=.044). In Wuhan, female gender (OR=1.379, p=.042) and undergraduate or above (OR=1.54, p=.0076) were considered as risk factors of insomnia. The presence of psychological symptoms was a risk factor of insomnia in both Wuhan (OR=2.124, p<.01) and Ningbo (OR=0.57, p=.046).
Xing et al.[56]	Cross-sectional Online-based survey From 25.01.20 to 16.02.20	China	Healthcare workers N=548, 72% of female, No data on age.	SCL-90	About 33% of the sample had an abnormal SCL-90 factors score. Medical personnel were at a higher level of somatization (p=.003), obsessive-compulsive (p<.0001), interpersonal sensitivity (p<.0001), anxiety (p=.001), phobic anxiety (p<.0001), and psychoticism (p=.017) than the national norm group. Constant (B=14.766, p<.0001) degree of suspicion that oneself was infected when the novel coronavirus-related symptoms occurred (B=2.959, p<.0001) and level of concern whether oneself and one's family have been infected (B=2.728, p<.0001) were the most associated factors to SCL-90 score.
Z. Zhu et al.[57]	Cross-sectional Online-based survey From 08.02.20 to 10.02.20	China	Healthcare workers N=5062, 85% of female. Age ≥19 (grouped)	PHQ-9, GAD-7, IES-R	Depression, anxiety, and psychological distress were reported by 13.45%, 24.06%, and 29.81% of respondents. Prevalence rates of all measured disorders were higher among females than males (all p<.001). The middle age group was (30-49) and nurses were more affected by depression, anxiety as well as psychological distress (all p<.001). Females were at risk to develop depression (OR=1.75, p<.001), anxiety (OR=1.33, p=.012), and psychological distress (OR=1.31, p=.032). Finally, nurses were 2.24 times (p<.001) at risk to develop psychological distress.
Mo et al.[58]	Cross-sectional Started on 21.02.20	China	Nurses N=180, 90% of female, Mean age= 32.71±6.52	SOS, SAS	The stress rate in the 180 nurses who assisted in fighting the COVID-19 was 39.91%. Nurses had a higher score of anxiety (p<.001) than national standard points and 22.22% of them presented anxiety. The authors stated that the higher the stress load is, the higher the total anxiety is and the more evident the anxiety mood will be. Working for hours (β=.106, p=.048), total anxiety score (β=.664, p=.000) and being the only child in the family (β=-4.625, p=.000) were the stress risk factors figured out by multiple regression analyses.

Xu et al.[59]	Cross-sectional Two surveys were carried out (P1: outbreak period & P2): non-outbreak period P1: 28.01.20-29.02.20 P2: 02.03.20-21.03.20	China	Surgeons N=120 P1: N=60, 63% of female. Mean age= 36.68±9.67 P2: N=60, 53% of female. Mean age= 35.77±7.06	Anxiety scale, Depression scale, Dream Anxiety scale, SF-36	The reported outcomes showed a significant increase in the levels of anxiety and depression of the surgical staff during the outbreak period, compared to those during the non-outbreak (all p<.001). Correlations between anxiety-depression (r=.636, p<.001 vs. r=.4048, p<.001), anxiety-dream anxiety (r=.4809, p<.001 vs. r=.1406, p<.0032) and depression-dream anxiety (r=487, p<.001 vs. r=.1027, p<.0125) were stronger during the outbreak period than the non-outbreak period.
S. X. Zhang et al.[60]	Cross-sectional Hospital-based survey From 05.04.20 to 20.04.20	Iran	Healthcare workers N=304, 59% of female, Mean age= 35.1±9.1	SF12, K6, PHQ-4	Authors found out that 20.1%, 28%, and 20.6% of respondents reported distress, anxiety, and depression, respectively. Women experienced more distress than men. The female gender predicted depression (β=.547, p<.05) and distress (β=2.14, p<.05) while the age predicted abnormal mental health (β=.230, p<.05).
Rossi et al.[61]	Cross-sectional Online-based survey From 27.03.20 to 31.03.20	Italy	Healthcare workers N=1379, 77% of female, Mean age= 39±16	GPS, PHQ-9, GAD-7, ISI, PSS	Insomnia, depression, anxiety, PTSS, and stress were reported by 8.27%, 24.73%, 19.8%, 49.38%, and 21.9% of respondents. Females were at risk (all OR>2, p<.001) to all disorders except insomnia (p=.40). However, nurses (OR=2.03, p<.05) and healthcare assistants (OR=2.34, p<.05) were at risk to develop insomnia. Being exposed to the COVID-19 infection increased the risk of depression (OR=1.54, p<.05).
Abdulah et al.[62]	Cross-sectional Online-based survey From 19.04.20 to 24.04.20	Iraq	Healthcare workers N=268, 30% of female, Mean age= 35.06±7.61	AIS	Stress and sleeplessness were found in 93.7% and 68.3%, respectively. A higher prevalence (77.5% vs. 64.4%) and a worse status (p=.034) of sleep were found among females. Neither age (p=.150) nor specialty (p=.059) were associated with sleeplessness. Dealing with patients and having stress at any level were associated with sleeplessness (all p<.001). Finally, stress was correlated with sleeplessness (r=.558, p<.001).
Badahdah et al.[63]	Cross-sectional Online-based survey Carried out in 04.20	Oman	Healthcare workers N=194, 60% of female, Mean age= 40.72±8.53	PSS-10, GAD-7, WHO-5	In the results, the overall prevalence was not available. Nonetheless, women had a higher level of stress (p=.02) and poor psychological well-being (p=.03) while there was no difference in anxiety between both two genders (p=.21). Age was negatively correlated to stress level (r=-.26, p=.002) and positively correlated to WHO-5 score (r=.25, p=.003). Multiple linear regression analyses showed that both stress score (β=–.40, p=.000) and anxiety score (β=–.40, p=.000) significantly predicted the scores on the psychological well-being index.
Patients and Quarantined					
Bo et al.[64]	Cross-sectional Online-based survey Started in 03.20	China	Clinically stabilized patients N=714, 51% of female, Mean age= 50.2 ± 12.9	PCL-C	96.2% of all the patients included in this survey presented significant posttraumatic stress symptoms associated with the COVID-19. The authors also reported that half of the sample (49.8%) stated that psycho-educational services would be helpful.

