Examining the profound effects of COVID-19 on mental health: A comprehensive systematic review on anxiety and depression

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The COVID-19 pandemic has presented challenges to humanity, economically and in health and well-being. The associated limited social isolation and lifestyle changes has increased the risk for mental health services, especially among vulnerable people. This highlights the need for mental health services, burden that already stretch the health systems. This review presents an exposition on COVID-19 and mental health, and ways to minimise, and possibly prevent, their effect on the psychological well-being of those people. We searched four databases (Academic Search Complete, CINAHL Plus, PsycINFO and PsycARTICLES) using specific search terms and eligibility criteria. Of the 33 included studies, 31 were quantitative, and one qualitative and mixed method each. The studies were analysed using thematic narrative synthesis that resulted in three main themes: (a) the internal and external influences on COVID-19 behaviour, (b) the impact of COVID-19 on health and well-being and (c) the coping strategies used. Since COVID-19 will exist for the foreseeable future, understanding its impact on health and mental well-being and the coping techniques to be adopted are important now than ever. This study contributes to such an understanding along with suggestions regarding ways to minimise the impact of COVID-19 on mental health using context-appropriate strategies.

Keywords: anxiety; coping strategies; COVID-19; depression; resilience

The COVID-19 pandemic has presented great challenges to humanity, both economically (McKibbin & Fernando, 2020) and in terms of health and well-being (Arslan et al., 2020). The pandemic has led to loss of lives, social distancing, loneliness, and sudden lifestyle changes, which could have direct implications on people's mental health (Bautista et al., 2018; Harper et al., 2020). It is becoming clear that people will have to cope with COVID-19 and its related restrictions on their "normal lives" for the foreseeable future. The pandemic has brought significant changes to people's daily routines, such as combining family and care responsibilities, remote working, and living without their usual social networks (Pakpour & Griffiths, 2020). Therefore, the influence of COVID-19 on people's mental health, along with its associated effects within the context of social distancing, cannot be overlooked (Venkatesh & Edirappuli, 2020).

Key to this experience is the unique individual challenges people face. We contend that this will increase people's need for mental health services. However, we need to understand the extent of the impact of COVID-19 on mental health and the need to support vulnerable groups, such as: (a) people with mental health challenges, (b) those who have been affected by COVID-19 personally or (c) through their relationships with friends and family members. In other words, it is imperative to identify available mental health care provision for those affected, and the kinds of support that could work for the majority of the people during this pandemic (Beckstein et al., 2021).

Facemask use is as one of the important means of preventing the spread of COVID-19 (Abboah-Offei, et al, 2021) although the psychological impact of long-term use of mask remains unclear. Studies are investigating many long-term implications that occurred due to the COVID-19 pandemic (Centers for Disease Control and Prevention [CDC], 2020; del Rio et al., 2020; Fraser, 2020; Pan et al., 2020); these implications are related to not only the physical health but also the mental well-being of the people involved (Pan et al., 2020; Savage, 2020). These long-term implications of COVID-19 could be minimised if more people and policymakers were aware of the contributing factors to mental health problems and the ways to avoid them (Arslan et al., 2020). However, strategies to cope with stress may work differently for different people (Ogwuche et al., 2020). Even though literature is emerging on the effects of COVID-19 on overall health and well-being, there is a dearth of evidence on the effects of COVID-19 on mental health. A critical appraisal of the relationship between COVID-19 and mental health will address this gap in the literature and serve as a guide for important factors to consider during COVID-19 and similar future pandemics. This review explores the impact of COVID-19 on mental health and ways to prevent/minimise that impact on an individual's psychological well-being, especially in those countries experiencing the second wave of COVID-19.

There are four review questions: (1) What is the available research on the impact of COVID-19 on mental health?(2) How has COVID-19 contributed to the burden on mental health? (3) Which populations are most susceptible to mental health challenges due to COVID-19? (4). Are there effective support strategies/interventions for protecting people who are susceptible to mental health challenges due to the COVID-19 pandemic?

METHOD

We conducted and reported the review using the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guidelines for systematic reviews using the research question as a guide. Recognising that research on the mental health impact of COVID-19 is still at an early stage, the researchers agreed to take a broad approach and look at the general population, rather than trying to focus on a particular population or group. This review is registered on PROSPERO (Salifu et al., 2020) with registration number (PROSPERO 2020 CRD42020198282).

We used Academic Search Complete, CINAHL PLUS, PsycINFO, and PsycARTICLES electronic databases for the review. Using a combination of search terms (Table 1), the search yielded 512 articles excluding all papers published before the 2019 COVID-19 outbreak. Other exclusion criteria included non-English articles and studies that used participants less than 18 years. Using the inclusion and exclusion criteria, 325 articles were excluded for different reasons, such as not meeting the inclusion criteria; 49 articles were removed for being unrelated to mental health; 22 articles were not related to COVID-19 specifically, and three articles were irretrievable. Thirty-three articles were included in the review (See Figure 1); 31 were quantitative studies, one was a qualitative study and one was a mixed method study.

The included studies were classified into two groups. The first group included articles related to the effect of the pandemic upon people's mental health, focusing on various populations, with a special focus on vulnerable populations and first responders. The second group focused on articles that targeted various interventions and guidance for supporting and maintaining positive mental health outcomes.

