

Entry

COVID-19 and Psychological Impact

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Definition: DefinitionThe worldwide mental health burden associated to COVID-19. The psychological symptoms associated to COVID-19 can originate from three different sources: lockdowns, pandemic life and virus infection (both COVID-19 and post COVID-19 condition). Within the psychological symptoms it can be found: anxiety, depression, post-traumatic stress, fatigue and cognitive impairment (i.e., 'brain fog', mental slowness, deficits in attention, executive functioning, working memory, learning, articulation, and/or psychomotor coordination). Plus, two psychological conditions associated to the COVID-19 pandemic have been coined so far by the World Health Organization: pandemic fatigue and post COVID-19 condition. The increase of psychological symptoms both in the general population and in frontline workers (especially health-care workers) generates an unprecedented number of psychological patients and it challenges national mental health systems.

Keywords: mental health; SARS-CoV-2; COVID-19; lockdown; frontline workers; pandemic fatigue; post COVID-19 condition; anxiety; depression; stress



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1. Introduction

The COVID-19 pandemic officially declared in March 2020 [1] is both “an epidemiological and psychological crisis” [2]. Aside from the harmful physical effects that the sickness may cause in infected patients, three collateral factors contribute to an unprecedented worldwide mental health burden in both infected and non-infected people: preventive isolation measures taken worldwide (i.e., lockdowns), drastic changes in daily life (i.e., deceased relatives, overflowed frontline workers, social distancing, curfews) and COVID-19 and post COVID-19 related psychological symptoms. The purpose of the present manuscript is to summarize the most up-to-date accumulated knowledge so far (5 January 2022) about the psychological impact of each factor (see Table 1 at the end of this entry for a brief summary of its content).

Importantly, given the overwhelming number of studies, a broad vision has been prioritized by selecting systematic reviews, meta-analysis and longitudinal research over transversal or nation-specific studies, whenever possible. However, this strategy does not ensure the provision of causal or relational knowledge given the fact that most of the studies conducted and published so far are cross-sectional (i.e., measuring a specific population group in a specific point of time) rather than longitudinal (i.e., gathering several measures of a specific population group along a period of time) or prospective (i.e., starting the data collection before the pandemic outbreak, which may count as a baseline, and continuing afterwards, to allow for comparisons), and therefore, even systematic reviews may be biased in their conclusions.

In those cases where the broad vision also implied citing a vast number of studies, due to space restrictions, two selection criteria were applied: chronological order of publication (first-year pandemic stage: March to December 2020 and late pandemic stage: from January 2021 on) to illustrate any potential longitudinal tendency and the affiliation of the authors (citing at least one study per continent, if any) to illustrate any potential cross-cultural difference. Despite the efforts invested to avoid a Western vision of COVID-19 and its

psychological impact, this entry may lack cultural diversity due to the low publication rate of low-income countries.

Table 1. Brief summary of sources and symptoms of psychological impact related to COVID-19.

Lockdowns	Pandemic Life	COVID-19 Infection
Not alarmingly affected global population but suicide vigilance is recommended	Global increase in the rates of anxiety, depression and post-traumatic disorders	COVID-19 infection: cognitive impairment and fatigue
Vulnerable subgroups: autism, pregnancy, homeless	Vulnerable subgroups: OCD, depression	Post COVID-19 condition (3 months after infection): cognitive impairment and fatigue over 2 months
Risk contexts: domestic violence, intrafamilial child abuse	Front-line workers more exposed, especially health-care workers	Post-intensive care syndrome in intensive care unit survivors: cognitive impairment and mental health problems
Pandemic fatigue: demotivation to follow preventive measures	Abundance of cross-sectional rather than longitudinal and prospective studies, preventing causal knowledge	Both patients and their relatives (current carers) may be at risk of psychological impact

2. Lockdowns

The characterization of COVID-19 as a “pandemic” by the World Health Organization (WHO) in March 2020 [1] entailed several nationwide public health measures, among which unprecedented lockdowns in recent decades took place. Lockdowns can be defined as the confinement of specific or general groups of population imposed by a certain authority during a given time aiming to reduce the spread of some disease as well as to attenuate the hospital pressure created by the above-average healthcare demands that the disease causes (the so-called “buy time” measure [3]) [4]. During the lockdowns, the confined population’s outdoor movements and activities are restricted, which usually entails a general closure of non-essential businesses and establishments. Therefore, the psychological wellbeing associated with the maintenance of rewarding events (such as relative visits, trips or outdoor leisure time) or routines (such as going to school/work or shopping) can be dramatically reduced.