Zhang et al.[65]	Cross-sectional App-based, anonymous survey From 15.02.20 to 29.02.20	China	Recovered to COVID-19, quarantined, and the general public. N=205, 21% of female, No well-presented data on age.	PHQ-9, GAD-7	The prevalence of severe depression symptoms was higher (p=.002) among patients who experienced COVID-19 infection (19.3%) than in the general public (14.3%), while the prevalence of anxiety was not statistically different across the three groups (p=.154). No statistical difference has been reported regarding the comorbidity depression-anxiety (p=.086). Patients who experienced COVID-19 infection and the general public were more likely to demonstrate depressed mood (p=.038) and somatic symptoms (all p<.01) than individuals under quarantine.
Zhu et al.[66]	Cross-sectional From 12.02.20 to 17.03.20	China	Quarantined and non-quarantined N=1443, 60% of female, No data on age.	SRQ-20, GAD-7, PHQ-9	Psychological symptoms, anxiety, and depression were present among 15%, 22.2%, and 22.1% of respondents. None of the used measures showed a significant difference between participants with and without quarantine (all p≥.303) according to the screening-positive rate. This study reported that the screening-positive rate of SRQ-20, GAD-7, and PHQ-9 were related to impacts on daily life (all p<.001), whereas is was not related to the variable of with/without quarantine (all p≥.303) or different-group (all p≥0.614).
Young People and Students					
Liang et al.[67]	Cross-sectional Online-based survey Started on 30.01.20	China	Young people N=584, 38% of females, ages 14-35 years old.	GHQ-12, PCL-C	Males were more affected than females by PTSD (p<.01) and mental health disturbances (p<.01). Junior high school had the highest score of GHQ among the educational level group. The risk to develop mental health disturbances was higher in junior high school or below (OR=8.71, p <.01), enterprise employees (OR=2.36, p<.05), those who had PTSD symptoms (OR=1.05, p<.01), and those who used adopted negative coping strategies (OR=1.03, p<.05).
Cao et al.[68]	Cross-sectional Online-based survey No data on survey period	China	College students N=7143, 70% of female, No data on age.	GAD-7	About one-quarter (14.9%) had symptoms of anxiety. Students living with parents had a significant effect on anxiety, such that students living alone had increased anxiety (p<.05), while gender and area had no significant effect on anxiety (p>.05). It was important to report that having a relative or an acquaintance infected with COVID-19 was a risk factor for anxiety (OR=3.007, p<.001).
Wang et al.[69]	Cross-sectional Online-based survey From 15.02.20 to 17.02.20	China	University students N= 3611, 60% of female, Ages from 18 to 24	SAS	The prevalence of anxiety was 15.43%. The authors figured out significant differences between all males and all females (p<.001) and between all students majoring in arts and sciences (p=.05) in the anxiety sample. It is noteworthy that a student living in Xiangyang city was screened most anxious and his SAS scores were 100 (maximum), while others were mildly anxious.

tend to lead towards negative behaviours[73] affecting their physical health.[47,48,73] A high level of anxiety has been reported by most studies. (modif txt) This is in line with the increased level of anxiety noticed in Hong Kong during the SARS outbreak, where 70% of people were affected by this disease.[75]

As noted in previous studies, the increase of anxiety rate was expectable.[11,76] Besides the fast spread and the high mortality of COVID-19, people worried because the risk to contract infection was great and the transmission could be from people around them.