To determine the validity and assess the quality of each eligible study, we used two different critical appraisal tools. Twenty-eight cross-sectional, observational studies were appraised using the STROBE critical appraisal tool (Vandenbroucke et al., 2014). This tool comprises six domains: (1) abstract, (2) introduction, (3) methods, (4) results, (5) discussion, and (6) funding information. Based on the questions in each domain, the studies were assessed and ranked. At the end of the appraisal, all assessed articles were given final scores based on their ranking. The score determined the final grade, ranging from grade 1 to 5, with grade 1 been the minimum score and grade 5 the maximum. The remaining articles, including the ones that did not use quantitative methodologies, were critically appraised using CASP and were ranked accordingly (Appendix 1). Data extraction was conducted using a customised Microsoft Word spreadsheet adapted from Timmins and McCabe (2005). This spreadsheet documented: (a) the name(s) of the author(s), (b) the date of the article, (c) the aim of the study, (d) the setting, (e) participants, (f) methodologies and methods, and (g) key findings.

Population and study characteristics were extracted from the included studies using this spreadsheet. Data were scanned for patterns in the text in order to generate themes (Braun and Clarke, 2016) resulting in a collection of topics that were then used as the basis for the analysis. Three major themes were identified: (1) internal and external influences of COVID-19, (2) impacts of COVID-19 on health and well-being, and (3) coping strategies.

Findings from the included studies were extracted under individual themes as appropriate (Appendix 2). Inclusion and exclusion criteria. Inclusion criteria: all primary research papers on COVID-19 and mental well-being published in the English language from 2019 until the date of the search. All study types quantitative, qualitative and mixed methods are included. The exclusion criteria: The study excluded editorial letters and reports, conference articles, abstracts, and periodical articles.

Findings from the included studies were categorised under appropriate themes (see Appendix 2).

Inclusion criteria included all primary research papers on COVID-19 and mental well-being, published in English from 2019 up to the search date. Studies employing quantitative, qualitative, and mixed methods were included.

Exclusion criteria included editorial letters, reports, conference articles, abstracts, and periodical articles.

Figure 1. PRISMA Flow Chart

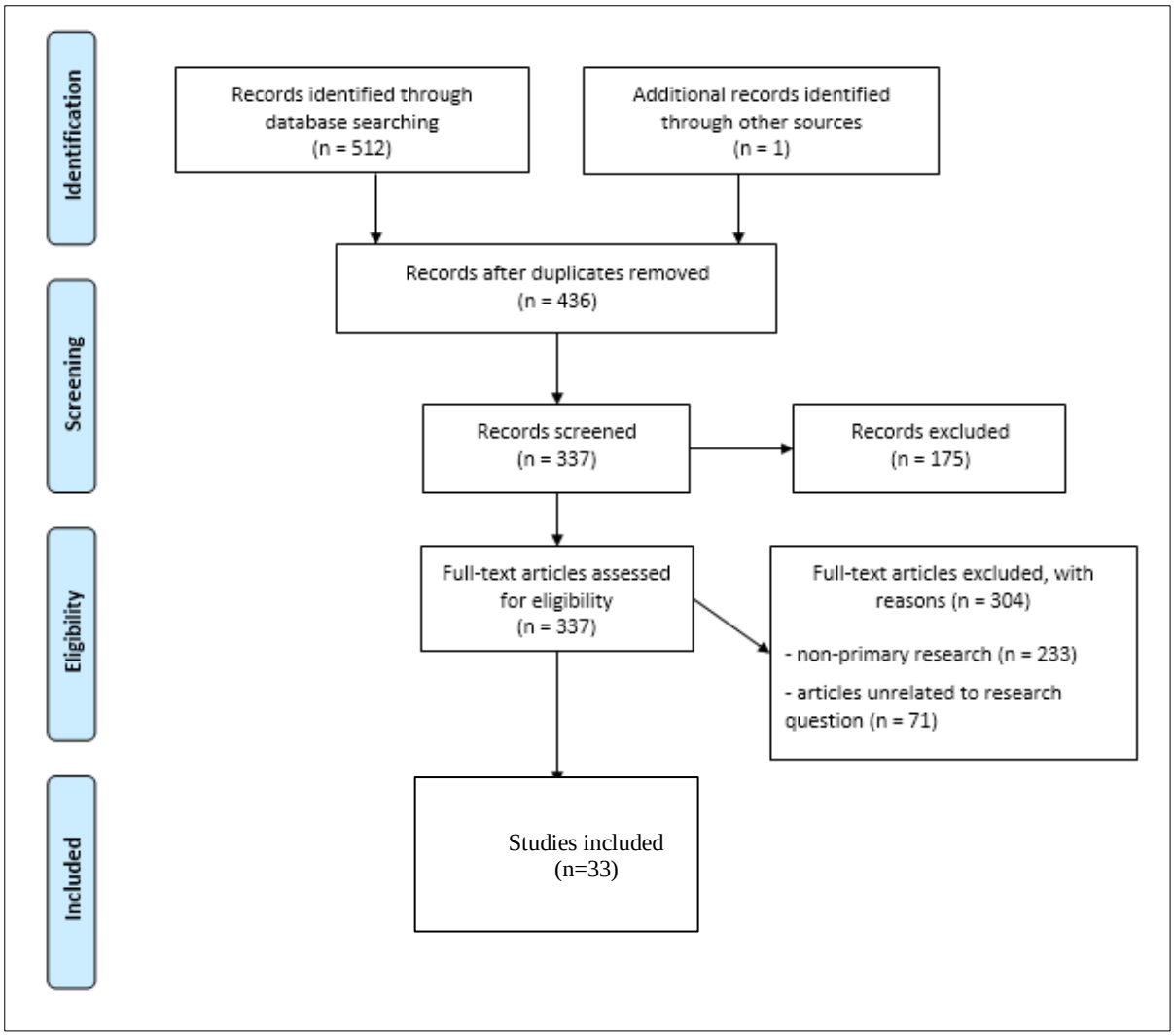

Table 1
Terms used for the impact-related literature search

Covid-19 OR coronavirus OR 2019-ncov
Mental health
Impact OR effect OR implication OR consequence* OR cause OR challenge [TX All Text]

