Psychological sequelae within different populations during the COVID-19 pandemic: a rapid review of extant evidence

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ABSTRACT

The rapid spread of coronavirus disease 2019 (COVID-19) has a potentially significant impact on not only physical health but also psychological well-being. To our best knowledge, no review thus far has consolidated the psychological impact of COVID-19 across different subpopulations. A systematic search of the literature until 15 June 2020 found 150 empirical papers pertinent to the mental health consequences of the pandemic. The majority (87.3%) were from China (45.3%), the rest of Asia (22.0%) and Europe (20.0%), and mostly examined the general population (37.3%), healthcare workers (31.3%) and those with pre-existing mental and physical illnesses (14.7%). The most common psychological responses across these subpopulations were anxiety (overall range 24.8%–49.5%), depression (overall range 18.6%–42.6%) and traumatic stress symptoms (overall range 12.7%–31.6%). Healthcare workers and those with pre-existing physical and mental illnesses were more severely affected. Future studies are needed on under-examined subgroups such as the elderly and recovered COVID-19 patients.

Keywords: healthcare workers, infectious diseases, psychological responses, vulnerable populations
INTRODUCTION

The severity and rapid spread of coronavirus disease 2019 (COVID-19) has had a significant impact on not only the physical health of communities worldwide but also their psychological well-being. This issue is of particular concern as the battle against this pandemic becomes increasingly long-drawn and strict infection control measures have been implemented. These measures will be eased at different rates around the world but may be reinstated with new waves of infection. As of 15 June 2020, COVID-19 has infected more than eight million people across 213 countries and territories; more than 435,000 people have died from the disease and over 4.1 million have recovered.(1)

Previous studies on the psychological impact of infectious diseases have commonly reported responses in the general population such as anxiety/fear, depression, anger, guilt, grief and loss, post-traumatic stress and stigmatisation. However, there is also a greater sense of empowerment and compassion towards others.(2) Healthcare workers at the forefront of the fight against infectious diseases experience various stressors such as the fear of getting infected, losing control of the spread of the virus, and passing the virus on to their family and friends.(3) Based on these past experiences, the potential mental health repercussions of infectious disease outbreaks are increasingly being recognised and acknowledged during the current COVID-19 pandemic.

To date, although there have been various international studies on the psychosocial responses related to COVID-19, no review thus far has consolidated the extant psychological impact on the different subpopulations such as the general population, healthcare workers and vulnerable populations, including patients with pre-existing physical or psychiatric illnesses. Hence, we aimed to examine and summarise existing studies to date regarding the psychological impact of COVID-19 on various populations through a rapid review. Understanding the psychological ramifications of this pandemic could inform healthcare
systems to target policy decisions for specific populations, and to anticipate and prepare for a protracted battle against COVID-19, in the face of globally dyssynchronous and varied infectious controls measures.

METHODS

We performed a systematic search of the available literature using PubMed and MEDLINE (Ovid). The following search strategy was used (‘Betacoronavirus’[Mesh] OR ‘Coronavirus Infections’[MH] OR ‘Spike Glycoprotein, COVID-19 Virus’[NM] OR ‘COVID-19’[NM] OR ‘Coronavirus’[MH] OR ‘Severe Acute Respiratory Syndrome Coronavirus 2’[NM] OR 2019nCoV[ALL] OR Betacoronavirus*[ALL] OR Corona Virus*[ALL] OR Coronavirus*[ALL] OR Coronovirus*[ALL] OR CoV[ALL] OR CoV2[ALL] OR COVID[ALL] OR COVID19[ALL] OR COVID-19[ALL] OR HCoV-19[ALL] OR nCoV[ALL] OR ‘SARS CoV 2’[ALL] OR SARS2[ALL] OR SARS-CoV[ALL] OR SARS-CoV-2[ALL] OR Severe Acute Respiratory Syndrome CoV*[ALL]) AND (mental health OR psychiatric OR psychological)) based on recommendations. Papers that were published from database inception to 15 June 2020 were considered for inclusion. Only empirical studies in the English language and papers from peer-reviewed journals that reported the psychological impact of COVID-19 on one or more populations were included. Case studies, reviews, qualitative studies and dissertations were excluded. Studies that did not report the rates or prevalence of psychological responses were also excluded. A PRISMA flow diagram depicting how articles were selected is presented in Fig. 1.
Fig. 1 PRISMA chart shows the article selection process.

RESULTS

The majority of the 150 included papers originated from Asia (67.3%, n = 101), Europe (20.0%, n = 30) and North America (9.3%, n = 14). Anxiety, depression, and traumatic distress were the three commonest reported psychological responses across all papers, with prevalence rates ranging from 2.7% to 72.8%, 0.9% to 83.6%, and 1.9% to 96.2%, respectively. Detailed prevalence rates are reported in the Appendix. Out of the 150 studies, 56 (37.3%) explored psychological responses in the general population, while 47 (31.3%) reported them within healthcare workers. Only 22 (14.7%) studies examined psychological responses in patients with pre-existing mental and physical conditions. In the general population, the prevalence of anxiety ranged from 2.7% to 62.5% while that of depression was 0.9% to
40.3\%,(11) and that of post-traumatic stress symptoms ranged from 1.9\%(12) to 33.0\%.(13) Among healthcare workers, the prevalence of anxiety ranged from 5.7\%(14) to 61.0\%,(15) depression ranged from 8.9\%(16) to 64.7\%.,(17) and post-traumatic stress symptoms ranged from 3.8\%(18) to 49.4\%.,(19) Among patients with pre-existing mental illnesses, the prevalence of anxiety was 23.6\%(5) to 50.0\%(20) and that of depression was 10.8\%(8) to 64.3\%,(20) while only one paper reported the prevalence of post-traumatic stress symptoms to be 31.6\%.(5) Among patients with pre-existing physical conditions, the prevalence of anxiety ranged from 42.0\%(21) to 72.8\%.(6) while that of depression ranged from 9.7\%(22) to 83.6\%.(6) There were relatively fewer reports on younger persons (children and youths), quarantined subgroups and COVID-19 patients. Available data suggests that the younger subgroup reported substantial rates of anxiety ranging from 24.9\%(23) to 45.5\%,(24) depression ranging from 9\%(25) to 48.1\%,(26) and traumatic stress ranging from 2.7\%(25) to 31.8\%,(27) Those who were quarantined reported anxiety ranging from 10.2\%(28) to 50.3\%,(29) depression ranging from 9.0\%(25) to 22.4\%,(30) and traumatic stress ranging from 2.7\%.,(25) Patients suffering from COVID-19 infection reported anxiety ranging from 2.4\%(31) to 55.3\%,(12) depression ranging from 12.2\%(31) to 60.2\%,(12) and traumatic stress ranging from 1\%(12) to 96.2\%.(9) Table I summaries the overall prevalence rates of COVID-19-related psychological responses among the different populations.

Table I. Overall prevalence rates of COVID-19-related psychological responses among different populations.

<table>
<thead>
<tr>
<th>Population</th>
<th>Anxiety</th>
<th>Depression</th>
<th>Traumatic stress symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>General population</td>
<td>2.7%–62.5%</td>
<td>0.9%–40.3%</td>
<td>1.9%–33.0%</td>
</tr>
<tr>
<td></td>
<td>Overall 24.8%</td>
<td>Overall 23.1%</td>
<td>Overall 20.8%</td>
</tr>
<tr>
<td></td>
<td>(16,825/67,773)</td>
<td>(13,412/58,114)</td>
<td>(2,163/10,380)</td>
</tr>
<tr>
<td>Healthcare workers</td>
<td>5.7%–61%</td>
<td>8.9%–64.7%</td>
<td>3.8%–49.4%</td>
</tr>
<tr>
<td></td>
<td>Overall 33.0%</td>
<td>Overall 25.7%</td>
<td>Overall 14.6%</td>
</tr>
<tr>
<td></td>
<td>(4,866/14,728)</td>
<td>(7,950/30,885)</td>
<td>(3,256/22,320)</td>
</tr>
<tr>
<td>Patients with pre-existing mental conditions</td>
<td>23.6%–50.0%</td>
<td>10.8%–64.3%</td>
<td>31.6%</td>
</tr>
<tr>
<td></td>
<td>Overall 26.0%</td>
<td>Overall 18.6%</td>
<td>Overall 31.6% (24/76)</td>
</tr>
<tr>
<td></td>
<td>(583/2,242)</td>
<td>(411/2,213)</td>
<td></td>
</tr>
</tbody>
</table>
Patients with pre-existing physical conditions

<table>
<thead>
<tr>
<th></th>
<th>42%–72.8%</th>
<th>9.7%–83.6%</th>
<th>12.7%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>49.5%</td>
<td>42.6%</td>
<td>broad criteria</td>
</tr>
<tr>
<td>(791/1,597)</td>
<td>(609/1,428)</td>
<td>12.7% (32/252)</td>
<td></td>
</tr>
</tbody>
</table>

**COVID-19: coronavirus disease 2019**

Measures proposed to address the mental health repercussions of the pandemic could be grouped into individual and collective measures. A total of 16 papers proposed measures that the individual could take, including ensuring adequate rest and exercise, increasing one’s self-awareness of emerging psychological stressors and mental health issues, boosting one’s sense of control. Collective measures proposed by 129 papers include regular crisis communications in order to ensure that accurate information is disseminated in a timely manner. False information should also be filtered out and corrected as soon as possible. There is a need to continually assess and monitor the psychological well-being of various populations (e.g. general population, healthcare workers and those with pre-existing physical or psychiatric conditions) in order to identify those at risk and offer early intervention. It has been recommended that adequate resources be allocated to mental health interventions, which should be made available and acceptable to various subpopulations through channels, including digital means. Disruption to essential medical services should be kept to a minimum such that those with pre-existing medical conditions can be supported throughout this pandemic. In addition, financial and social support may be helpful for reducing the repercussions for mental health that can arise from job losses or prolonged quarantine.