Other studies also previously stated that the vulnerability to psychological disorders is multifactorial.[18,77-79]

The Pappa et al.'s systematic review and meta-analysis also reported that females had a higher depressive level than males,[80] which can be supported by the notion of the already established gender gap for depressive symptoms.[81]

Medical professionals during the pandemic, especially frontline healthcare givers, are considered as vulnerable as COVID-19 patients and have been the most exposed group.[11,82] In addition, this may be strongly explained by the fact that COVID-19 is the first new occupational disease to be described in this decade.[83] A high impact on mental health among old people was expectable because COVID-19 was strongly associated with the elderly in terms of both morbidity and mortality.[7,10]

The COVID-19 worldwide pandemic, like other previous crises, has been a major source of collective psychological disturbances, resulting in a long-term posttraumatic stress disorder and chronic psychological distress.[3,77] Stress due to COVID-19 was a major risk factor that disturbed sleep habits.[16,17,62] Besides worrying about an eventual infection, the experience of being infected or hospitalized as well as experiencing the death of beloved ones were some of several factors that increased stress disorder and posttraumatic disorder.[84] The psychoneuroimmunity approach supports the fact that sleep disturbances in healthcare givers as well as in other people groups enhance the susceptibility to infections through a negative effect on the immune system.[85,86] So, it constitutes a weakness in the pandemic management effectiveness. It was expected that a constellation of mental disorders could be triggered by the fear of the unprecedented COVID-19 pandemic and that would lead to a potential mental health crisis.[88]

With everything considered, the evidence is not strong enough to make a robust statement on the impact of COVID-19 pandemic on mental health in the population. Overall, the literature applied several different measures whose outcomes were difficult to synthesize and to make homogeneous. Consequently, it is not completely possible to draw strong conclusions from the current evidence base. Although all studies used validated psychometric tools, their designs are naturally limiting factors of the generalisability of the research. Besides, the context in which those studies were carried out directly increased those limiting factors.

No study used a randomized controlled trial approach, which makes it challenging to assess potential confounders, and therefore difficult to accurately evaluate the impact of COVID-19. Reviewed studies evaluated the level of mental health without taking into account neither the in-depth population background nor the development of pandemic in terms of morbidity and mortality. Moreover, most studies were carried out online during the COVID-19 pandemic which is a limitation of most of those studies. As a consequence, it can lead to potential confounding factors such as social desirability bias. Furthermore, there is great inequality in the distribution of the population with high differences in sample size, study design and location. Those differences may be susceptible to affect the results, which would present potential confounders to any findings. Randomized and controlled processes would consider most of the possible factors, which could modify results such as demographic, population background, apparent mental health state, state of the pandemic in the area, and others. To do so, an appropriate clinical assessment was required and respondents would be under the control of investigators to easily manage potential confounding.

Hence, this review faced some limitations that made its application to future decisions difficult. More information is needed to provide a specific view to decision-makers to allow policy and strategies to aim at specific areas.

At First, regarding included studies, all the studies except one were cross-sectional which were limited by their nature. In this case, causality is not possible to be done. About the unique longitudinal study, besides self-reporting, the population sampled during both the first and second surveys were not the same participants. In addition, many respondents completed both surveys. The presence of mental health problems was assessed

by standardized and validated clinical questionnaires. Nonetheless, these measures are not equivalent to clinical diagnoses, and these instruments have their own limitations. They often use self-reporting, so recall bias must be considered. A clinician assessment is always necessary to make statements about psychiatric troubles. For instance, the structured clinical interview was missing, which makes the interpretation of the outcomes less specific. Second, the majority of the studies were carried out in Asia, especially China, preventing the current generalization of the results. Third, reviewers only used two search engines and only searched for studies written in English. A considerable number of relevant articles have been possibly missed out and its outcomes could bring a different view. Finally, the effect of socioeconomic and cultural factors was not deeply considered in this review as it includes studies from different corners of the world. Further research in this field is necessary, including studies designed to evaluate mental health in a larger number of participants as well as in individuals with specific conditions during such crises. Standardized protocols including randomization, psycho-clinical interviews are also required to enable a better understanding of outcomes.