Table 2
Terms used for the intervention-related literature search

Covid-19, coronavirus, or 2019-ncov
Mental health
(Programme or intervention or resource or strategy or manag* or treatment) not effect not impact [TX All Text]

Population characteristics

4.1. Age

Age is the most documented variable with all studies reporting participant ages, providing robust data to enhance the transparency of research findings. The impact of age on mental health in response to the pandemic varies from studies favouring the young, to those favouring the elderly, and to those showing no age difference. Twelve out of eighteen studies focusing on age disparities in psychological state suggest that younger generations' mental health is significantly more impacted by COVID-19. When considering anxiety, younger participants scored higher on relevant questionnaires compared to other age groups (Ahmad & Murad, 2020; Huang & Zhao, 2020a; Liang et al., 2020; Wang et al., 2020). Conversely, studies (Arslan et al., 2020; Goodman-Casanova et al., 2020; Zhao et al., 2020) reported lower anxiety levels in the elderly compared to the younger population. Regarding depression in younger populations, a similar pattern was observed with anxiety being more prevalent than in elderly participants (Gao et al., 2020; Huang & Zhao, 2020b; Khanna et al., 2020). In stark contrast, three studies (Gao et al., 2020; Sun et al., 2020; Uzun et al., 2020) reported that, in general, elderly population members experience more mental health challenges than their younger counterparts. However, four studies suggest that age does not mediate the relationship between COVID-19 and health outcomes (Cao et al., 2020; Korajlija & Jokic-Begic, 2020; Hou et al., 2020; Shevlin et al., 2020; Zhao et al., 2020;).

4.2. Gender

Out of the 31 included quantitative studies, eight measured gender differences concerning the effect of COVID-19 on mental health. Three studies suggested that women are more affected by the pandemic in terms of fear and anxiety in samples from the US (Fitzpatrick et al., 2020), China (Wang et al., 2020), and Turkey (Demir, 2020). On the contrary, Liang et al. (2020) indicate that males are more affected by anxiety. Half of these eight studies reported that gender is not a mediating factor when it comes to mental health and the pandemic (Gao et al., 2020; Hou et al., 2020; Huang & Zhao, 2020; Wang et al., 2020).

4.3. Occupation

Occupation was also a dimension where the results relating to mental health varied. Table 3 includes 33 studies, out of which 14 studies emphasised an effect of participants' type of work on COVID-19. Accordingly, studies were categorised as focusing on health workers, students (Das & Relojo-Howell, 2021), and the general population. Most of the studies that specifically emphasise one occupation focus on health workers, as they were the key individuals involved in dealing with the pandemic. Four studies included only focus on medical personnel.

Huang and Zhao (2020) compared a sample size of 7,236 health workers to other populations and concluded that healthcare workers are at a higher risk of facing and/or developing mental health challenges, as well as poor sleep quality, than workers in other occupations (Pilao et al., 2019). In two studies that focused on healthcare workers, the authors (Chatterjee et al., 2020; Uzun et al., 2020) found that as many as 35% of participants had high rates of anxiety, stress, or depression. On the other hand, Sun et al. (2020) suggest that health workers have an overall better level of mental health when compared to the other participating groups. However, Uzun et al. (2020) and Khanna et al. (2020) found that young health workers, more specifically those in gynaecology and ophthalmology, had significantly more mental health challenges than their older counterparts.

While many studies noted younger populations presenting more symptoms of mental health challenges, three pieces of research specifically focused on university students. Baloran (2020) who adopted a non-standardised test observed that 63% of the students from the South Philippines presented symptoms of anxiety.

Gao et al. (2020), who utilised the GAD-7 standardised measure to record the anxiety levels of Chinese participants, found that a quarter of the student sample reported experiencing anxiety. Similarly, Zhao et al. (2020), who used standardised tests such as the self-rating anxiety scale (SAS) and the self-rating depression scale (SDS), found that in their sample of 515 Chinese students, 29.7% presented with depressive symptoms, 14.4% with anxiety, and 5.6% with PTSD.

4.4 Personality and attitudes

Five studies highlight the implication of characteristics such as one's personality and attitudes on experiences of mental health challenges as a result of COVID-19 (Arslan et al., 2020; Bacon & Corr 2020; Satici et al., 2020; Sun et al., 2020; Uzun et al., 2020). These five studies identified those qualities that positively correlate with COVID-19 stress, anxiety, and fear. Arslan et al. (2020) suggest that COVID-19 stress had a significant predictive effect on dimensions such as optimism-pessimism, psychological inflexibility, and psychological problems. Moreover, Satici et al. (2020) also highlight the intolerance of uncertainty as being positively correlated to COVID-19 fear and a positive predictor of rumination. Lastly, a negative attitude to the coronavirus is also significantly and strongly correlated with anxiety and depression (Bacon & Corr 2020).

Two of the studies (Sun et al., 2020; Uzun et al., 2020) that utilised the SCL with medical personnel populations concluded that the obsessive-compulsive dimension was the most prominent in the Chinese and Turkish populations studied.

4.5. Community and ethnic backgrounds

The results from this sub-theme are quite varied, pointing towards a need for studies specifically focusing on community and ethnic backgrounds. Two studies (Fitzpatrick et al., 2020; Shapiro et al., 2020) highlight that immigrants in the USA and Israel, respectively, are more likely to report anxiety and fear. In addition, Fitzpatrick et al. (2020) also suggest that COVID-19 fear is concentrated around the more populated urban areas of the USA, as would be expected. On the other hand, Cao et al. (2020) concluded that living in an urban area in China is a protective factor against fear and anxiety. While these two studies (Cao et al., 2020; Fitzpatrick et al., 2020) both have a high number of participants (7,143 and 10,368, respectively), the identified difference could be caused by the populations studied; the former is general, while the latter is focused upon students. However, the finding could also indicate that the different situations and attitudes in the USA were influential when compared to China.