The psychological impact that the lockdowns might cause in the population had no previous modern referent because there are no historical records of previous simultaneous worldwide strict confinements during the last century. Most resembling lockdowns might be the public actions taken during the two influenza pandemics across the XX century, however, they were not regularly adopted nationwide; varied in intensity—from lazarettos to border closures—and did not happen coordinately with other nations or in an instant-globalized-Internet-based world; see [5] for a revision of quarantines since Middle Age times. There is also little evidence of prior measurements of the psychological impact of more than three months of confinement. The closest study available was a rapid review published some days before the pandemic characterization listing the evidence about the psychological impact of recent regional quarantines of a maximum of 21 days caused by SARS, Ebola, H1N1 influenza and Middle East respiratory syndrome [6]. They found that symptoms were “wide-ranging, substantial and can be long-lasting” (p. 919) and provided six suggestions to ameliorate them: keeping the lockdowns as short as possible, giving a lot of information, providing adequate supplies, reducing boredom and improving communication, paying especial attention to health-care workers and appealing to altruism.

After COVID-19 lockdowns, research about the psychological impact concluded that, fortunately, the lockdowns themselves seemed not to have contributed to produce significant psychological impact in the general population: a recent meta-analysis found that their magnitude was “small and highly heterogeneous, suggesting that lockdowns do not have

uniformly detrimental effects on mental health and that most people are psychologically resilient to their effects" [7] (abstract). Indeed, suicide rates did not rise during house confinement, as a time-series analysis from 21 countries showed [8]. However, optimism should not prevent further strategies, because the return after lockdowns can have a rebound effect and some authors suggest remaining cautious and vigilant, especially with regards to suicide [9,10]. Moreover, even when at a general level the psychological impact of lockdowns was low, for certain vulnerable sectors of population it was severe, such as children and adolescents [11], subjects with autism spectrum [12], pregnant women [13], homeless people [14], people in poverty, migrants and refugees [13], to name a few. As a future lesson, researchers suggest that using common psychological impact measures in different samples would benefit further cross-cultural comparison, i.e., [6] (see Section 3, "Pandemic life", for a list of the most used instruments to measure each disorder).

Behaviours with associated negative psychological consequences changed during lockdowns, especially those related to addiction. Whereas a meta-analysis about alcohol consumption revealed that the average intake did not vary significantly, it did within subsamples with some previous mental health/alcohol-related risk factors [15] or those who were already chronic/excessive consumers, as a four-year longitudinal study showed [16]. The same happened to gambling: although bets decreased across countries, in some subsamples problematic gambling was increased [17]. This evidence shows that people with previous vulnerable factors should be especially protected in times of significant life adversity, such as an international emergency health crisis. Furthermore, crimes that cause relevant psychological impact, such as domestic violence, intrafamilial sexual abuse, production and demand for child sexual exploitation material, online-grooming and cyberbullying increased worldwide during lockdowns because the confinement led to permanent contact between offenders and victims as well as to higher rates of unsupervised Internet connection between children. In this sense, there is evidence of a worldwide increase in domestic violence cases, as systematic reviews report [18,19], as well as an increase of calls to domestic violence helplines [20] so that more than fifty countries integrated prevention and response to violence against women and girls into COVID-19 response plans, as the United Nations Data Platform shows [21]. Multiple international voices raised concern about the need for child protection at home due to the high risk of violence against them, i.e., [22] and data showed that child sexual exploitation material demand raised [23].

The return to regular life after lockdown has been associated with the folk syndrome coined "cabin fever", describing "a combination of anxiety, lassitude, irritability, moodiness, boredom, depression, or feeling of dissatisfaction in response to confinement, bad weather, routine, isolation, or lack of stimulation" [24]. However, this popular syndrome has no correspondent official nosologic entity. Indeed, according to the WHO, the unique psychological impact officially recognized as being related to COVID-19 measures is "pandemic fatigue". Pandemic fatigue describes "demotivation to follow recommended protective behaviours emerging gradually over time and affected by a number of emotions, experiences and perceptions, such as complacency, alienation and hopelessness. It is an expected and natural response to a prolonged public health crisis—not least because the severity and scale of the COVID-19 pandemic have called for the implementation of invasive measures with unprecedented impacts on the daily lives of everyone, including those who have not been directly affected by the virus itself" [25] (pp. 4–7).