Conclusion

To conclude, despite the lack of such strong evidence of unidirectional effect, this review suggests that the impact of the COVID-19 pandemic on the mental health of the world population without any restriction seems relatively scarce. More often, considerable gaps were mentioned between different groups. Although patients and healthcare workers are vulnerable and were more affected, the least exposed to the COVID-19 group presented a panel of psychological troubles as well. Previous studies revealed that such crises are likely to have long-term mental health effects. These findings suggest that governments be aware of the psychological crisis during outbreaks and necessarily need to ensure mental health well-being through strategic planning and coordination for psychological first aid, telemedicine services for patients in need, comprehensive crisis prevention, and intervention systems.

Authors' Contributions

H.C and L.K designed the study. H.C and F.H did the literature search. H.C, N.N, and D.B carried out the data extraction. H.C and F.H assessed the study's quality, and any discrepancies were discussed with R.K. H.C wrote the first draft of the review. E.KA, R.K, and L.K. contributed and suggested improvements in the design of the study. E.KA, L.K, and R.K. reviewed the first draft. H.C wrote the final draft. R.K reviewed the final draft. All the authors read and approved the review protocol and the final manuscript.

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Ethics Approval and Consent to Participate

This study was approved by PROSPERO (no. CRD4 2020193580). Participants were voluntary and written informed consent was obtained from all participants. The project was conducted according to the World Medical Association Declaration of Helsinki.

Conflict of Interest

The authors declare no conflicts of interest.

References

1. World Health Organization. Mental health and psychosocial considerations during the COVID-19 outbreak. 2020.
2. Shanafelt T, Ripp J, Sinai M, Trockel M. Understanding and Addressing Sources of Anxiety Among Health Care Professionals During the COVID-19 Pandemic. JAMA. 2020; 323(21):2133-4. doi:10.1001/jama.2020.5893
3. Fegert JM, Vitiello B, Plener PL, Clemens V. Challenges and burden of the Coronavirus 2019 (COVID-19) pandemic for child and adolescent mental health : a narrative review to highlight clinical and research needs in the acute phase and the long return to normality. Child Adolesc Psychiatry Ment Heal. 2020;14:20. doi:10.1186/s13034-020-00329-3
4. Kontoangelos K, Economou M, Papageorgiou C. Mental Health Effects of COVID-19 Pandemia: A Review of Clinical and Psychological Traits. Psychiatry Investig. 2020;17(6):491-505. doi:10.30773/pi.2020.0161
5. Bahn GH. Coronavirus Disease 2019, School Closures, and Children's Mental Health. J Korean Acad Child Adolesc Psychiatry. 2020;31(2):74-9. doi:10.5765/jkacap.200010
6. Pappas G, Kiriaze IJ, Giannakis P, Falagas ME. Psychosocial consequences of infectious diseases. Clin Microbiol Infect. 2009;15(8):743-7. doi:10.1111/j.1469-0691.2009.02947.x
7. Cullen W, Gulati G, Kelly BD. Mental health in the COVID-19 pandemic. QJM: An Int J Med. 2020;113(5):311-2. doi:10.1093/qjmed/hcaa110
8. Griffiths MD, Mamun MA. COVID-19 suicidal behavior among couples and suicide pacts: Case study evidence from