**DISCUSSION**

Our rapid review sought to capture an overview of psychological responses to date in various populations during the COVID-19 pandemic. We found that most studies focused on the general adult population, healthcare workers and the vulnerable (defined as those with pre-
existing physical and psychiatric illnesses), and anxiety, depression, traumatic stress were the more commonly reported responses across studies.

By geographical region, the majority of the studies conducted were from Asia (101 papers, 67.3%), especially China (68 papers, 45.3%), followed by Europe (30 papers, 20.0%). This is likely to be because China was the first country to discover and experience the rapid spread of COVID-19, followed by countries in Europe. Other countries may learn from the experiences of Asia (such as China) and Europe to better plan to serve mental healthcare needs in response to changes in the respective epidemic curves over time.

In terms of prevalence rate, healthcare workers tended to report higher rates of anxiety (overall 33.0%, 4,866/14,728) but lower rates of traumatic stress (overall 14.6%, 3,256/22,320) compared with the general population (overall 24.8%, 16,825/67,773 for anxiety and 20.8%, 2,163/10,380 for traumatic stress). The higher anxiety in healthcare workers can be related to the high infectivity of COVID-19 with the resultant sharp rise in infected cases and mortality seen and managed by frontline healthcare workers, especially at the start of the pandemic when little was known about its natural history.(155) The relative lower rate of traumatic stress in healthcare workers could be related to the better preparedness in terms of protective equipment and strict infection control measures within healthcare facilities in managing the outbreak.(49) Compared with past epidemics such as the severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) outbreaks, the rates of anxiety (up to 96% in MERS vs. overall 33% in COVID-19)(15,156) and traumatic stress (25.5% in SARS vs. overall 14.6% in COVID-19)(19,157) in healthcare workers were lower during the current pandemic. This likely reflects progressive improvements in infection control measures and infrastructure that have translated to better psychological well-being since earlier outbreaks such as SARS, especially in Asia, which bore the brunt of the infection and fatality.(158) Of note, there were relatively substantial psychological responses within subgroups, such as among those with pre-existing
physical and psychiatric illnesses (overall anxiety 26%–49.5%, overall depression 18.6%–42.6% and overall traumatic stress symptoms of 12.7%–31.6%).(5,6,8,20,22,44,50-65) Although less studied, psychological sequelae were noted in younger individuals such as children and youths (overall anxiety 31.0%, overall depression 34.2% and traumatic stress symptoms 11%),(23-27,39,41,66-69) individuals who were quarantined (overall anxiety 28.2%, overall depression 14.7%, overall traumatic stress symptoms 2.7%),(24,25,28-30,67,70,71) and patients who were infected with COVID-19 (overall anxiety 32.2%, overall depression 39.9%, overall traumatic stress symptoms 80.7%).(9,12,28,31,72,73) This highlights the need for active monitoring, early detection and attention to these psychological issues within the different subpopulations.

Practical implications include individual and institutional measures to address and ameliorate the psychological impact. At the institutional and governance level, useful considerations are: commitment for the long haul; timely communication about the local epidemic curve; enabling access to timely, accurate COVID-19-related information and resources for psychological help among the population and subgroups; constant review of implemented measures; and early identification of those in need of psychological help.(2) At the individual level, an emphasis on self-care and a healthy balance between work and rest, nutrition, sleep, and social connectivity(2) are crucial.

Several limitations were observed. First, timely publication of appropriate reports from other affected countries globally would provide a better representation of the nature and scale of the psychological impact. Second, examination of the psychological sequelae in specific subgroups such as the elderly, those who have recovered from COVID-19, and patients with multiple physical and psychiatric comorbidities is warranted. Third, some specific psychosocial responses are less examined but have been observed in past infectious disease outbreaks, including stigmatisation, grief and positive growth. Fourth, a better understanding of how digitalisation has helped or hindered psychological well-being would inform measures
to enhance psychological support. Fifth, there is a need to consider longitudinal studies to ascertain longer-term psychological sequelae within the different subgroups.

In conclusion, extant studies at this juncture suggest that there is substantial COVID-19 psychological sequelae among healthcare workers and the general population, including vulnerable subgroups. Further work is needed to better understand the psychological impact on under-examined subgroups, especially prospectively, in order to optimise psychological support for them globally.

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emotions, perceived stressors and coping strategies during a MERS-CoV outbreak. Clin