Two studies from China present more evidence on the lack of differences in terms of anxiety and depression according to the participants' community. First, Gao et al. (2020) highlight that there is no regional difference in these two factors, and secondly, Zhao et al. (2020) suggest that students who travelled during the Spring Festival celebrations did not differ in terms of anxiety and depression compared to those who did not travel. One notable factor is that Wang et al. (2020) suggest that based on the general population, those who had visited Wuhan developed higher levels of psychological distress.

Study characteristics

Apart from the aforementioned themes and sub-themes, the studies included in this review can be categorised according to characteristics such as the location where they were carried out and participants recruited, among others, as these variables help build a clearer picture of the effect of COVID-19 on mental health. The location where the studies were carried out and therefore where the population was sampled from is an important factor to consider, as the pandemic had different levels of morbidity and mortality in different parts of the world.

Of the 33 studies, 13 were conducted in China (Cao et al., 2020; Gao et al., 2020; Huang & Zhao, 2020; Hou et al., 2020; Liang et al., 2020; McKay et al., 2020; Ni et al., 2020; Sun et al., 2020; Wang et al., 2020a; Zhang et al., 2020). Three studies were conducted in India (Chakraborty & Chatterjee, 2020; Chatterjee et al., 2020; Khanna et al., 2020), four from Turkey (Arslan et al., 2020; Demir, 2020; Satici et al., 2020; Uzun et al., 2020), three from the United States (Alonzi et al., 2020; Fitzpatrick et al., 2020; Umucu & Lee, 2020), and two studies came from the UK (Bacon & Corr, 2020; Shevlin et al., 2020).

The two studies that focused on medical staff (Chatterjee et al., 2020; Khanna et al., 2020) used the DASS-21 and PHQ-9 standardised surveys, respectively, in order to measure mental health. While using different scales, the two studies found that 35% and 32.5% of the population could be categorised as depressed. Alternatively, Chakraborty & Chatterjee (2020), who used their own scale on the general population, found that 24.7% of these were depressed.

In studies from Turkey, Satici et al. (2020) and Uzun et al. (2020) used different scales to measure anxiety and depression: the Warwick-Edinburgh Mental Wellbeing Scales (WEMWBS) and the Beck Anxiety Inventory (BAI), respectively. Therefore, a comparison of their results would not be valid. However, the researchers focused on characteristics related to personality and found that intolerance to uncertainty and the obsessive-compulsive dimension, respectively, are related to the magnitude of anxiety felt by the populations as a result of COVID-19 (Satici et al., 2020; Uzun et al., 2020).

Similarly, in the studies carried out in the United States: (a) Umucu & Lee (2020) used the Patient Satisfaction Questionnaire (PSQ-8) adapted to COVID-19, (b) Fitzpatrick et al. (2020) employed the Generalized Anxiety Disorder 7-item scale (GAD-7), and (c) Alonzi et al. (2020) used the Patient-Reported Outcomes Measurement Information System short forms (PROMIS SF) to measure depression and anxiety. Here coping strategies are investigated (Umucu & Lee, 2020), as well as any increase in the levels of anxiety among participants who are mentally and physically disabled (Alonzi et al., 2020). Moreover, Fitzpatrick et al. (2020) found that in the USA, COVID-19 fear is concentrated in the more densely populated areas. In the United Kingdom, two studies used the GAD-7 to measure anxiety (Bacon & Corr, 2020; Shevlin et al., 2020), allowing for a more thorough comparison of the results and populations. The mean results and standard deviation in Bacon & Corr's (2020) study are 15.05 and 5.82, respectively. Along similar lines, Shevlin et al. (2020) found that 21.6% of their population had scored over 10, signifying anxiety.

Data analysis

Thirty-one quantitative studies on the effect of the coronavirus pandemic on various populations were included in this study, and three themes were identified: (1) the internal and external influences on COVID-19 behaviour, (2) the impacts on health and well-being and (3) coping strategies. Each theme is composed of various sub-themes which portray areas of influence of the COVID-19 pandemic upon people. Included are internal factors such as physical and psychological effects and external issues such as social media, in addition to various stressors such as the fear of being infected and worry for one’s family. In addition to the three themes, it was observed that mental health challenges, due to COVID-19 pandemic, vary according to a population’s characteristics such as: (a) age; (b) gender; (c) occupation; (d) personality; (e) community and ethnic background; and (f) family relationships.

RESULTS

These section presents the results from the 31 quantitative studies.

1. Internal and external influences

Firstly, in terms of the opening identified theme, the internal and external influences of theCOVID-19 pandemic, three sub-themes have been touched upon in the 31 quantitative studies: social media, vulnerability and stressors. The studies offer a valuable overview of the factors that have a role in the way that the pandemic influences people, both internally and externally.

1.1. Social media

Four studies highlighted the impact of social media as an external mediator of the relationship between the coronavirus and people's mental health (Ahmad & Murad, 2020; Chakraborty & Chatterjee, 2020; Gao et al., 2020; Wang et al., 2020). All four studies highlight the negative correlation between coronavirus-related news and social media use, and mental health variables such as anxiety (Gao et al., 2020), depression (Chakraborty & Chatterjee, 2020), panic (Ahmad & Murad, 2020), and concern (Wang et al., 2020).

One of the most highly rated studies in the STROBE critical analysis (Gao et al., 2020) found that people without mental health challenges had higher proportions of frequent social media exposure than those with such challenges. This finding points towards the importance of the content accessed via social media, considering that all negative effects were observed in relation to coronavirus news, not general social media exposure.