3. Pandemic Life

Living life during the COVID-19 pandemic entails adapting to different preventive measures and both the interpersonal and financial consequences of the virus spread. Meta-analyses reviewing the impact that the COVID-19 pandemic has had on mental health mostly focus on three disorders: anxiety, depression and post-traumatic stress. These studies usually differentiate the sample evaluated between the general population and frontline workers since the latter have been more exposed to contagion, traumatic images and have experienced an overwhelming workload. Within the different jobs considered

among frontline workers, health care workers have been the most studied professional group so far. Next, there is a summary of the accumulated knowledge about anxiety, depression and post-traumatic stress across three different sections and within each section there is specific mention of studies with samples of health care workers.

3.1. Anxiety

During the COVID-19 pandemic, different national preventive measures and international recommendations have been applied: from general closure of non-essential businesses and establishments to time restricted openings, curfews and travel restrictions; from mandatory vaccination to some population sectors and face mask use to periodic hand-washing and ventilation. This situation forces people to flexibly adapt to new scenarios, remain alert about the spread of the virus and sometimes lose previous income levels. Moreover, the news remains the main source of information for the general population, usually updating daily about new virus variants, preventive measures, legal changes or providing data on the economic impact and death and incidence rates. This situation helps people to be informed as well as makes them constantly alert about the spread of the virus. Consequently, the modification of regular civil life under the feeling of uncertainty, the constant need to be alert, the economic instability with large-scale job loss and the permanent information about contagions and death, within this new uncontrollable situation, may contribute to the emergence of anxiety disorders.

A study reviewing research that provided the pre- and post COVID-19 prevalence of mental health burden across 204 countries reported that after one year of the COVID-19 pandemic, there was a 25.6% global increase of the prevalence of anxiety disorders, namely, an additional 76.2 million (64.3 to 90.6) estimated cases [26]. Even when there are countries lacking data, these numbers reveal a high global psychological impact that can potentially impact mental care systems. With regards to health care workers, systematic reviews and meta-analysis found that this professional sector had a higher level of anxiety compared to general population (24% [27] (November, 2020), 34.4% [28] (December 2020) from 8.5% to 13% [29] (January 2021)) and, in all cases, the level of anxiety was constantly higher in Western rather than Asian professionals [30] (May 2021), whereas other authors suggested higher rates in Middle-Eastern professionals [31] (March 2021).

The most at-risk of suffering from anxiety disorders (both onset or increasing pre-existing symptoms) are people with obsessive-compulsive symptoms, such as concerns about becoming contaminated themselves, fear of unknowingly spreading contamination and causing harm to others, overestimation of threats and tendencies to seek reassurance by excessive searching for news on COVID-19 [32]. Unfortunately, for all of them, living surrounded by necessary guidelines and signage on hygienic measures about how to prevent the virus spread, such as periodic handwashing, can reinforce their obsessive ideas. Moreover, doomscrolling, or spending an excessive amount of screen time devoted to the absorption of negative news [33], may also approach high rates within the pandemic.

Finally, and for further research purposes, the instruments employed to measure anxiety in the meta-analysis and systematic reviews are, in alphabetical order: DASS-21: Depression Anxiety Stress Scale; GAD: General Anxiety Disorder; HADS: Hospital Anxiety and Depression Scale; HAMA: Hamilton Anxiety Rating Scale.

3.2. Depression

During the COVID-19 pandemic, the number of contagions and deaths has constantly increased, varying periodically from curve deflations to exponential peaks. This situation has led people to lose loved ones, or even suffer COVID-19 health issues themselves with long-term sequelae. The pandemic has also led to the reduction of rewarding activities and fueled negative further perspectives about the future due to financial loss, recurrent new contagion waves and difficulties to schedule prevalence-dependent massive outdoor activities (e.g., weddings, music concert), which may contribute to depressive mood.

Within the aforementioned study reviewing research that provided the pre- and post COVID-19 prevalence of mental health burden across 204 countries after one year of the COVID-19 pandemic, it is reported that there is a 27.6% global increase of the prevalence of depressive disorders, namely, an additional 53.2 million (44.8 to 62.9) estimated cases [26]. With regards to health care workers, systematic reviews and meta-analysis found that this professional sector had a higher level of depression compared to the general population: 25% [27] (November, 2020), 31.8% [28] (December, 2020), from 9.5% to 12.2% [29] (January 2021) and 23% [30] (May 2021).

A revision of the psychological consequences for relatives caused by losing loved ones after being in an intensive care unit (ICU), which is the treatment of choice for severe COVID-19 patients, estimated that “the number of cases of complicated grief following COVID-19 deaths may virtually reach the number of overall COVID-19 deaths” [34] (p. 3). Therefore, one of the most at-risk groups of suffering from depression may be those who lost relatives because of COVID-19 disease. In addition, despite the rates of suicide seeming to decrease during the first months of the pandemic [8], the research community suggests being vigilant with these groups of the population [9].