press reports. Psychiatry Res. 2020;289:113105. doi:10.1016/j.psychres.2020.113105
9. Gold JA. Covid-19: adverse mental health outcomes for healthcare workers. BMJ. 2020;369:m1815. doi:10.1136/bmj.m1815
10. Orru G, Ciacchini R, Gemignani A, Conversano C. Psychological intervention measures during the COVID-19 pandemic. Clin Neuropsychiatry. 2020;17(2):76-9. doi:10.36131/CN20200208
11. Holmes EA, O'Connor RC, Perry VH, Tracey I, Wessely S, Arseneault L, et al. Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science. Lancet Psychiatry. 2020;7(6):547-60. doi:10.1016/S2215-0366(20)30168-1
12. Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gωtzsche PC, Ioannidis JP, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. J Clin Epidemiol. 2009;62(10):e1-34. doi:10.1016/j.jclinepi.2009.06.006
13. Kwon Y, Lemieux M, McTavish J, Wathen N. Identifying and removing duplicate records from systematic review searches. J Med Libr Assoc. 2015;103(4):184-8. doi:10.3163/1536-5050.103.4.004
14. Wells GA, Shea B, O'Connell D, Peterson J, Welch V, Losos M, et al. The Newcastle-Ottawa Scale (NOS) for assessing the quality of nonrandomised studies in meta-analyses. Clin Epidemiol. 2000.
15. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. Int J Environ Res Public Health. 2020;17(5):1729. doi:10.3390/ijerph17051729
16. Liu N, Zhang F, Wei C, Jia Y, Shang Z, Sun L, et al. Prevalence and predictors of PTSS during COVID-19 outbreak in China hardest-hit areas: Gender differences matter. Psychiatry Res. 2020;287:112921. doi:10.1016/j.psychres.2020.112921
17. Huang Y, Zhao N. Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. Psychiatry Res. 2020;288:112954. doi:10.1016/j.psychres.2020.112954
18. Wang C, Pan R, Wan X, Tan Y, Xu L, McIntyre RS, et al. A longitudinal study on the mental health of general population during the COVID-19 epidemic in China. Brain Behav Immun. 2020;87:40-8. doi:10.1016/j.bbi.2020.04.028
19. Tian F, Li H, Tian S, Yang J, Shao J, Tian C. Psychological symptoms of ordinary Chinese citizens based on SCL-90 during the level I emergency response to COVID-19. Psychiatry Res. 2020;288:112992. doi:10.1016/j.psychres.2020.112992
20. Gao J, Zheng P, Jia Y, Chen H, Mao Y, Chen S, et al. Mental health problems and social media exposure during COVID-19 outbreak. Plos One. 2020;15(4):e0231924. doi:10.1371/journal.pone.0231924
21. Zhang Y, Ma ZF. Impact of the COVID-19 pandemic on mental health and quality of life among local residents in Liaoning Province, China: A cross-sectional study. Int J Environ Res Public Health. 2020;17(7):2381. doi:10.3390/ijerph17072381
22. Li JB, Yang A, Dou K, Cheung RY. Self-control moderates the association between perceived severity of coronavirus disease 2019 (COVID-19) and mental health problems among the Chinese public. Int J Environ Res Public Health. 2020;17(13):4820. doi:10.3390/ijerph17134820
23. Wang Y, Di Y, Ye J, Wei W. Study on the public psychological states and its related factors during the outbreak of coronavirus disease 2019 (COVID-19) in some regions of China. Psychol Health Med. 2021;26(1):13-22. doi:10.1080/13548506.2020.1746817
24. Rossi R, Socci V, Talevi D, Mensi S, Niolu C, Pacitti F, et al. COVID-19 pandemic and lockdown measures impact on mental health among the general population in Italy. Front Psychiatry. 2020:790. doi:10.3389/fpsyt.2020.00790
25. Rossi R, Socci V, Talevi D, Niolu C, Pacitti F, Di Marco A, et al. Trauma-spectrum symptoms among the Italian general population in the time of the COVID-19 outbreak. Eur J Psychotraumatol. 2021;12(1):1855888. doi:10.1080/20008198.2020.1855888
26. Mazza C, Ricci E, Biondi S, Colasanti M, Ferracuti S, Napoli C, et al. A nationwide survey of psychological distress among Italian people during the COVID-19 pandemic: immediate psychological responses and associated factors. Int J Environ Res Public Health. 2020;17(9):3165. doi:10.3390/ijerph17093165