1.2. Vulnerability

When considering the second sub-theme, vulnerability can be both an external and internal factor of influence on mental health. In terms of the external factors causing vulnerability, those with a low education or a lower socio-economic status were consistently at a significantly higher risk of facing challenges in terms of their mental health. Other authors identified some of the internal risk factors associated with anxiety, to include chronic health conditions such as disabilities (Korajlija & Jokic-Begic, 2020), as well as mental and physical health conditions (Alonzi et al. 2020; Pilao et al., 2017), including post-traumatic stress disorder (PTSD) (Liang et al., 2020).

1.3. Stressors

The last of the three sub-themes highlights the internal and external stressors experienced by various populations. The most prevalent factor that correlated with symptoms of anxiety was "fear for one's family" (Chakraborty & Chatterjee, 2020; Fitzpatrick et al., 2020; Goodman-Casanova et al., 2020; Shapiro et al., 2020; Sun et al., 2020). However, with studies involving university students, economic fears were the most prevalent (Baloran, 2020; Gao et al., 2020).

Also, in 5 of the 8 studies (Baloran, 2020; Chakraborty & Chatterjee, 2020; Fitzpatrick et al., 2020; Gao et al., 2020; Shapiro et al., 2020), which exclude medical staff, isolation and related effects on daily life are highlighted as significant stressors. It is important to note that the fear of becoming infected was a stressor not only among health workers (Sun et al., 2020) but was also a source of stress with the general population (Chakraborty & Chatterjee, 2020; Fitzpatrick et al., 2020; Shapiro et al., 2020). While a sense of fear was noted among older adults (Goodman-Casanova et al., 2020), no such stressors were identified in the studies focusing on student populations (Baloran, 2020; Gao et al., 2020).

2. Impacts on health and well-being

The results identified a huge impact of COVID-19 on people’s health and well-being, including both physical and psychological impacts, as presented in this theme.

2.1. Physical impacts

2.1.1. Physiological responses

The connection between the coronavirus pandemic and physical markers of mental health challenges is only approached in 2 of the 31 quantitative studies in this review (Bacon & Carr 2020; Shevlin et al., 2020). In the two studies, coronavirus and anxiety correlated with the activation of the behavioural immune system (BIS) and fight-flight-freeze system (FFFS) (Bacon & Corr 2020), as well as with general somatic symptoms. Particularly noted were gastrointestinal and fatigue issues, which are independent of generalised anxiety (Shevlin et al.,2020), thereby establishing a direct relationship between stress and physiological responses (i.e., a weak immune system). Zhang et al. (2020) carried out a qualitative study focused on working populations and highlighted that there was no difference in body pain or physical function between individuals who were employed and those who were unemployed.

2.1.2. Sleep effects

As mental health is closely related to one's sleep quality, 6 studies included this variable in their operationalizations of mental health (Chakraborty & Chatterjee, 2020; Demir, 2020; Goodman-Casanova et al., 2020; Huang & Zhao, 2020c; Wang et al., 2020). The rate of disturbed sleep noted in general populations ranged from 12.2% (Wang et al., 2020) to 33.1% reported by Chakraborty & Chatterjee (2020). In their 7,236-participant study, Xiong et al. (2020) reported that healthcare workers are at the highest risk of experiencing bad sleep quality when compared to other professions. On the other hand, regardless of the increased morbidity and mortality rate among the elderly population, Goodman-Casanova et al. (2020) found that 70% of the elderly included in their study reported that they were able to maintain their sleep quality.

2.2. Psychological impacts

A large proportion of the 31 quantitative studies included in this review presented information regarding the effect of COVID-19 on participants' psychological functioning. The three sub-themes identified from this main theme are: (1) anxiety, (2) depression and (3) fearfulness.

2.2.1. Anxiety

A variety of tests was used to assess the effects of the pandemic on levels of anxiety experienced by the participants, yet they all pointed towards the fact that such impacts exist, but with different effect sizes. While the studies, which measured anxiety using the GAD-7, portray large effects such as 35.1% (Huang & Zhao, 2020a), researchers using the SAS only reported rates of 7.3% for the general population (Wang et al., 2020) and 14.4% for students (Zhao et al., 2020). The study by Gao et al. (2020), rated 5 stars according to STROBE, used the WHO-5 and concluded that 22.6% of the sample presented symptoms of anxiety. Lastly, when Chakraborty & Chatterjee (2020) asked their participants about their levels of anxiety since the start of the COVID-19 pandemic, 71.8% responded that they were more worried 'in the past week'.

Some moderators of the relationship between the coronavirus pandemic and anxiety levels are: (a) anxiety sensitivity (McKay et al., 2020) and (b) the time spent focusing on COVID-19. In this latter circumstance, in excess of three hours per day was associated with a significantly higher prevalence of anxiety symptoms (Huang & Zhao, 2020) than in those individuals focusing for less than three hours.

As noted above, the studies used different scales to measure anxiety and mental health (See Table 4). The most used scale for anxiety was the GAD-7, which was used in six studies (Bacon & Corr, 2020; Cao et al., 2020; Fitzpatrick et al., 2020; Gao et al., 2020; Huang & Zhao, 2020a; Shevlin et al., 2020). While these investigations were carried out on different populations, somewhat surprisingly similar results were obtained. For example, Shevlin et al. (2020) observed that 21.6% of their UK population had a score equal to or greater than 10, the cut-off point for anxiety. Similarly, 22.6% of Chinese participants in a study by Gao et al. (2020) also scored 10 or more. Moreover, 35.1% of Huang & Zhao's (2020) Chinese population scored 9 or above, adding to the reliability of GAD-7 as a tool to measure anxiety in this context.