158. Shannon GW, Willoughby J. Severe acute respiratory syndrome (SARS) in Asia: a
## APPENDIX


<table>
<thead>
<tr>
<th>Author; country</th>
<th>Population</th>
<th>Scale</th>
<th>Main findings</th>
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</thead>
</table>
| Hao et al; China | Psychiatric patients n = 76 Age 32.8 ± 11.8 yr 37.1% female Healthy controls n = 109 age 33.1 ± 11.2 yr 62.4% female | IES-R, DASS-21, ISI | Psychiatric patients vs. healthy controls:  
• 31.6% vs. 13.8% PTSD  
• 23.6% vs. 2.7% anxiety  
• 22.4% vs. 0.9% depression  
• 17.0% vs. 0.9% stress  
• 27.6% vs. 0.9% insomnia |
| Almandoz et al; USA | Patients with obesity n = 123 Age 51.2 ± 13.0 yr 87.0% female | QIDS-SR – self-designed (lifestyle behaviours, COVID-19, employment) |  
• 72.8% anxiety  
• 83.6% depression  
• 61.2% stress eating |
| Cao et al; China | Medical staff n = 37 Age 32.8 ± 9.6 yr 78.3% female 43.2% doctors; 51.3% nurses; 5.5% clinical technicians | PHQ-9, MBI |  
• Doctors: 6.3% depression  
• Nurses: 31.6% depression  
• Entire sample: 18.9% depression |
| Rohde et al; Denmark | Case notes of patients under psychiatric services in Central Denmark Region n = 1,357 case notes from 918 patients Age (female) 36.3 ± 14.3 yr Age (male) 40.9 ± 13.8 yr 67.6% female | – |  
• 39.7% anxiety  
• 12.8% unspecified stress  
• 10.8% depression  
• 11.0% delusions  
• 0.019% PTSD symptoms  
• 0.063% obsessive-compulsive symptoms |
| Bo et al; China | COVID-19 patients n = 714 Age 50.2 ± 12.9 yr 50.9% female | PCL-C |  
• 96.2% significant PTSS  
• 49.8% considered psycho-educational services helpful |
| Balkhi et al; Pakistan | General population in Karachi, Pakistan n = 400 50.0% female | Self-designed (psychological impact of COVID-19) | 62.5% anxious on a daily basis |
| Lee et al; USA | Adults n = 1,237 45% female | CAS, GAD-7, PHQ, WSAS |  
• 25.4% coronavirus anxiety  
• 36.0% generalised anxiety  
• 40.3% depression  
• 35.0% functional impairment |
| Guo et al; China | COVID-19 patients n = 103 Age 42.5 ± 12.5 yr 42.7% female Matched controls n = 103 Age 41.5 ± 13.1 yr 47.6% female | PHQ-9, GAD-7, PSS-10, PCL-5 | Patients:  
• 60.2% depression (17.5% moderate to severe)  
• 55.3% anxiety (6.8% moderate to severe)  
• 1.0% PTSD |
<p>| Fekih-Romdhane et al; Tunisia | Tunisia general population n = 603 | IES-R, MSPSS, self-designed | 33.0% reported PTSD symptoms |</p>
<table>
<thead>
<tr>
<th>Study</th>
<th>Setting</th>
<th>Participants</th>
<th>Psychological measures</th>
<th>Mental health outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chew et al. (2014) Singapore, India</td>
<td>Healthcare workers from major hospitals in Singapore and India n = 906 53.0% Singapore, 47.0% India 64.3% female 39.2% nurses; 29.6% physicians; 10.6% allied healthcare professionals</td>
<td>DASS-21, IES-R</td>
<td>5.7% anxiety, 10.6% depression, 5.2% stressed, 7.4% PTSD  Most commonly reported physical symptoms:  ● 31.9% headache  ● 33.6% throat pain  ● 26.7% anxiety  ● 26.6% lethargy  ● 21.0% insomnia</td>
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<tr>
<td>Choudhury et al. (2015) England</td>
<td>Staff at a tertiary cardiac centre in the northwest of England n = 106 67% female</td>
<td>Self-designed (COVID-19 knowledge and behaviour), PHQ-9, PSS-4, GAD-7</td>
<td>53.0% depression  ● 61.0% anxiety</td>
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<tr>
<td>Tan et al. (2016) Singapore</td>
<td>Medical personnel n = 296  Non-medical personnel n = 174</td>
<td>DASS-21, IES-R</td>
<td>Medical personnel:  ● 10.8% anxiety  ● 8.1% depression  ● 6.4% stress  ● 5.7% PTSD  Non-medical personnel:  ● 20.7% anxiety  ● 10.3% depression  ● 6.9% stress  ● 10.9% PTSD</td>
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<tr>
<td>Elbay et al. (2017) Turkey</td>
<td>HCWs n = 442  Age 36.05 ± 8.69 yr 56.8% female</td>
<td>DASS-21</td>
<td>64.7% depression  ● 51.6% anxiety  ● 41.2% stress</td>
<td></td>
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<tr>
<td>Yin et al. (2018) China</td>
<td>HCWs n = 371  Age 35.3 ± 9.5 yr 61.5% female</td>
<td>PCL-5, PSQI</td>
<td>3.8% PTSS</td>
<td></td>
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<tr>
<td>Rossi et al. (2019) Italy</td>
<td>HCWs n = 1,379  Age 39.0 ± 16.0 yr 77.2% female</td>
<td>GPS, PHQ-9, GAD-7, ISI, PSS</td>
<td>49.38% reported PTSS  ● 24.73% reported symptoms of depression  ● 19.80% reported symptoms of anxiety  ● 8.27% reported insomnia  ● 21.90% reported high perceived stress</td>
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<tr>
<td>Forlenza &amp; Stella (2020) Brazil</td>
<td>Outpatients attending a psychogeriatric clinic n = 72</td>
<td>HADS, NPI-Q</td>
<td>37.7% exacerbation of pre-existing symptoms  ● 20.8% report new mental health symptoms  ● 60.0% psychiatric or psychological distress  ● 57.0% sleep complaints  ● 64.3% depression/dysphoria  ● 50.0% anxiety  ● 65.7% apathy  ● 60.0% irritability  ● 67.1% nocturnal behaviours  ● 58.6% appetite/eating behaviour  ● 23.0% paranoid symptoms</td>
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<tr>
<td>Yuan et al. (2021) China</td>
<td>Parents with children hospitalised during</td>
<td>HADS, VDAS, SF-36</td>
<td>During COVID-19 period:  ● 42.0% anxiety</td>
<td></td>
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<tr>
<td>Study</td>
<td>Country</td>
<td>Sample Description</td>
<td>Measures</td>
<td>Findings</td>
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<tr>
<td>COVID-19</td>
<td>n = 50</td>
<td>Age 36.8 ± 5.2 yr 62% female</td>
<td>Parents with children hospitalised during other periods n = 50 Age 37.2 ± 5.4 yr 52% female</td>
<td>• 48.0% depression  Non-COVID-19 periods:  • 8.0% anxiety  • 8.0% depression</td>
</tr>
<tr>
<td>Ng et al; Hong Kong</td>
<td>Cancer survivors n = 72</td>
<td>Age 52.96 ± 8.34 yr</td>
<td>Healthy controls n = 45 Age 57.78 ± 8.77 yr</td>
<td>Cancer survivors:  • 8.3% borderline anxiety  • 9.7% borderline depression  • 4.2% clinical anxiety  • 5.6% clinical depression  Healthy controls:  • 6.7% borderline anxiety  • 4.4% borderline depression  • 6.7% clinical anxiety  • 6.7% clinical depression</td>
</tr>
<tr>
<td>Cao et al; China</td>
<td>Undergraduates of Changzhi Medical College n = 7,143 67% female</td>
<td>Self-designed (COVID-19 knowledge and behaviour), GAD-7</td>
<td>24.9% anxiety</td>
<td></td>
</tr>
<tr>
<td>Zhang et al; China</td>
<td>College students practising social distancing at home n = 66 Age 20.70 ± 2.11 yr 62% female</td>
<td>DASS-21, BPAQ, self-designed (COVID-19 knowledge and behaviour)</td>
<td>• 28.79% stress  • 45.45% anxiety  • 22.73% depression  • 84.85% worried or very concerned about COVID-19</td>
<td></td>
</tr>
<tr>
<td>Tang et al; China</td>
<td>Home quarantined university students n = 2,485 60.8% female</td>
<td>PCL-C, PHQ-9</td>
<td>2.7% probable PTSD 9.0% depression</td>
<td></td>
</tr>
<tr>
<td>Odriozola-González et al; Spain</td>
<td>Members of university n = 2,530 Age 27.9 ± 12.4 yr 66.1% female</td>
<td>DASS-21, IES</td>
<td>• 35.2% anxiety  • 48.1% depression  • 40.3% stress  • 50.4% moderate to severe impact of outbreak</td>
<td></td>
</tr>
<tr>
<td>Liu et al; USA</td>
<td>Young adults aged 18–30 yr n = 898 Age 24.5 yr 81.3% female</td>
<td>CD-RISC-10, Distress Tolerance Scale, MSPSS, Two-Way Social Support Scale, UCLA-3 Short Form, Self-designed (COVID-19 related worry), PHQ-8, GAD-7, PCL-C</td>
<td>• 61.5% high loneliness  • 72.0% low resilience  • 74.1% low distress tolerance  • 43.3% high levels of depression  • 45.4% high anxiety scores  • 31.8% high PTSD symptoms</td>
<td></td>
</tr>
<tr>
<td>Zhang et al; China</td>
<td>Patients with COVID-19 n = 57 Age 46.9 ± 15.4 yr 49.1% female</td>
<td>PHQ-9, GAD-7</td>
<td>Patients:  • 29.2% depression  • 20.8% anxiety  Under quarantine:  • 9.8% depression  • 10.2% anxiety  General public:  • 34.7% depression  • 19.6% anxiety</td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Country</td>
<td>Sample Description</td>
<td>Measures</td>
<td>Findings</td>
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<tr>
<td>Madani et al. (29)</td>
<td>Algeria</td>
<td>Internet users living through first confinement</td>
<td>Self-designed (COVID-19 impact)</td>
<td>• 50.3% reported feeling anxious &lt;br&gt; • 48.2% reported feeling stress</td>
</tr>
<tr>
<td>Lei et al. (30)</td>
<td>China</td>
<td>Chinese population affected by quarantine</td>
<td>Self-designed (COVID-19 knowledge and behaviour), SAS, SDS</td>
<td>Entire sample: &lt;br&gt; • 8.3% anxiety &lt;br&gt; • 14.6% depression &lt;br&gt; Under quarantine: &lt;br&gt; • 12.9% anxiety &lt;br&gt; • 22.4% depression &lt;br&gt; Not under quarantine: &lt;br&gt; • 6.7% anxiety &lt;br&gt; • 11.9% depression</td>
</tr>
<tr>
<td>Qi et al. (31)</td>
<td>China</td>
<td>COVID-19 patients</td>
<td>GHQ-12, PCL-C, SAS, SDS, FS-14, SSRS, SCSQ</td>
<td>• 43.9% general mental health problems &lt;br&gt; • 12.2% PTSD symptoms &lt;br&gt; • 12.2% both anxiety and depression &lt;br&gt; • 12.2% only depression &lt;br&gt; • 2.4% only anxiety &lt;br&gt; • 53.6% chronic fatigue</td>
</tr>
<tr>
<td>Wu &amp; Wei (32)</td>
<td>China</td>
<td>Frontline medical staff from a designated hospital</td>
<td>SCL-90, SDS, SAS, PSQI, PCL-C</td>