27. Moccia L, Janiri D, Pepe M, Dattoli L, Molinaro M, De Martin V, et al. Affective temperament, attachment style, and the psychological impact of the COVID-19 outbreak: an early report on the Italian general population. Brain Behav Immun. 2020;87:75-9. doi:10.1016/j.bbi.2020.04.048
28. Costantini A, Mazzotti E. Italian validation of CoViD-19 Peritraumatic Distress Index and preliminary data in a sample of general population. Riv Psichiatr. 2020;55(3):145-51. doi10.1708/3382.33570
29. Ramandi MM, Yarmohammadi H, Beikmohammadi S, Fahimi BH, Amirabadizadeh A. Factors associated with the psychological status during the Coronavirus pandemic, baseline data from an Iranian Province. Caspian J Intern Med. 2020;11(Suppl 1):484-94. doi: 10.22088/cjim.11.0.
30. Moghanibashi-Mansourieh A. Assessing the anxiety level of Iranian general population during COVID-19 outbreak. Asian J Psychiatr. 2020;51:102076. doi:10.1016/j.ajp.2020.102076
31. Adams-Prassl A, Boneva T, Golin M, Rauh C. The impact of the coronavirus lockdown on mental health: evidence from the US. 2020.
32. Tull MT, Edmonds KA, Scamaldo KM, Richmond JR, Rose JP, Gratz KL. Psychological outcomes associated with stay-at-home orders and the perceived impact of COVID-19 on daily life. Psychiatry Res. 2020;289:113098. doi:10.1016/j.psychres.2020.113098
33. Ozdin S, Bayrak Ozdin Ş. Levels and predictors of anxiety, depression and health anxiety during COVID-19 pandemic in Turkish society: The importance of gender. Int J Soc Psychiatry. 2020;66(5):504-11. doi:10.1177/0020764020927051
34. Jungmann SM, Witthuft M. Health anxiety, cyberchondria, and coping in the current COVID-19 pandemic: Which factors are related to coronavirus anxiety?. J Anxiety Disord. 2020;73:102239. doi:10.1016/j.janxdis.2020.102239
35. Jahanshahi AA, Dinani MM, Madavani AN, Li J, Zhang SX. The distress of Iranian adults during the Covid-19 pandemic–More distressed than the Chinese and with different predictors. Brain Behav Immun. 2020;87:124-5. doi:10.1016/j.bbi.2020.04.081
36. Voitsidis P, Gliatas I, Bairachtari V, Papadopoulou K, Papageorgiou G, Parlapani E, et al. Insomnia during the COVID-19 pandemic in a Greek population. Psychiatry Res. 2020;289:113076. doi:10.1016/j.psychres.2020.113076
37. Sønderskov KM, Dinesen PT, Santini ZI, Østergaard SD. The depressive state of Denmark during the COVID-19 pandemic. Acta Neuropsychiatr. 2020;32(4):226-8. doi:10.1017/neu.2020.15
38. de Quervain D, Aerni A, Amini E, Bentz D, Coynel D, Gerhards C, et al. The Swiss corona stress study. 2020.
39. Kazmi SS, Hasan DK, Talib S, Saxena S. COVID-19 and lockdown: A study on the impact on mental health. Available at SSRN 3577515. 2020. doi:10.2139/ssrn.3577515
40. Pieh C, Budimir S, Probst T. Mental health during COVID-19 lockdown: A comparison of Austria and the UK. SSRN Electron. J. 2020.
41. Qiu J, Shen B, Zhao M, Wang Z, Xie B, Xu Y. A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: implications and policy recommendations. Gen Psychiatr. 2020;33(2):e100213. doi:10.1136/gpsych-2020-100213
42. Sakib N, Bhuiyan AK, Hossain S, Al Mamun F, Hosen I, Abdullah AH, et al. Psychometric validation of the Bangla Fear of COVID-19 Scale: Confirmatory factor analysis and Rasch analysis. Int J Ment Health Addict. 2022;20:2623-34. doi:10.1007/s11469-020-00289-x
43. Zhang WR, Wang K, Yin L, Zhao WF, Xue Q, Peng M, et al. Mental health and psychosocial problems of medical health workers during the COVID-19 epidemic in China. Psychother Psychosom. 2020;89(4):242-50. doi:10.1159/000507639
44. Li Z, Ge J, Yang M, Feng J, Qiao M, Jiang R, et al. Vicarious traumatization in the general public, members, and non-members of medical teams aiding in COVID-19 control. Brain Behav Immun. 2020;88:916-9. doi:10.1016/j.bbi.2020.03.007
45. Simione L, Gnagnarella C. Differences between health workers