The two studies which measured anxiety using the SAS (Wang et al., 2020; Zhao et al., 2020) also had similar means and standard deviations of 36.92 (SD = 7.33) and 39.01 (SD = 9.26) respectively. While these studies both involve similar Chinese populations, the close results suggest that the SAS is a

good reliable measure. While specific tests for anxiety were used, some studies employed more generalised scales for mental health, which contain components able to address anxiety. Some of the most used scales in this context are: (a) the Kessler 6 (Kessler et al., 2003) which was used in three studies (Sibley et al., 2020; Wang et al., 2020; Zhang et al., 2020), (b) the Symptom Checklist 90 (Derogatis, 1994), which has a personality component in addition to an anxiety component, was used in three studies (Hou et al., 2020; Sun et al., 2020; Uzun et al., 2020), (c) the Depression Anxiety Stress Scale (DASS) was used by Chatterjee et al. (2020) and McKay et al., 2020), (d) the Brief Symptom Inventory (BFI) was used by Arslan et al. (2020), and (e) the Patient-Reported Outcomes Measurement Information System short forms were employed by Alonzi et al. (2020) and Harper et al. (2020). Six researchers chose to construct their own questionnaires to measure stress and anxiety (Ahmad & Murad, 2020; Baloran, 2020; Demir, 2020; Khanna et al., 2020; Shapiro et al., 2020; Urooj et al., 2020). All six studies yielded valid and reliable results that are in line with those who used standardised scales (Table 4).

2.2.2. Depression

Depression was measured in 8 of the 31 quantitative studies (Alonzi et al., 2020; Chakraborty & Chatterjee, 2020; Gao et al., 2020; Huang & Zhao, 2020b; Khanna et al., 2020; Shapiro et al., 2020; Wang et al., 2020; Zhao et al., 2020). Although no consistent questionnaire was used for its measurement, the effect of the pandemic on this variable is visible and significant, no matter the measurement method or instrument employed (Table 4).

The SDS was used in two studies, therefore allowing for the comparison of the two populations: general and students. As with anxiety, students had the higher rate of depression at 29.7% (Zhao et al., 2020), compared to the other participants, where the percentage was 18.2% (Wang et al., 2020). The highest rate of depression of 48.3% was observed by Gao et al. (2020) in their 4,872-participant study using the WHO-5 questionnaire. They also note that depression is negatively correlated with one's self-rated level of physical and mental health (Gao et al., 2020).

Two versions of the PHQ were also used; the shorter format (PHQ-2) by Shapiro et al. (2020), yielding a rate of 12% of depression risk. The longer format (PHQ-9) was employed by Khanna et al. (2020), yielding 32.6% in a population of 2,355 ophthalmologists. This finding suggests the importance of considering the version of the test employed, as well as the research population, when making comparisons.

Lastly, scores from Chakraborty & Chatterjee's (2020) self-designed questionnaire and from the CES-D tool used by Huang & Zhao (2020) lead to the conclusion that 24.7% and 20.1% respectively of their research populations are at a high risk of developing depression.

2.2.3. Fearfulness

Fear has been explicitly reported in 4 of the included studies and it portrays a significant mediating factor between one’s psychological well-being and the current pandemic (Satici 2020: Fitzpatrick et al., 2020; Craig et al., 2020; McKay et al., 2020). Satici (2020) negatively correlates COVID-19 fear with mental well-being, while Fitzpatrick et al. (2020) positively associate fear with depressive and anxiety symptoms. Moreover, Craig et al. (2020) suggest that the fear of COVID-19 was the only positive predictor of positive behavioural change, supporting future research on potential interventions and ways of changing / improving health behaviours.

3. Coping

The last theme (coping) that emerged following the analysis of the 31 quantitative studies yielded three sub-themes: (1) coping strategies; (2) support and resilience ; and (3) knowledge and awareness. These sub-themes represent how people deal with the effects of the pandemic, as well as their attitudes regarding the situation.

3.1. Coping strategies

When considering the coping strategies employed by various populations, it was noted that the studies provided very little detail (Baloran, 2020; Liang et al., 2020; McKay et al., 2020; Umucu & Lee, 2020; Wang et al., 2020). However, these research initiatives identify the general internal and external approaches that people employ to reduce any negative effects on their mental health.

Two studies (Liang et al., 2020; Wang et al., 2020) focus on coping styles, including those associated with mental health challenges and those that are part of the model explaining 86.2% of the variance in experienced COVID-19 distress. With such an effect size, more research is needed into the specific coping strategies that can facilitate or hinder the effect of the pandemic on the general population's health.

Supporting this claim, the participants included in the study by Umucu & Lee (2020) demonstrated not only a chronic condition but also disability coping strategies such as active coping, emotional support (Relojo & dela Rosa, 2017), and denial, which explained 54% of the variance in well-being. Baloran (2020) noted that students use both external and internal coping strategies, such as hand washing, talking with their family, or keeping occupied at home, to minimise the impact of COVID-19 on their mental health (Kuha et al., 2018).

3.2. Support and resilience

Six studies provided information relating to resilience and support. Both Shapiro et al. (2020) and Chakraborty & Chatterjee (2020) highlighted that a small portion of their samples, 6% and 2.2% respectively, reached out for mental health support during the pandemic. It is important to note that 87% of the participants in the research by Shapiro et al. (2020) thought they did not need any such help.
In terms of social support, when considering health workers, Hou et al. (2020) suggest that the score on the Symptoms Check List 90 (SCL-90) was independently associated with the level of an individual's received social support. Moreover, the participants in the study by Shevlin et al. (2020) recalled feeling a higher sense of community and social support during and after the lockdown, compared to before the pandemic. Hou et al. (2020) only explicitly measured resilience regarding health workers, and they observed that levels of resilience are positively correlated with the respondent's age, portraying a dimension where young people are disfavoured (Relojo-Howell, 2020). Furthermore, Wang et al. (2020) highlight that 83.8% of their population were "hopeful", which coincided with low levels of anxiety and depression in their sample. Goodman-Casanova et al. (2020) suggest that television-based telehealth improved cognitive stimulation in older adults, portraying a potential replacement for in-person support during the pandemic and hopeful developments in terms of future care and interventions (Relojo-Howell, 2021).