<td>Designated hospital staff: 26.7% severe insomnia (Total PSQI 17–21)</td>
</tr>
<tr>
<td>Xu et al. (33)</td>
<td>China</td>
<td>Surgical medical staff</td>
<td>Self-designed (anxiety, depression, dream anxiety) SF-36</td>
<td>• 46.7% anxiety &lt;br&gt; • 40.0% depression</td>
</tr>
<tr>
<td>Zhang et al. (34)</td>
<td>China</td>
<td>Persons in China</td>
<td>ISI, SCL-90-R, PHQ-4 (GAD-2 and PHQ-2)</td>
<td>Non-medical health workers vs. medical health workers: &lt;br&gt; • 30.5% vs. 38.4% insomnia &lt;br&gt; • 8.5% vs. 13.0% anxiety &lt;br&gt; • 9.5% vs. 12.2% depression &lt;br&gt; • 0.4% vs. 1.6% somatisation &lt;br&gt; • 2.2% vs. 5.3% obsessive-compulsive symptoms</td>
</tr>
<tr>
<td>Yang &amp; Ma (35)</td>
<td>China</td>
<td>General population in China before the outbreak</td>
<td>Emotional Well-being Scale</td>
<td>74% decline in emotional well-being after the outbreak</td>
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<tr>
<td>Study</td>
<td>Country</td>
<td>Sample Description</td>
<td>Methodology</td>
<td>Findings</td>
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<td>Abdessater et al.;36 France</td>
<td>n = 3,000 Members of the French Association of Urologists in Training</td>
<td>Self-designed (COVID-19 knowledge and behaviour)</td>
<td>92.0% stressed</td>
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</table>
| Lwin et al.;37 NA | > 20 million social media (Twitter) posts | – | Change in proportion of daily tweets from January to April:  
- Fear: > 50% to < 30%  
- Anger: ~10% to > 20%  
- Joy: ~10% to ~30%  
- Sadness: Maintained at < 10% but still doubled over the course of time |
| Teufel et al.;38 Germany | People in Germany n = 12,244 | GAD-7, PHQ-2 | 11.9% depression  
10.0% generalised anxiety |
| Zhou et al.;39 China | Junior and senior high school students in China n = 8,079 | Self-designed (COVID-19 knowledge and behaviour), PHQ-9, GAD-7 | 43.7% depression  
37.4% anxiety  
31.3% comorbid anxiety and depression |
| Gao et al.;40 China | Chinese citizens n = 4,872 Age 32.3 ± 10.0 yr 67.6% female | Self-designed (social media exposure), WHO-5, GAD-7 | 48.3% depression  
22.6% anxiety  
19.4% combined depression and anxiety |
| Li et al.;41 China | Health professional students n = 1,442 | K6, IES-R | 26.6% clinically significant psychological distress  
11.1% probable ASR  
9.1% both distress and ASR |
| Wang et al.;42 China | General Chinese population n = 1,210 67.3% female | Self-designed (COVID-19 knowledge and behaviour), IES-R, DASS-21 | 16.5% moderate to severe depressive symptoms  
28.8% moderate to severe anxiety symptoms  
8.1% moderate to severe stress |
| Meng et al.;43 China | Seniors in China n = 1,556 61.3% female | PHQ-9, GAD-7 | 37.1% depression and anxiety |
| Jiang et al.;44 China | Patients in Wuhan undergoing the methadone maintenance treatment programme n = 17 | PHQ-9, GAD-7 | Average number of visits decreased from 127 persons per day to 109 persons per day |
| Li et al.;45 China | General population of Chinese residents n = 5,033 66.7% female | GAD-7, PHQ-9 | 20.4% anxiety or depression or both |
| Mamun & Ullah.;46 Pakistan | Suicide data from press reports | – | 16/29 suicide reports were related to COVID-19 issues:  
- About 9 were due to economic recession  
- 4 were due to fears of COVID-19 infection |
| Wang et al.;47 China | General Chinese population n = 1,738 | Self-designed (COVID-19 knowledge and behaviour) | 8.1% moderate to severe stress  
28.8% moderate to severe anxiety  
16.5% moderate to severe depression |
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<tr>
<th>Study</th>
<th>Country</th>
<th>Population</th>
<th>Methodology</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zhou et al.</td>
<td>China</td>
<td>Frontline healthcare workers, n = 1,001; Age 33.8 ± 6.6 yr; 88.9% female</td>
<td>IES-R, DASS-21</td>
<td>SCL-90, PSQI, CPSS</td>
</tr>
<tr>
<td>Cai et al.</td>
<td>China</td>
<td>Doctors, nurses, and other hospital staff throughout Hunan province, n = 534; Age 36.4 ± 16.2 yr; 68.7% female; 46.4% nurses; 43.6% doctors; 9.0% medical technicians; 1.0% hospital staff</td>
<td>Self-designed (COVID-19 knowledge and behaviour)</td>
<td>40.6% moderately or very nervous or frightened in the ward. Strict protective measures, knowledge of virus prevention and transmission, social isolation measures, and positive self-attitude were coping strategies used most frequently. Seeking help from family and friends was endorsed as a helpful strategy. Medical staff did not wish to reduce stress by consulting a psychologist.</td>
</tr>
<tr>
<td>Brown et al.</td>
<td>USA</td>
<td>Affected hip and knee arthroplasty patients, n = 360; Age 65 yr; 58% female</td>
<td>Self-designed (COVID-19 knowledge and behaviour)</td>
<td>60.0% moderately to severely anxious about not knowing when the procedure would be rescheduled; 79.4% isolated or lonely</td>
</tr>
<tr>
<td>Colizzi et al.</td>
<td>Italy</td>
<td>Parents and guardians of individuals with autism spectrum disorder, n = 527; Age of children with autism 13.0 ± 8.1 yr</td>
<td>–</td>
<td>35.5% reported more intense behavioural problems during outbreak; 41.5% reported more frequent behavioural problems during outbreak</td>
</tr>
<tr>
<td>Colle et al.</td>
<td>France</td>
<td>Patients from the psychiatric department, n = 376; Age 46.0 yr; 57.1% female</td>
<td>–</td>
<td>63.1% exacerbation of anxiety; 20.8% exacerbation of depression; 15.1% exacerbation of substance abuse</td>
</tr>
<tr>
<td>Frank et al.</td>
<td>Germany</td>
<td>Patients with mental illnesses treated in Technische Universität München, München, Germany, n = 196; Age 47 ± 15.8 yr; 54% female</td>
<td>CGI</td>
<td>Patients from all groups: &gt; 50% felt that they had to endure much more mental distress due to the pandemic; Patients with affective disorders: 1 in 4 reported increased difficulties sleeping; Patients with addiction: ≥ 50% complained that their daily routines were badly affected, they were afraid of the future, had financial worries, suffered from isolation and had increased irritability.</td>
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<td>Gupta</td>
<td>Canada</td>
<td>Patients with primary PTSD diagnosis, n = 20; 85% female</td>
<td>–</td>
<td>55.0% recent onset of difficulty falling asleep; 70.0% fragmented sleep recently and waking up 2–3 times due to disturbing dreams</td>
</tr>
<tr>
<td>Hao et al.</td>
<td>China</td>
<td>Patients with epilepsy, n = 252; Age 29.3 ± 11.3 yr; 52.4% female; Healthy controls, n = 252</td>
<td>K6</td>
<td>Patients vs. healthy controls: 13.0% vs. 2.0% psychological distress</td>
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<td>Study</td>
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<td>Findings</td>
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| Plunkett et al; (56) Ireland               | Patients attending community mental health team for anxiety disorder n = 30 Age 38.8 ± 12.8 yr 60.0% female | BAI, HAMA, CGI-Severity, GAF, Y-BOCS, CGI-Improvement                                            | • 50.0% reported deleterious effect of COVID-19 on mental health  
• 40.0% reported deleterious effect of COVID-19 on anxiety  
• 26.7% patients had disimprovement in symptoms as reported by clinician  
• 46.7% patients had improvement in symptoms as reported by clinician |
| Prasad et al; (57) India                   | Patients with Parkinson's Disease n = 100 Age 58.06 ± 10.04 yr 30% female                            | Self-designed (COVID-19 knowledge and behaviour)                                                  | Patients:  
• 8.0% perceived a higher risk of contracting COVID-19  
• 11.0% reported or perceived a worsening of or new symptoms following the onset of the COVID-19 pandemic  
Caregivers:  
• 4.0% perceived a higher risk of contracting COVID-19  
• 10.0% reported or perceived a worsening of or new symptoms following the onset of the COVID-19 pandemic |
| Rivetti & Barruscotti; (58) Italy          | Female patients with diagnosed telogen effluvium of at least 4–24 mth duration n = 25 Age 36.3 yr 100.0% female | –                                                                                                 | • 8.0% required psychological counselling due to worry  
• 56.0% perceived a worsening of their medical condition |
| Shalash et al; (59) Egypt                  | Parkinson’s Disease (PD) patients and controls PD patients n = 38 Age 55.6 ± 9.96 yr 23.7% females  
Controls n = 20 Age 55.6 ± 5.71 yr 30.0% female                                                | DASS-21, International Physical Activity Questionnaire, PD Questionnaire                          | PD patients vs. healthy controls:  
• 60.5% vs. 30.0% depression  
• 60.5% vs. 25.0% anxiety  
• 52.6% vs. 25.0% stress |
| Siniscalchi et al; (60) Italy              | Adults with celiac disease who had been on a gluten-free diet for at least 6 months n = 276 Age 39.0 ± 12.5 yr 75.7% female | CD-QOL                                                                                            | • 60.1% worried about pandemic  
• 39.4% disturbed/tense thinking about COVID-19 |