and general population in risk perception, behaviors, and psychological distress related to COVID-19 spread in Italy. Front Psychol. 2020;11:2166. doi:10.3389/fpsyg.2020.02166
46. Ozamiz-Etxebarria N, Dosil-Santamaria M, Picaza-Gorrochategui M, Idoiaga-Mondragon N. Stress, anxiety, and depression levels in the initial stage of the COVID-19 outbreak in a population sample in the northern Spain. Cad Saude Publica. 2020;36. doi:10.1590/0102-311X00054020
47. Kang L, Ma S, Chen M, Yang J, Wang Y, Li R, et al. Impact on mental health and perceptions of psychological care among medical and nursing staff in Wuhan during the 2019 novel coronavirus disease outbreak: A cross-sectional study. Brain Behav Immun. 2020;87:11-7. doi:10.1016/j.bbi.2020.03.028
48. Tan W, Hao F, McIntyre RS, Jiang L, Jiang X, Zhang L, et al. Is returning to work during the COVID-19 pandemic stressful? A study on immediate mental health status and psychoneuroimmunity prevention measures of Chinese workforce. Brain Behav Immun. 2020;87:84-92. doi:10.1016/j.bbi.2020.04.055
49. Sun D, Yang D, Li Y, Zhou J, Wang W, Wang Q, et al. Psychological impact of 2019 novel coronavirus (2019-nCoV) outbreak in health workers in China. Epidemiol Infect. 2020;148:e96. doi:10.1017/S0950268820001090
50. Zhang C, Yang L, Liu S, Ma S, Wang Y, Cai Z, et al. Survey of insomnia and related social psychological factors among medical staff involved in the 2019 novel coronavirus disease outbreak. Front Psychiatry. 2020;11:306. doi:10.3389/fpsyt.2020.00306
51. Chen Y, Zhou H, Zhou Y, Zhou F. Prevalence of self-reported depression and anxiety among pediatric medical staff members during the COVID-19 outbreak in Guiyang, China. Psychiatry Res. 2020;288:113005. doi:10.1016/j.psychres.2020.113005
52. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. JAMA Netw Open. 2020;3(3):e203976. doi:10.1001/jamanetworkopen.2020.3976
53. Cai W, Lian B, Song X, Hou T, Deng G, Li H. A cross-sectional study on mental health among health care workers during the outbreak of Corona Virus Disease 2019. Asian J Psychiatr. 2020;51:102111. doi:10.1016/j.ajp.2020.102111
54. Lu W, Wang H, Lin Y, Li L. Psychological status of medical workforce during the COVID-19 pandemic: A cross-sectional study. Psychiatry Res. 2020;288:112936. doi:10.1016/j.psychres.2020.112936
55. Li X, Yu H, Bian G, Hu Z, Liu X, Zhou Q, et al. Prevalence, risk factors, and clinical correlates of insomnia in volunteer and at home medical staff during the COVID-19. Brain Behav Immun. 2020;87:140-1. doi:10.1016/j.bbi.2020.05.008
56. Xing J, Sun N, Xu J, Geng S, Li Y. Study of the mental health status of medical personnel dealing with new coronavirus pneumonia. PloS One. 2020;15(5):e0233145. doi:10.1371/journal.pone.0233145
57. Zhu Z, Xu S, Wang H, Liu Z, Wu J, Li G, et al. COVID-19 in Wuhan: immediate psychological impact on 5062 health workers. MedRxiv. 2020. Doi:10.1101/2020.02.20.20025338
58. Mo Y, Deng L, Zhang L, Lang Q, Liao C, Wang N, et al. Work stress among Chinese nurses to support Wuhan in fighting against COVID-19 epidemic. J Nurs Manag. 2020;28(5):1002-9. doi:10.1111/jonm.13014
59. Xu J, Xu QH, Wang CM, Wang J. Psychological status of surgical staff during the COVID-19 outbreak. Psychiatry Res. 2020;288:112955. doi:10.1016/j.psychres.2020.112955
60. Zhang SX, Liu J, Jahanshahi AA, Nawaser K, Yousefi A, Li J, et al. At the height of the storm: Healthcare staff's health conditions and job satisfaction and their associated predictors during the epidemic peak of COVID-19. Brain , Behav , Immun. 2020;87:144-6. doi:10.1016/j.bbi.2020.05.010
61. Rossi R, Socci V, Pacitti F, Di Lorenzo G, Di Marco A, Siracusano A, et al. Mental health outcomes among front and second line health workers associated with the COVID-19 pandemic in Italy. MedRxiv. 2020. doi:10.1101/2020.04.16.20067801
62. Abdulah DM, Musa DH. Insomnia and stress of physicians during COVID-19 outbreak. Sleep Med. 2020;2:100017. doi:10.1016/j.sleepx.2020.100017
63. Badahdah AM, Khamis F, Al Mahyijari N. The psychological well-being of physicians during COVID-19 outbreak in Oman. Psychiatry Res. 2020;289:113053. doi:10.1016/j.psychres.2020.113053