Finally, and for further research purposes, the instruments employed to measure depression in the meta-analysis and systematic reviews are, in alphabetical order: CES-D: Center for Epidemiologic Studies Depression Scale; DASS: Depression Anxiety Stress Scale; HADS: Hospital Anxiety and Depression Scale and HAMD: Hamilton Depression Rating Scale.

3.3. Post-Traumatic Stress

The population has witnessed (first-hand or through public information) both COVID-19 related dramatic images, such as accumulated coffins of COVID-19 deceased patients, intubated patients and threatening behaviours, such as actions specifically associated to situations of emergency conducted by peers (i.e., non-perishable stockpiling, panic buying). All this together with the constant threat of being infected may be strong enough to meet the criteria for traumatic events, given their uniqueness and because witnesses may feel their life is at risk.

Indeed, meta-analysis conducted early after the pandemic characterization found that one-in-four adults [35] or a similar 20% (95% CI: 14–25%, $p < 0.001$) [36] experienced significant traumatic stress due to the COVID-19 pandemic. Importantly, the pandemic is almost two years long already and the persistence of the stressor is associated with the chronicity of the disorder and with its comorbidity with psychiatric diagnosis. Therefore, the number of people in the population at risk of developing further psychiatric and psychological needs is high.

With regards to health care workers, systematic reviews and meta-analysis found that this professional sector had a higher level of post-traumatic stress compared to the general population: 13% (Krishnamoorthy, November, 2020), 11.4% [28] (December, 2020), 21% [31] (March 2021) or two in every ten healthcare workers [37] (March 2021).

Finally, and for further research purposes, the instruments employed to measure post-traumatic symptoms in the meta-analysis and systematic reviews are, in alphabetical order: IES-R: Impact of Event Scale-Revised; PSS: Perceived Stress Scale; PTSD-SS: Self-Assessment Scale for Post-Traumatic Stress Disorder; PTSS: Post-Traumatic Stress Syndrome.

4. COVID-19 and Post COVID-19 Psychological Symptoms

The COVID-19 infection may spread to the nervous system and cause cognitive impairment in patients, in consonance with reports about previous viral epidemics that found neurological disorders and cognitive alterations after infection [38]. These psychological consequences are not only restricted to the aforementioned disorders such as depression, anxiety and post-traumatic stress (meta-analysis show that infected patients reported anxiety, depression [39,40] and about three in every ten experienced PTSD symptoms [37]) but also expand to alterations in basic cognitive procedures.

Indeed, an analysis of more than 80 thousand participants supported the hypothesis that COVID-19 has a multi-domain impact on human cognition [41]. Importantly, a cohort study of almost 500 participants informed that negative cognitive performance appears to be associated to some COVID-19 symptoms: “headache, anosmia and dysgeusia constituted the main risk factors for cognitive impairment related with attention, memory and executive function [whereas] the need for oxygen therapy and diarrhea were also associated with memory, attention and executive function deficits” [42] (abstract). A systematic review found that studies reported cognitive deficits, fatigue at follow-up and sleep disturbances, concluding that infected patients are “at risk of psychiatric sequelae but the symptoms generally improve over time” [39].

Unfortunately, the remission of symptoms from COVID-19 infection can also persist [41]. Following a Delphi methodology, namely, including patients, experts and physicians in the working team, the WHO has developed the definition for “post COVID-19 condition”: “Post COVID-19 condition occurs in individuals with a history of probable or confirmed SARS-CoV-2 infection, usually 3 months from the onset of COVID-19 with symptoms and that last for at least 2 months and cannot be explained by an alternative diagnosis. Common symptoms include fatigue, shortness of breath, cognitive dysfunction but also others and generally have an impact on everyday functioning. Symptoms may be new onset following initial recovery from an acute COVID-19 episode or persist from the initial illness. Symptoms may also fluctuate or relapse over time” [43].

A meta-analysis found the proportion of individuals experiencing fatigue 12 or more weeks following COVID-19 diagnosis was 0.32 (95% CI, 0.27, 0.37; $p < 0.001$; $n = 25,268$; $I^2 = 99.1\%$), whereas the proportion of individuals exhibiting cognitive impairment was 0.22 (95% CI, 0.17, 0.28; $p < 0.001$; $n = 13,232$; $I^2 = 98.0$) 12 or more weeks following COVID-19 diagnosis [44] (December, 2021). The cognitive impairment included: ‘brain fog’, mental slowness (i.e., increase in time needed to perform tasks such as reading/writing documents), deficits in attention (i.e., difficulty in concentrating), executive functioning and working memory (i.e., forgetfulness, spatial memory dysfunctions), learning (i.e., difficulties in learning new skills or procedures), articulation (i.e., difficulties forming words; feeling lost for words), and/or psychomotor coordination [40,44]. So far, the literature is scarce, and the heterogeneity of samples and procedures preclude generalization, however, the recognition of the post COVID condition by WHO should encourage further investigation since the quality of life of the people affected may be reduced.