3.3 Knowledge and awareness

The present studies portray that most of the participants were knowledgeable about what COVID-19 is and were aware of the behaviours that could mitigate the risk of contracting the virus (Bacon & Corr, 2020; Baloran, 2020; Chakraborty & Chatterjee, 2020; Huang & Zhao, 2020b; Korajlijia & Jokic-Begic, 2020; Liang et al., 2020). This mindset was observed in studied populations from the South Philippines (Baloran, 2020), in 78.8% of the ones in China (Huang & Zhao, 2020; Liang et al., 2020), and 98.7% of the ones in West Bengal (Chakraborty & Chatterjee, 2020).

In terms of safety behaviours, these were reported to increase among the Croatian population from the first instance of observation to the next after three weeks (Korajlijia & Jokic-Begic, 2020). Bacon & Corr (2020) suggest that age is negatively correlated with the probability of self-isolation. Also, a high level of behavioural immune system (BIS) activation, individuals are less likely to engage in safety behaviours. The authors recognised that the latter could be due to the learned behaviour where there is a psychological conflict between staying safe and the desire to continue living a life of pleasure.

Findings from the qualitative studies

This review identified one qualitative study (Ni et al., 2020) and one mixed method study (Urooj et al., 2020). Niuniu et al. (2020) explored the psychological experience of 20 nurses/caregivers of COVID-19 patients in China using a phenomenological approach. The research team found that nurses exhibited a mixed feeling of negative and positive emotional experience. However, most nurses reported negative emotional experiences during the early stages of the COVID-19 pandemic, although they described positive experiences later. Additionally, it was established that good coping and psychological resilience facilitated good mental health among nurses/caregivers (Ni et al., 2020). Using a mixed-method exploratory web-based survey, Urooj et al. (2020) examined the expectations

and fears faced by 222 doctors from the UK, Pakistan, and the USA. The authors found: (a) that about 80% (*n* = 177) feared infecting their family members, (b) that 63% (*n* = 140) were worried about the rapid spread of COVID-19, and (c) that 60% (*n* = 134) feared complications associated with the disease. About the same number were concerned about becoming a carrier 29% (n=64) or missing the diagnosis, 28% (*n* = 62).

Table 3. Summary of included studies

	Name(s) of author(s) and date of publication	Aim of the study	Setting	Participants	Methodology and methods	Key findings
1	Niuniu Sun, Luoqun Wei, Suling Shi, Dandan Jiao, Runluo Song, Lili Ma, Hongwei Wang, Chao Wang, Zhaoguo Wang, Yanli You, Shuhua Liu & Hongyun Wang (2020)	To explore the psychological experience of nurses/caregivers of COVID-19 patients.	China Hospital of Henan University	20 nurses	Phenomenological approach Interviews face-to-face and telephone	1. Nurses showed coexisting positive and negative emotions during outbreak 2. Negative emotions dominant in the early stages, positive emotions appeared gradually 3. Coping styles and psychological growth important to maintain mental health
2	Dean McKay, Haibo Yang, Jon Elhai & Gordon J.G. Asmundson (2020)	To investigate the predictive and moderating effects of disgust on anxiety sensitivity and fear of contracting COVID-19.	China 24/02 -> 15 March 2020	908 Chinese adults Volunteer sampling on WeChat (compensated) 40.4 yrs old 82.82% women	Survey DASS-21 CoVGAD-7 ASI-3 DPSS-R Community sample	1. The Behavioural Immune System (BIS) contributes to pandemics anxiety 2. Disgust propensity and sensitivity was a moderator in fear of contracting COVID-19 3. Anxiety sensitivity was a moderator of COVID-19 anxiety 4. 2. and 3. are independent 5. Interventions for those with high anxiety

						sensitivity – educate on false alarms + include disgust in intervention models
3	Seshradi Chatterjee, Ranjan Bhattacharyya, Sumita Bhattacharyya, Sukanya Gupta, Soumitra Das & Bejoy Banerjee	Explore knowledge, attitude, and behaviour of doctors regarding the pandemic and how it influences their depression, anxiety, and stress.	West Bengal, India 28/03 -> 06/04	152 doctors Volunteer sampling on social media and doctor groups 42.05 years old 78.3% male	Cross-sectional, observational study Online semi-structured questionnaire 1. General info 2. Opinion abd knowledge of COVID-19 3. DASS-21	1. Age and multiple comorbidities are predictive factors of anxiety, depression and stress (42.8% have one or more comorbidities) 2. Prevalence: 39.5 % anxiety, 35% depression, 33% stress 3. Altruistic coping and protective measures should be warranted. 4. Stressors: practicing area, working sector, working hours, high-risk procedure, use of hand sanitiser, history of being ostracised
4	Alison M Bacon & Philip J Corr (2020)	To contain spread of COVID-19, public behaviour change is necessary. Study presents an examination of individual differences in some relevant psychological factors.	United Kingdom 18/03 -> 19/03 55% self isolating	202 respondents 33.8 yrs old 62.87% females	Cross-sectional psychometric design Personality questionnaire BDI- II GAD-7	1. -ve illness attitude positively correlated with RST factors -specially BIS & FFFS 2. Older people, higher SES, -ve illness attitude, high

					IAS RST-PQ and questions about COVID-19 concerns and intentions	RR score were most concerned about NHS 3. Self-isolation likelihood +ve correlated to young, -ve illness attitude, high FFFS score 4. Results suggest psychological conflict for high BIS (less likely to isolate): between the urge to stay safe and the desire to maintain a normal, pleasurable life 5. Personal safety concerns are related to fight–flight–freeze system traits.
5	Gökmen Arslan, Murai Yildirim, Ahmet Tanhan, Matin Bulus, Kelly-Ann Allen (2020)	Examine the mediating role of optimism-pessimism and psychological inflexibility in the relationship of COVID stress with psychological problems.	Turkey	451 adults 23.3 yearrs old 55% women	Online survey CSM OPM AAQ- II BSI-18	1. COVID stress had a significant predictive effect on optimism-pessimism, psychological inflexibility, and psychological problems. 2. Older, higher SES and higher degree correlated with lower MPCs 3. Optimism-pessimism and psychological inflexibility mediated effect of COVID stress on psychological problems in adults.