64. Bo HX, Li W, Yang Y, Wang Y, Zhang Q, Cheung T, et al. Posttraumatic stress symptoms and attitude toward crisis mental health services among clinically stable patients with COVID-19 in China. Psychol Med. 2021;51(6):1052-3. doi:10.1017/S0033291720000999
65. Zhang J, Lu H, Zeng H, Zhang S, Du Q, Jiang T, et al. The differential psychological distress of populations affected by the COVID-19 pandemic. Brain, Behav Immun. 2020;87:49-50. doi:10.1016/j.bbi.2020.04.031
66. Zhu S, Wu Y, Zhu CY, Hong WC, Yu ZX, Chen ZK, et al. The immediate mental health impacts of the COVID-19 pandemic among people with or without quarantine managements. Brain, Behav Immun. 2020;87:56-8. doi:10.1016/j.bbi.2020.04.045
67. Liang L, Ren H, Cao R, Hu Y, Qin Z, Li C, et al. The effect of COVID-19 on youth mental health. Psychiatr Q. 2020;91(3):841-52. doi:10.1007/s11126-020-09744-3
68. Cao W, Fang Z, Hou G, Han M, Xu X, Dong J, et al. The psychological impact of the COVID-19 epidemic on college students in China. Psychiatry Res. 2020;287:112934. doi:10.1016/j.psychres.2020.112934
69. Wang C, Zhao H. The impact of COVID-19 on anxiety in Chinese university students. Front Psychol. 2020;11:1168. doi:10.3389/fpsyg.2020.01168
70. Badkhen A. PTSDland. Foreign Policy. 2012;195:34-6.
71. Allsopp K, Brewin CR, Barrett A, Williams R, Hind D, Chitsabesan P, et al. Responding to mental health needs after terror attacks. BMJ. 2019;366:l4828. doi:10.1136/bmj.l4828
72. Shervington DO, Richardson L. Mental health framework: coronavirus pandemic in post-Katrina New Orleans. J Inj Violence Res. 2020;12(2):191-7. doi:10.5249/jivr.vo112i2.1538
73. Rubin GJ, Wessely S. The psychological effects of quarantining a city. BMJ. 2020;368:m313. doi:10.1136/bmj.m313
74. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. Int J Environ Res Public Health. 2020;17(5):1729. doi:10.3390/ijerph17051729
75. Cheng C, Cheung MW. Psychological responses to outbreak of severe acute respiratory syndrome: a prospective, multiple time-point study. J Pers. 2005;73(1):261-85. doi:10.1111/j.1467-6494.2004.00310.x
76. Shigemura J, Ursano RJ, Morganstein JC, Kurosawa M, Benedek DM. Public responses to the novel 2019 coronavirus (2019-nCoV) in Japan: Mental health consequences and target populations. Psychiatry Clin Neurosci. 2020;74(4):281-2. doi:10.1111/pcn.12988
77. Boyraz G, Legros DN. Coronavirus disease (COVID-19) and traumatic stress: probable risk factors and correlates of posttraumatic stress disorder. J Loss Trauma. 2020;25(6-7):503-22. doi:10.1080/15325024.2020.1763556
78. Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, Greenberg N, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. Lancet. 2020;395(10227):912-20. doi:10.1016/S0140-6736(20)30460-8
79. Taylor MR, Agho KE, Stevens GJ, Raphael B. Factors influencing psychological distress during a disease epidemic: data from Australia's first outbreak of equine influenza. BMC Public Health. 2008;8(1):347. doi:10.1186/1471-2458-8-347
80. Pappa S, Ntella V, Giannakas T, Giannakoulis VG, Papoutsi E, Katsaounou P. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. Brain Behav Immun. 2020;88:901-7. doi:10.1016/j.bbi.2020.05.026
81. Albert PR. Why is depression more prevalent in women?. J Psychiatry Neurosci. 2015;40(4):219-21. doi:10.1503/jpn.150205
82. Adams JG, Walls RM. Supporting the health care workforce during the COVID-19 global epidemic. JAMA. 2020;323(15):1439-40. doi:10.1001/jama.2020.3972
83. Koh D. Occupational risks for COVID-19 infection. Occup Med. 2020;70(1):3-5. doi:10.1093/occmed/kqaa036
84. Mucci F, Mucci N, Diolaiuti F. Lockdown and isolation: psychological aspects of COVID-19 pandemic in the general

population. Clin Neuropsychiatry. 2020;17(2):63-4. doi:10.36131/CN20200205
85. Besedovsky L, Lange T, Born J. Sleep and immune function. Pflugers Arch - Eur J Physiol. 2012;463(1):121-37. doi:10.1007/s00424-011-1044-0
86. Irwin MR. Why sleep is important for health: a psychoneuroimmunology perspective. Annu Rev Psychol. 2015;66:143-72. doi:10.1146/annurev-psych-010213-115205
87. Neria Y, Sullivan GM. Understanding the mental health effects of indirect exposure to mass trauma through the media. JAMA. 2011;306(12):1374-5. doi:10.1001/jama.2011.1358
88. Zhou J, Liu L, Xue P, Yang X, Tang X. Mental health response to the COVID-19 outbreak in China. Am J Psychiatry. 2020;177(7):574-5. doi:10.1176/appi.ajp.2020.2003030