| Sun et al; (61) China                      | People living with HIV in China n = 703                                                              | –                                                                                                 | • 60.8% depression  
• 49.8% anxiety  
• 38.5% recent insomnia |
| Termorshuizen et al; (62) USA, Netherlands | People with eating disorders n = 511 (USA) Age 30.6 ± 9.4 yr 97.0% female                             | Self-designed (COVID-19 impact on eating disorders), GAD-7                                         | Eating disorder behaviour in past 2 weeks USA sample:  
• 23.0% binge eating  
• 48.0% restriction  
• 35.0% compensatory behaviours |
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<tbody>
<tr>
<td>Umucu &amp; Lee; (63)</td>
<td>USA</td>
<td>People with self-reported chronic conditions and disabilities n = 269 Age 39.37 ± 12.18 yr 43.9% female</td>
<td>PSQ-8, Brief COPE, PERMA-Profiler (Well-being), PHQ-4</td>
<td>Moderate level of stress, depression and anxiety based on mean scores reported. Acceptance and self-distraction were the most frequent coping strategies used. Denial was the least commonly used strategy, followed by substance use as the second least.</td>
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<tr>
<td>Zhao et al; (64)</td>
<td>China</td>
<td>Post-transplant patients residing in Wuhan during the outbreak n = 492</td>
<td>–</td>
<td>69.7% fear 11.0% depression</td>
</tr>
<tr>
<td>Zhou et al; (65)</td>
<td>China</td>
<td>Psychiatric outpatients n = 2,065 71.5% patients with pre-existing psychiatric disorders; 28.5% new patients</td>
<td>GAD-7, PHQ-9, ISI</td>
<td>Entire sample: 25.5% anxiety 16.9% depression 26.2% insomnia Patients with pre-existing psychiatric disorders: 20.9% reported deterioration of their mental health condition related to the pandemic 22.0% could not receive routine psychiatric care due to suspended hospital visits 18.1% have self-reduced medication dosages 17.2% have stopped taking their medication due to lack of access to prescriptions 7.4% sought online help for medical care New patients 24.5% could not receive timely diagnoses and treatment</td>
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<tr>
<td>Ma &amp; Miller; (66)</td>
<td>various Chinese students studying abroad</td>
<td>Chinese students studying abroad n = 182 Age 26.5 ± 4.9 yr 57.0% female</td>
<td>STAI, self-designed (discrimination, fear, living conditions), PSSS</td>
<td>31.3% perceived discrimination from the local community 58.2% perceived discrimination from the media 72.0% afraid of being infected 73.1% afraid of family/friends being infected</td>
</tr>
<tr>
<td>Saurabh &amp; Ranjan; (67)</td>
<td>India</td>
<td>Quarantined children and adolescents n = 121 Age 15.4 yr 14.88% female</td>
<td>Self-designed (COVID-19 knowledge and behaviour)</td>
<td>68.59% worry 66.11% helpless 61.98% fear</td>
</tr>
<tr>
<td>Xie et al; (68)</td>
<td>China</td>
<td>Primary school students in Hubei n = 1,784 43.3% female</td>
<td>CDI-S</td>
<td>22.6% depressive symptoms 18.9% anxiety symptoms</td>
</tr>
<tr>
<td>Liang et al; (69)</td>
<td>China</td>
<td>Chinese youths (aged 14–35 yr)</td>
<td>Self-designed (COVID-19 knowledge and</td>
<td>40.4% prone to psychological problems 14.4% PTSD symptoms</td>
</tr>
<tr>
<td>Authors</td>
<td>Country</td>
<td>Sample Description</td>
<td>Assessment</td>
<td>Findings</td>
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<tr>
<td>Xue et al. (70)</td>
<td>China</td>
<td>General population in China who were medically isolated; n = 707; Those in reported self-isolation; n = 3,012; Those in non-reported isolation; n = 10,786</td>
<td>GHQ-12, PCL-C, SCSQ</td>
<td>- Medically isolated: 76.7% difficulty falling asleep at least once in past week - Under self-isolation: 51.0% difficulty falling asleep at least once in past week The prevalence of sleep problems was high during the first 2 weeks of medical isolation and decreased thereafter</td>
</tr>
<tr>
<td>Zhu et al. (71)</td>
<td>China</td>
<td>Under quarantine; n = 1,443; Not under quarantine; n = 836</td>
<td>SRQ-20, GAD-7, PHQ-9</td>
<td>Under quarantine - 15.0% general psychological symptoms - 22.2% anxiety - 22.1% depression Not under quarantine - 13.4% general psychological symptoms - 20.8% anxiety - 20.8% depression</td>
</tr>
<tr>
<td>Zarghami et al. (72)</td>
<td>Iran</td>
<td>COVID-19 patients; n = 82 (32 inpatients, 50 outpatients); Age of inpatients 40.3 ± 14.4 yr; Age of outpatients 43.6 ± 15.8 yr; 61.0% female</td>
<td>PHQ-9, GAD-7, PSS-14</td>
<td>- 15.9% adjustment disorder - 29.3% insomnia - 3.7% major depressive disorder - 6.1% generalised anxiety disorder - 15.9% had 2 psychiatric illnesses - 37.3% depression (PHQ-9) - 28.9% anxiety (GAD-7) - Those with hospital admission (n = 30): 60.0% incidence of mental illness - Those without hospital admission (n = 52): 28.8% incidence of mental illness</td>
</tr>
<tr>
<td>Zhou et al. (73)</td>
<td>China</td>
<td>Suspected COVID-19 patients; n = 63; Age: 33.9 yr; 52.3% female</td>
<td>HADS</td>
<td>23.8% reported hospital anxiety and/or depression</td>
</tr>
<tr>
<td>Ahmad et al. (74)</td>
<td>Iraq</td>
<td>Social media users in Iraq; n = 516; 43% female</td>
<td>Self-designed</td>
<td>38.6% psychologically affected</td>
</tr>
<tr>
<td>Ahmad et al. (75)</td>
<td>30 different countries</td>
<td>Dentists; n = 650; 75% female</td>
<td>Self-designed (COVID-19 knowledge and behaviour)</td>
<td>- 87.0% afraid of getting infected with COVID-19 from either a patient or coworker - 90.0% anxious when treating a coughing patient or patient suspected to be infected with COVID-19 - 92.0% afraid of carrying the infection from dental practice to their families</td>
</tr>
<tr>
<td>Md Hazir et al. (76)</td>
<td>China</td>
<td>Chinese people; n = 1,074; Age 33.5 ± 11.1 yr; 46.8% female</td>
<td>BAI, BDI, AUDIT, WEMWBS</td>
<td>- 29.0% anxiety (12.9% severe) - 37.1% depression - 32.2% hazardous drinking or worse</td>
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<tr>
<td>Amerio et al. (77)</td>
<td>Italy</td>
<td>Italian general practitioners; n = 131; Age 52.3 ± 12.2 yr; 49.1% female</td>
<td>Self-designed (COVID-19 knowledge and behaviour), PHQ-9, GAD-7, ISI, SF-12</td>
<td>22.9% at least moderate depressive symptoms</td>
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<tr>
<td>Study</td>
<td>Country</td>
<td>Sample Details</td>
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<td>Findings</td>
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</table>
| Barbato & Thomas; (78) United Arab Emirates | n = 148 | Age 41.4 ± 7.7 yr 76% female | IES-R, PHQ-8, GAD-7 | - 22.3% PTSD  
- 20% depressive symptoms  
- 23% anxiety |
| Barello et al; (79) Italy | HCWs assisting COVID-19 patients n = 376 | Age 40 ± 11 yr | MBI | - 37.0% high emotional exhaustion  
- 24.7% high depersonalisation  
- 45% high frequency of physical symptoms |
| Bünzelt al; (80) Germany | Oncologists n = 47 | Patients n = 146 | Self-designed (COVID-19 knowledge and behaviour) | Physicians:  
- 52.0% anticipated negative impact of the crisis on their own mental and physical health  
- 21.0% feared the consequences of mental health specifically  
- 40.0% worried about getting infected by COVID-19  
- 33.0% emotionally stressed or burned out  
Patients:  
- 43.0% expected long-term impact on physical health  
- 34.0% described medical staff as emotionally stressed or burned out |
| Buonsenso et al; (81) Sierra Leone | Householders n = 78 | 21.8% female | Self-designed (COVID-19 knowledge and behaviour) | - 57.7% anxiety  
- 82% difficulty providing food for family |
| Cai et al; (82) China | HCWs treating COVID-19 n = 1,521 | | SCL-90, CD-RISC, SSRS | 14.1% psychological abnormality |
| Chen et al; (83) China | Paediatric medical staff in Guiyang, China n = 105 | Age 32.6 ± 6.5 yr 90.5% female | SAS, SDS | - 18.1% anxiety  
- 29.5% depression |
| Choi et al; (84) Hong Kong | Hong Kong general population n = 500 | Age 47.26 ± 15.82 yr 54.80% female | PHQ-9, GAD-7, Global Rating of Change Scale | - 19.8% depression  
- 14.0% anxiety  
- 25.4% deterioration in mental health |
| Civantos et al; (85) USA | Otofaryngology physicians n = 349 | 39.3% female | Mini-Z Burnout Assessment, GAD-7, IES, PHQ-2 | - 21.8% burnout  
- 47.9% anxiety  
- 60.2% distress  
- 10.6% depression |
| Consolo et al; (86) Italy | Dental practitioners n = 356 | 39.6% female | Self-designed (COVID-19 knowledge and behaviour), GAD-7 | - 4.2% experienced fear intensely  
- 42.7% minimal anxiety; 33.3% mild anxiety; 15.2% moderate anxiety; 8.7% severe anxiety |
<p>| Dixit et al; (87) Bangladesh, India, Indonesia, Nepal | General population in Bangladesh, India, Indonesia and Nepal n = 548 | 61.3% India; 22.3% Nepal; 10.2% Bangladesh; 6.2% Indonesia | Self-designed (binge watching) | 73.7% had considerable increase in binge watching |</p>
<table>
<thead>
<tr>
<th>Study</th>
<th>Population</th>
<th>Sample Size</th>
<th>Measures</th>
<th>Findings</th>
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</thead>
</table>
| Dong et al; (88) China | Hospital staff | n = 4,618 86.7% female | Self-designed (COVID-19 knowledge, behaviour and impact), HEI | • 24.2% high levels of anxiety and/or depressive symptoms  
• 14.9% mild negative emotions  