Importantly, survivors of intensive care units (ICUs) may also experience post-intensive care syndrome (PICS) some months after discharge, which may include a vast array of symptoms collectively grouped into physical impairment, cognitive impairment and mental health problems. Since COVID-19 can entail ICU hospitalization, a recent review has warned about the prevalence of symptoms associated to PICS in COVID-19 patients, reaching high rates of psychological impact: 20–57% pertaining to cognitive impairments and 6–60% pertaining to mental health problems after 1–6 months after discharge [45]. Therefore, further research in the psychological impact of COVID-19 may also consider the study of PICS in discharged COVID-19 patients as well as in their relative carers.

5. Conclusions and Prospects

The rapid fluctuation and emergence of variants of the virus as well as the astonishing rhythm of publication of new COVID-19 related studies makes this entry easily out-of-date. However, there is some solid unperishable data (see Table 1).

Across this entry, the psychological impact associated with COVID-19 has been related to three aspects: experiencing lockdowns, living in a pandemic or getting infected. With regards to COVID-19 lockdowns, these measures have not alarmingly and globally affected the population, except for certain vulnerable subgroups and victims of crimes committed at home. However, the absence of global, alarming symptoms after lockdowns should not prevent further vigilance after release, especially with regards to suicide. Demotivation

to follow preventive measures during a prolonged public health crisis has been coined “pandemic fatigue”.

With regards to living in the COVID-19 pandemic, there is evidence of a global increase in the rates of anxiety, depression and post-traumatic disorders in the general population. Certain subgroups are more at risk of suffering from anxiety (i.e., OCD patients) or depression (i.e., complicated grief). The worst mental health burden is globally found in health care workers.

With regards to COVID-19 infection, the most prevalent psychological symptoms are associated with cognitive impairment and fatigue. Plus, post COVID-19 condition is a term coined to describe the onset or persistence of fatigue, shortness of breath and cognitive dysfunction for 2 months, usually 3 months after having been infected. The cognitive impairment of post COVID-19 condition includes: ‘brain fog’, mental slowness, deficits in attention, executive functioning and working memory, learning, articulation and/or psychomotor coordination. Furthermore, in COVID-19 patients discharged from ICU the prevalence of cognitive impairment and mental health problems as part of a broader PICS is high, therefore, psychological and medical follow-ups should be considered and these symptoms further investigated.

Finally, it is important to note that most of the studies included in the systematic reviews commented on so far followed a cross-sectional methodology, namely, they described the mental state of the population in their samples at a certain point of time, therefore not allowing causal or longitudinal knowledge to be provided, but inferential. These studies are relevant because they are descriptive of an unprecedented health crisis in recent history. However, it is also very informative to look at longitudinal studies because they can provide baseline levels (before the pandemic outbreak) to be compared to pandemic levels, so that the potential significant differences found can be less doubtlessly attributed to the effects of the pandemic. These studies are scarce because they imply both a periodic interest in monitoring the mental health of the population and some reserved budget devoted to the assessment task. In this respect, official national reports about mental health are one eligible piece of evidence, since they provide longitudinal data at different waves in large samples and they are usually freely available (e.g., see UK report about mental distress: it increased from 18.9% (95% CI 17.8–20.0) in 2018–2019 to 27.3% (26.3–28.2) in April, 2020) [46]. In addition, prospective studies collecting data at several points during a certain period can be very informative. Concretely, by measuring the mental health during different moments along the COVID-19 pandemic period, the potential long-term psychological symptoms, or cumulative consequences of certain subgroups of the population, such as health care workers, can be revealed (e.g., this study [47] collected data during three COVID-19 waves: April–May 2020, December 2020 and April–May 2021 and was able to conclude that there was an elevated frequency of anxiety, an increasing prevalence of depression and active thoughts of leaving their jobs in Italian health workers). Thus, the methodology of the studies is crucial to carefully conclude about the psychological impact related to COVID-19 depending on our interest (i.e., describing, comparing, foreseeing). Indeed, future studies about psychological impact should consider these interests to look for previous data (and produce longitudinal data) or to propose different measurement points (and produce repeated cross-sectional data).

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