• 5.5% moderate negative emotions  
• 3.8% severe negative emotions |
| Du et al; (89) China | Frontline HCWs from two Wuhan-based hospitals  
Age 37.65 ± 9.72 yr  
HCWs in the outreach team  
Age 34.66 ± 6.1 yr | Self-designed (sleep quality), PSS, BDI-II, BAI | • 12.7% mild depressive symptoms  
• 20.1% mild anxiety symptoms  
• 59.0% moderate to severe perceived stress  
• 61.7% poor sleep quality  
Fear of self and colleagues getting infected ranked as the top source of stress and anxiety |
| Durankuş & Aksu; (90) Turkey | Pregnant women  
Age 29.6 ± 3.8 yr | EPDS, BDI, BAI | 35.4% at risk of depression |
| El-Zoghby et al; (91) Egypt | Adult Egyptians  
Age 30.0 ± 11.5 yr  
54.1% female | IES-R, self-designed (COVID-19 knowledge and behaviour) | • 41.4% severe impact  
• 34.1% stress from work  
• 55.7% financial stress  
• 62.7% stress from home  
• 53.9% horrified  
• 52.0% helpless  
• 66.3% apprehensive  
• 64.7% increased care for family members' feelings |
| Forte et al; (92) Italy | Italian general population  
Age 29.6 ± 11.4 yr  
74.0% female | Self-designed (COVID-19 PTSD), IES-R, SCL-90, PSQI, STAI-Y | 29.0% PTSD |
| Forte et al; (93) Italy | Italian general population  
Age 30.0 ± 11.5 yr  
74.6% female | Self-designed (mood scales), IES-R, SCL-90, STAI-Y | • 31.4% psychopathological symptoms  
• 37.2% anxiety  
• 27.7% PTSD symptoms |
| Gómez-Salgado et al; (94) Spain | General Spanish population  
Age 40.3 ± 13.2 yr  
74.0% female | GHQ-12 | 72.0% psychological distress |
| González-Sanguino et al; (95) Spain | General Spanish population  
Age 37.82 yr  
75% female | PHQ-2, GAD-2, PCL-C-2, InDi-D, UCLA-3 | • 18.7% depression  
• 21.6% anxiety  
• 15.8% moderate to extreme PTSS |
| Hou et al; (96) China | HCWs  
Age 37.82 yr  
54.6% female | SSRS, CD-RISC, SCL-90 | 7% psychological abnormality |
| Huang & Zhao; (97) China | Chinese public  
Age 35.3 ± 5.6 yr  
54.6% female | GAD-7, CES-D, PSQI | • 35.1% anxiety  
• 20.1% depression  
• 18.2% poor sleep quality |
| Kang et al; (98) China | Doctors and nurses in Wuhan  
Age 35.3 ± 5.6 yr  
75.5% female; 18.4% | Self-designed (COVID-19 knowledge and behaviour), PHQ-9, GAD-7, ISI, IES-R | • 34.4% mild disturbances (on all scales)  
• 22.4% moderate disturbances (on all scales)  
• 6.2% severe disturbances (on all scales) |
<table>
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<tr>
<th>Study</th>
<th>Participants</th>
<th>Measures</th>
<th>Findings</th>
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<tbody>
<tr>
<td>Khanna et al; (99) India</td>
<td>Ophthalmologists and ophthalmology trainees n = 2,355 Age 42.5 ± 12.1 yr 43.3% female</td>
<td>PHQ-9</td>
<td>• 32.6% some degree of depression</td>
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<td>• 6.9% moderate depression</td>
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<td>• 4.3% severe depression</td>
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<tr>
<td>Killgore et al; (100) USA</td>
<td>USA adults n = 1,013 55.9% female</td>
<td>UCLA-3, PHQ-9</td>
<td>• 43% reported high loneliness</td>
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<td>• 54.7% of lonely participants reported moderate to significant depression</td>
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<tr>
<td>Killgore et al; (101) USA</td>
<td>General USA population n = 1,013 56.0% female</td>
<td>PHQ-9, COVID-19 pandemic worry scale, ISI</td>
<td>• 56.0% insomnia</td>
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<td>• 19.8% moderate range</td>
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<td>• 5.2% severe range</td>
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<tr>
<td>Lai et al; (102) China</td>
<td>HCWs treating COVID-19 patients n = 1,257 96.4% female 60.8% nurses; 39.2% physicians</td>
<td>PHQ-9, GAD-7, ISI, IES-R</td>
<td>• 50.4% depressive symptoms</td>
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<td>• 44.6% anxiety symptoms</td>
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<td></td>
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<td></td>
<td>• 34.0% insomnia symptoms</td>
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<td>• 71.5% distress symptoms</td>
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<tr>
<td>Lee &amp; You; (103) Korea</td>
<td>Korean residents n = 973 Age 46.31 ± 14.94 yr 50.1% female</td>
<td>Self-designed (COVID-19 knowledge and behaviour)</td>
<td>• 51.3% perceived neither high nor low risk related to COVID-19</td>
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<td>• Perceived severity of COVID-19 (48.6% high, 19.9% very high)</td>
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<td></td>
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<td></td>
<td>• 67.8% reported practising hand hygiene</td>
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<td></td>
<td>• 63.2% reported always wearing a face mask outside</td>
</tr>
<tr>
<td>Li et al; (104) China</td>
<td>Female HCWs n = 4,369</td>
<td>PHQ-9, GAD-7, IES-R</td>
<td>• 14.2% depression</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• 25.2% anxiety</td>
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<td>• 31.6% acute stress symptoms</td>
</tr>
<tr>
<td>Li et al; (105) China</td>
<td>Chinese residents n = 3,637 Age 34.46 ± 9.62 yr 63% female</td>
<td>ISI, GAD-7, PHQ-9, IES-R</td>
<td>• 12.5% developed new-onset insomnia and worsened insomnia symptoms</td>
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<td></td>
<td>• 17.6% had COVID-19 related stress</td>
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<td></td>
<td></td>
<td>• Anxiety increased from 16.1% to 27.5%</td>
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<tr>
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<td></td>
<td>• Depression increased from 22.7% to 31.2%</td>
</tr>
<tr>
<td>Li et al; (106) China</td>
<td>Medical staff personnel in Wuhan n = 219 78.0% female</td>
<td>AIS, SRQ-20</td>
<td>• Staff in Wuhan: 58.9% insomnia</td>
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<td></td>
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<td>• Staff in Ningbo: 25.0% insomnia</td>
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<tr>
<td></td>
<td>Medical staff personnel in Ningbo n = 729 76.4% female</td>
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<tr>
<td>Liu et al; (107) China</td>
<td>Medical staff n = 512 84.5% female</td>
<td>Self-designed (COVID-19 knowledge and behaviour), SAS</td>
<td>12.5% anxiety (10.35% mild)</td>
</tr>
<tr>
<td>Liu et al; (108) China</td>
<td>General public in China n = 608 58.7% female</td>
<td>STAI, SDS, SCL-90</td>
<td>• 15.8% state anxiety</td>
</tr>
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<td></td>
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<td>• 4.0% trait anxiety</td>
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<td></td>
<td>• 27.1% depression</td>
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<tr>
<td></td>
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<td>• 7.7% psychological abnormalities</td>
</tr>
<tr>
<td>Liu et al; (109) China</td>
<td>Residents in Wuhan and surrounding cities n = 285 54.4% female 43.5% currently in Wuhan</td>
<td>PTSD Checklist for DSM-5 (PCL-5), PSQI</td>
<td>7.0% PTSS</td>
</tr>
<tr>
<td>Study</td>
<td>Country</td>
<td>Population Description</td>
<td>Measures</td>
</tr>
<tr>
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<tr>
<td>Mazza et al.</td>
<td>Italy</td>
<td>General Italian population n = 2,766 Age 32.9 ± 13.2 yr 71.6% female</td>
<td>DASS-21, PID-5-BF</td>
</tr>
<tr>
<td>Mo et al.</td>
<td>China</td>
<td>Nurses treating COVID-19 n = 180 Age 32.7 ± 6.5 yr 90% female</td>
<td>SOS, SAS</td>
</tr>
<tr>
<td>Moccia et al.</td>
<td>Italy</td>
<td>General Italian population n = 500 59.6% female</td>
<td>K10, TEMPS-A, ASQ</td>
</tr>
<tr>
<td>Morgantini et al.</td>
<td>Various</td>
<td>Healthcare professionals from 60 countries n = 2,707</td>
<td>–</td>
</tr>
<tr>
<td>Ni et al.</td>
<td>China</td>
<td>Community-based adults in Wuhan n = 1,577</td>
<td>GAD-2, PHQ-2, MOS-SSS</td>
</tr>
<tr>
<td>Özdin et al.</td>
<td>Turkey</td>
<td>Turkish people n = 343 Age 37.2 ± 10.3 yr 49.2% female</td>
<td>HADS, HAI</td>
</tr>
<tr>
<td>Padala et al.</td>
<td>USA</td>
<td>Participants from ongoing geriatric clinical research studies n = 51 Age 69.3 ± 9.4 yr 47% female 60.7% veterans; 39.3% caregivers</td>
<td>Self-designed (COVID-19 knowledge and behaviour)</td>
</tr>
<tr>
<td>Pedrozo-Pupo et al.</td>
<td>Columbia</td>
<td>Columbian adults n = 406 Age 43.9 ± 12.4 yr 61.8% female</td>
<td>PSS-10</td>
</tr>
<tr>
<td>Podder et al.</td>
<td>India</td>
<td>Doctors in India n = 384 (144 dermatologists, 240 non-dermatologists) Age of dermatologists 33.7 ± 9.3 yr 52.4% female Age of non-dermatologists 30.8 ± 7.8 yr 40.0% female</td>
<td>PSS-10, self-designed (risk factors of stress)</td>
</tr>
<tr>
<td>Qiu et al.</td>
<td>China</td>
<td>General Chinese population n = 52,370 64.73% female</td>
<td>CPDI</td>
</tr>
<tr>
<td>Ren et al.</td>
<td>China</td>
<td>General Chinese public n = 1,172</td>
<td>PHQ-9, GAD-7, SCL-90 (somatisation), PSS-10, CD-RISC-10, MINI-SD, ISI, PCL-5</td>
</tr>
</tbody>
</table>

DASS-21: Depression Anxiety Stress Scale-21
PID-5: Psychopathology Identification Device - 5
BF: Beck’s Depression Inventory
SOS: Sleep Quality Scale
SAS: Sleep Anxiety Scale
K10: Kessler Psychological Distress Scale
TEMPS-A: Temperament and Character Inventory
ASQ: Anxiety Sensitivity Questionnaire
PHQ-9: Patient Health Questionnaire
GAD-7: Generalized Anxiety Disorder-7
SCL-90: Symptom Checklist-90
MINI-SD: Mini International Neuropsychiatric Interview
ISI: Insomnia Severity Index
PCL-5: Posttraumatic Stress Disorder
CD-RISC: Connor-Davidson Resilience Scale
PSS-10: Perceived Stress Scale
CPDI: Psychological Distress Inventory
PHQ-9, GAD-7, SCL-90: Psychometric measures
CD-RISC: Psychological resilience
MINI-SD, ISI: Psychological distress scales
PCL-5: Psychological distress

Note: The above table summarizes various studies conducted in different countries and populations, focusing on the assessment of mental health during the COVID-19 pandemic using various psychological tools and scales.

Additional information includes the percentage of females and specific findings related to depression, anxiety, stress, sleep quality, and psychological distress.
<table>
<thead>
<tr>
<th>Study Authors</th>
<th>Country</th>
<th>Participants</th>
<th>Methods</th>
<th>Findings</th>
</tr>
</thead>
</table>
| Roy et al. (121) | India | Residents in India n = 662 Age 29.09 ± 8.83 yr 51.2% female | Self-designed (COVID-19 knowledge and behaviour) | - 82.2% preoccupied with thinking about the COVID-19 pandemic over the past week
- 12.5% had difficulty sleeping as they were worried about the pandemic
- 36.4% affected by posts on social media about the pandemic
- 46.1% affected by news about the pandemic
- 83.5% felt it would be beneficial if mental health professionals help people in dealing with the current pandemic
- 82.9% would suggest for others to obtain mental health help if they were highly affected by the pandemic |
| Saccone et al. (122) | Italy | Pregnant women n = 100 | IES-R, STAI (short form), Visual analogue scale for anxiety | 68.0% anxiety |
| Sahu et al. (123) | India | Orthopaedic surgeons from India n = 611 | Self-designed (COVID-19 knowledge and behaviour) | 22.5% definitely stressed |
| Shacham et al. (124) | Israel | Dentists and dental hygienists in Israel n = 338 Age 46.39 ± 11.2 yr 58.6% female, 58.6% dentists | COVID-19-related factors questionnaire, Demands Scale-Short Version, General Self-Efficacy Scale, K6 | 11.5% at risk of elevated psychological distress |
| Shapiro et al. (125) | Israel | General population of Israelis n = 503 Age 47.0 yr 61.0% female | PHQ-2 | - 24.1% high or very high anxiety levels
- 13.0% at risk of depression |
| Shen et al. (126) | China | Nurses in ICU ward in Wuhan n = 85 | -- | - 45.0% difficulty sleeping
- 28.0% nervousness |
| Simpson et al. (127) | USA | Board-eligible or board-certified psychiatrists in the United States or in an accredited training programme n = 101 | -- | - 76.0% worried about contracting COVID-19
- 95.0% worried about patients contracting COVID-19 |
| Somma et al. (128) | Italy | General Italian population n = 1,043 Age 32.8 ± 12.7 yr 81.5% female | SDQ EPS, PID-5-SF, CBQ | 13.2% emotional problems |
| Sønderskov et al. (129) | Denmark | Denmark residents n= 2,458 Age 49.1 yr 51% female | WHO-5 (wellbeing), questionnaire (anxiety and depression) | Entire sample: 25.4% probable depression |
| Song et al. (130) | China | Medical staff working in emergency department of hospitals with COVID-19 wards | PSSS, CES-D, PCL-5 | - 25.2% depressive symptoms
- 9.1% PTSD |
<table>
<thead>
<tr>
<th>Study</th>
<th>Population and Methodology</th>
<th>Measure(s)</th>
<th>Findings/Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suleiman et al. (2013)</td>
<td>Jordanian doctors who might be in first contact with COVID-19 patients</td>
<td>Self-designed (COVID-19 knowledge and behaviour)</td>
<td>90.9% anxious about possibility of spread of COVID-19 and increase in number of positive patients</td>
</tr>
</tbody>
</table>
| Sun et al. (2013)      | Those working in a hospital in China                                                        | 2019-nCOV impact questionnaire, IES                                         | • 86.2% more stressed at work than before  
• 75.6% worried about being infected  
• 32.6% experienced stigma  
• 63.3% felt friends and family were worried about getting infected through them                                        |
| Sun et al. (2013)      | General Chinese population                                                                  | Self-designed (COVID-19 impact on addictive behaviours)                    | • 46.8% increased dependence on internet use  
• 16.6% longer internet use  
• 4.3% severe internet addiction  
• 18.7% of 331 ex-smokers relapsed  
• 25.3% of 190 ex-smokers relapsed                                         |
| Suzuki (2013)          | Postnatal mothers who gave birth to singleton healthy babies at Japanese Red Cross Katsushika Maternity Hospital | EPDS, Mother-to-Infant Bonding Scale Japanese version                      | COVID-19 patients vs. healthy controls:  
• 14.4% vs. 14.9% depression  
• 29.5% vs. 15.5% problems with bonding                                                                                           |
| Tan et al. (2013)      | Members of the workforce living in Chongqing                                               | IES-R, DASS-21, ISI                                                        | • 10.8% PTSD  
• 3.8% anxiety  
• 3.7% depression  
• 1.5% stress  
• 2.3% insomnia                                                                                                           |
| Taylor et al. (2013)   | General public in Canada and America                                                        | Self-designed (COVID-19 knowledge and behaviour), PHQ-4, SHAI, OCI-R, XS, MCSD-SF | • 28.0% elevated anxiety  
• 22.0% depressive symptoms                                                                                                                |
| Temsah et al. (2013)   | Healthcare workers                                                                        | Self-designed (COVID-19 and MERS-CoV), GAD-7                              | 11.0% moderate high or high anxiety                                                                                                           |
| Tian et al. (2013)     | Ordinary Chinese citizens                                                                  | SCL-90                                                                    | • 3.1% (Scores of 4–5 on ≥ 1 SCL-90 dimension)  
• 62.8% (Scores of 3–4 on ≥ 1 SCL-90 dimension)                                                                                   |
<table>
<thead>
<tr>
<th>Study Authors &amp; Location</th>
<th>Sample Characteristics</th>
<th>Measures</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uvais et al. (139) Gulf Cooperation Council countries</td>
<td>Malayalam-speaking expats in Gulf Cooperation Council countries n = 157 5.1% female</td>
<td>PHQ-9, GAD-7</td>
<td>22.4% anxiety 29.7% depression</td>
</tr>
<tr>
<td>Van Agteren et al. (140) Australia</td>
<td>General population recruited during COVID-19 n = 673 Age 44.8 ± 14.7 yr 65.0% female General population recruited during non-COVID-19 period n = 1,624 Age 42.7 ± 11.4 yr 46.0% female General population help-seeking group recruited during non-COVID-19 period n = 340 Age 42.6 ± 11.8 yr 58.0% female</td>
<td>DASS-21, MHC-SF, Satisfaction With Life Scale, Brief Resilience Scale</td>
<td>COVID-19 cohort: 79.0% had problematic mental health outcomes General population: 52.0% had problematic mental health outcomes General population help-seeking: 58.0% had problematic mental health outcomes</td>
</tr>
<tr>
<td>Varshney et al. (141) India</td>
<td>India residents n = 653 Age 41.82 ± 13.85 yr 24.8% female</td>
<td>IES-R</td>
<td>33.2% reported significant psychological impact</td>
</tr>
<tr>
<td>Voitsidis et al. (142) Greece</td>
<td>Greek general population n = 2,363 76.2% female</td>
<td>AIS, IUS-12, De Jong Gierveld Loneliness Scale, PHQ-2, self-designed (COVID-19 negative attitudes)</td>
<td>37.6% insomnia</td>
</tr>
<tr>
<td>Wang et al. (143) China</td>
<td>HCWs in Wuhan n = 123 Age 33.8 ± 8.4 yr 90% female</td>
<td>PSQI, SAS, SDS</td>
<td>38.0% sleep disturbances 7.0% anxiety 25.0% depression</td>
</tr>
<tr>
<td>Wang et al. (144) China</td>
<td>General population in China n = 600 Age 34 ± 12 yr 55.5% female</td>
<td>SAS, SDS</td>
<td>6.3% anxiety 17.2% depression</td>
</tr>
<tr>
<td>Wu et al. (145) China</td>
<td>Pregnant women in their third trimester of pregnancy Group 1: investigated before January 21, 2020 n = 2,839 100.0% female Group 2: investigated after declaration of human transmission of COVID-19 on January 20, 2020</td>
<td>EPDS</td>
<td>Group 1: 26.0% depression Group 2: 29.6% depression Overall: 26.0% vs. 34.2% (before 21 January 2020 vs. between 5 and 9 February 2020)</td>
</tr>
<tr>
<td>n = 1,285</td>
<td>100.0% female</td>
<td>Post-discharged COVID-19 survivors n = 370</td>
<td>Age 50.5 ± 13.1 yr</td>
</tr>
<tr>
<td>n = 548</td>
<td>72.1% female</td>
<td>Medical personnel with at least 1 year of work experience</td>
<td>SCL-90</td>
</tr>
<tr>
<td>n = 65</td>
<td>47.6% female</td>
<td>Physical therapists</td>
<td>Self-designed (COVID-19 knowledge and behaviour), GAD-7, PHQ-9</td>
</tr>
<tr>
<td>n = 263</td>
<td>Age 37.7 ± 14.0 yr</td>
<td>Chinese residents in Liaoning Province</td>
<td>Self-designed (COVID-19 knowledge and behaviour), IES</td>
</tr>
<tr>
<td>n = 304</td>
<td>Age 35.1 ± 9.1 yr</td>
<td>Healthcare staff</td>
<td>SF-12, PHQ-4, K6</td>
</tr>
<tr>
<td>n = 1,563</td>
<td>82.7% female</td>
<td>Medical staff</td>
<td>ISI, PHQ-9, GAD-7, IES-R</td>
</tr>
<tr>
<td>n = 1,630</td>
<td>Age 29.17 ± 10.58 yr</td>
<td>General public in China</td>
<td>PSS, PSQI, SAS, RSE</td>
</tr>
</tbody>
</table>

**AIS**: Athens Insomnia Scale; **ASQ**: Attachment Style Questionnaire; **ASR**: acute stress reaction; **AUDIT**: Alcohol Use Disorder Identification Test; **BAI**: Beck Anxiety Inventory; **BDI**: Beck Depression Inventory; **BPAQ**: Buss-Perry Aggression Questionnaire; **CAPE-42**: Community Assessment of Psychic Experiences-42; **CAS**: Coronavirus Anxiety Scale; **CBQ**: COVID-19 Causal Belief Questionnaire; **CD-RISC**: Connor-Davidson Resilience Scale; **CD-RISC-10**: Connor-Davidson Resilience Scale-10; **CDIS**: Children’s Depression Inventory – Short Form; **CDQOL**: Celiac Disease Quality of Life Measure; **CES-D**: Center for Epidemiological Studies Depression Scale; **CGI**: Clinical Global Impression; **COPE**: Coping Orientation to Problems Experienced; **CPDI**: COVID-19 Peritraumatic Distress Index; **CPSS**: Chinese Perceived Stress Scale; **CSDC**: Child Stress Disorders Checklist; **DASS-21**: Depression, Anxiety and Stress Scale; **DES-II**: Dissociative Experiences Scale; **DSM**: Diagnostic and Statistical Manual of Mental Disorders; **EPDS**: Edinburgh Postpartum Depression Scale; **FCV-19S**: Fear of COVID-19 Scale; **FS-14**: Fatigue Scale-14; **GAD-2**: Generalized Anxiety Disorder-2; **GAD-7**: Generalized Anxiety Disorder Scale; **IES**: Impact of Event Scale; **ISI**: Insomnia Scale; **PPQ**: Peritraumatic Distress Questionnaire; **RSE**: Resilience Scale; **SAS**: Stanford Anxiety Scale; **SCL-90**: Symptoms Checklist-90; **SF-12**: Short Form-12; **SOCS**: Simple Opinion Questionnaire; **STAI**: State-Trait Anxiety Inventory; **SSQ**: Somatic Symptom Scale; **SSS**: Stress Symptoms Scale; **TMSQOL-10**: Celiac Disease Quality of Life Measure; **TOPI**: Total OPertinent Inventory; **TOPI**: Total OPertinent Inventory; **TPQ**: Trauma Questionnaire; **TRIP**: Trauma Risk Inventory for Primary Care; **TQ**: Trauma Questionnaire; **UKQ**: University of Kentucky Questionnaire; **USQ**: University of Sydney Questionnaire; **WPS**: Work Pressure Scale; **XPI**: X-Peritraumatic Inventory; **XQ**: X-Questionnaire; **XQ**: X-Questionnaire.
7: Generalized Anxiety Disorder-7; GAF: Global Assessment of Functioning; GHQ-12: General Health Questionnaire-12; GHQ-28: General Health Questionnaire-28; GPS: Global Psychotrauma Screen; GSES: General Self-Efficacy Scale; HADS: Hospital Anxiety and Depression Scale; HAI: Health Anxiety Inventory; HAMA: Hamilton Anxiety Scale; HAMD: Hamilton Depression Scale; HCW: healthcare worker; HEI: Huaxi Emotional-Distress Index; IES: Impact of Event Scale; IES-R: Impact of Event Scale-Revised; InDI-D: Day-to-Day Discrimination Index; ISI: Insomnia Severity Index; IUS-12: Intolerance of Uncertainty Scale; K10: Kessler Psychological Distress Scale-10; K6: Kessler Psychological Distress Scale-6; MBI: Maslach Burnout Inventory; MCSD-SF: Marlowe-Crowne Social Desirability Scale Short Form; MERS-CoV: Middle East respiratory syndrome coronavirus; MHC-SF: Mental Health Continuum – Short Form; MINI-SD: Mini International Neuropsychiatric Interview for Suicidality Disorders Studies; MOS-SSS: Medical Outcome Study Social Support Survey; MSPSS: Multidimensional Scale of Perceived Social Support; NPI-Q: Neuropsychiatric Inventory-Questionnaire; NRS: numeric rating scale; OCI-R: Obsessive-Compulsive Inventory-Revised; OER: Online Ecological Recognition; OSSS-3: Oslo Social Support Scale-3; PANSS: Positive and Negative Syndrome Scale; PCL-5: PTSD Checklist-5; PCL-C: PTSD Checklist-Civilian; PCL-C-2: PTSD Checklist-Reduced; PCS: Pain Catastrophizing Scale; PERMA: Positive emotion, Engagement, Relationships, Meaning and Accomplishment; PHQ-2: Patient Health Questionnaire-2; PHQ-4: Patient Health Questionnaire-4; PHQ-9: Patient Health Questionnaire-9; PID-5-BF: Personality Inventory for DSM-5-Brief Form-Adult; PID-5-SF: Personality Inventory for DSM-5 Short Form; PPE: personal protective equipment; PSAS: Psychological Stress and Adaptation at work Score; PSQ-8: Perceived Stress Questionnaire-8; PSQI: Pittsburgh Sleep Quality Index; PSS-10: Perceived Stress Scale; PSSS: Perceived Social Support Scale; PTSD: post-traumatic stress disorder; PTSS: post-traumatic stress symptoms; QIDS-SR: Quick Inventory of Depressive Symptomatology (Self-Report); RSE: Rosenberg Self-Esteem Scale; SAS: Self-Rating Anxiety Scale; SASR: Stanford Acute Stress Reaction Questionnaire; SCL-90-R Symptom Checklist-90-Revised; SDQ: Simplified Coping Style Questionnaire; SDQ: Strengths and Difficulties Questionnaire; SDQ: Strengths and Difficulties Questionnaire emotional problems scale; SDS: Self-Rating Depression Scale; SF-12: short form-12; SF-36: short form-36; SHAI: Short Health Anxiety Inventory; SMSP-A: Severity Measure for Specific Phobia-Adult; SNAP-IV: Swanson, Nolan and Pelham Rating Scale-IV; SOS: Stress Overload Scale; SRQ: Stress Response Questionnaire; SRQ-20: Self-Reporting Questionnaire-20; SSRS: Social Support Rating Scale; STAI: State-Trait Anxiety Inventory; STAI-Y: State-Trait Anxiety Inventory (Form Y); SWLS: Satisfaction with Life Scale; TEMPS-A: Temperament Evaluation of Memphis, Pisa, Paris and San Diego Autoquestionnaire; UCLA-3: UCLA Loneliness Scale; USA: United States of America; VDAS: Van Drea Can Anxiety Scale; WEMWBS: Warwick-Edinburgh Mental Wellbeing Scale; WHO-5: World Health Organization-Five Well-Being Index; WSAS: Work and Social Adjustment Scale; XS: Xenophobia Scale; Y-BOCS: Yale Brown Obsessive Compulsive Scale