						4. 59% of variance in psych problems explained by covid stress, optimism, pessimism & psych inflexibility
6	Anita Lauri Korajlija & Natasa Jokic-Begic (2020)	To examine changes in levels of COVID-19 concern and safety behaviours among Croatians.	Croatia 1.when first person was diagnosed 2.first covid fatality (3 weeks later)	1,888 83.1 % female 31.3 yrs 966 75.8 %female 40 yrs Snowball sample	Online questionnaire CSBC CAS-1 & CAS-2	1. Increase in concern and safety behaviours among participants during 3 weeks when first case and death was identified. 2. Parents, and mothers especially, showed the most concern. small size effect 3. No correlation age and concerns 4. People with chronic health conditions also showed greater concern than healthy participants.
7	Mark Shevlin, Emma Nolan, Marcin Owczarek, Orla McBride, Jamie Murphy, Jilly Gibson Miller, Todd K. Hartman, Liat Levita, Liam Mason, Anton P. Martinez, Ryan McKay,	To estimate the association between anxiety associated with COVID and somatic symptoms.	United Kingdom 23/03 -> 28/03	2025 adults 45.45 years old 51.9% female Stratified quota	Online questionnaire Income, pre-existing health problems, COVID-19 anxiety, GAD-7, PHQ-15	1. Moderate to high levels of anxiety associated with COVID are significantly associated with general somatic symptoms and in particular with gastrointestinal and fatigue symptoms.

	Thomas V. A. Stocks, Kate M. Bennett, Philip Hyland & Richard P. Bentall (2020)			sampling		2. First evidence that COVID-associated anxiety makes unique contribution to somatisation, independent of GAD 3. Higher sense of community & social support post lockdown
8	Chris G Sibley, Lara M Greaves, Nicole Satherley, Marc S Wilson, Nickola C Overall, Carol H J Lee, Petar Milojev, Joseph Bulbulia, Danny Osborne, Taciano L Milfont, Carla A Houkamau, Isabelle M Duck, Raine Vickers-Jones & Fiona Kate Barlow (June 2020)	To investigate the immediate effects of a nationwide lockdown	New Zealand participants from NZAVS longitudinal l panel study All recruited long before the pandemic 1.1/10 ->31/12 2. 26/03 -> 12/04	1003 New Zealanders assessed before lockdown and during	Longitudinal national probability panel survey Institutional trust and attitudes Kessler-6, subjective health, social support, belongingness, life satisfaction	People in pandemic/lockdown group reported: 1. Higher trust in science, politicians and police 2. Higher levels of patriotism 3. Higher rates of mental distress
9	Emre Umucu & Beatrice Lee (2020)	Aimed to describe the perceived stress levels and coping mechanism related to COVID-19, and whether coping is related to well-being in people with self-reported chronic conditions and disabilities.	United States	269 US residents with self-reported conditions. 39.37 yrs old 56.1% men	Online surveys and questionnaires Demographic PSQ-8 COPE PERMA-Profiler PHQ-4	1. Perceived stress related to COVID-19 was positively associated with coping strategies. 2. Coping strategies were associated with participants' well-being

					Amazon MTurk		after controlling for demographic and psychological characteristics. (54% variance explained)
0	1	Uzma Urooj, Asma Ansari, Asifa Siraj, Sumaira Khan & Humaira Tariq (2020)	To explore the expectations and fears faced by doctors during COVID-19 pandemic.	N/A	222 doctors from UK, Pakistan, and US 33.58 yrs old 67.5% females (29.3% had covid patients)	Mixed method exploratory web-based survey Questionnaire with both closed ended questions and open ended questions	1. Fears included: Infecting family members (n=177), rapid spread of disease (140), complications of disease (134), becoming a carrier (64), and missing the diagnosis (62). 2. Qual: ● Depressing circumstances: 58% ● Anxiety: 86% ● Hopeful 56.7% ● 99% concerns were cantered around family ● +80% expected full institutional support
1	1	Kevin M. Fitzpatrick, Casey Harris & Grant Drawve (2020)	To examine the intersection of COVID-19 fear with social vulnerabilities and mental health consequences among adults living in the US.	United States Start: 23 March *just observations from early weeks of year-long study*	10,368 US adults Post- stratified weighted	Online survey CESD GAD-7 US region, social vulnerability questions,	1. Respondents were fearful, worried and uncertain for consequences for them, families, communities & nation 2. Unequally distributed for women, Hispanic, parents, laid off or furloughed

						3. New: COVID fear is concentrated in densely populated communities, ones with higher reported cases & urban areas 4. COVID-19 fear is clearly linked to depressive and anxiety symptoms (more covid fear= more mental health challenges reported)
2	1	Craig A. Harper, Liam P. Satchell, Dean Fido & Robert D. Latzman (April 2020)	To examine the role of individual differences in emotional and personality-based variables in predicting virus-mitigating behaviours.	International 27/03 -> 28/03	324 respondents 73% British or UK nationality 50% female (compensated)	Online study Demographics FCV-19S (covid fear) YGBC (covid beh change) POMIS-SFs MFQ-20 WHOQOL-BREF	1. The only predictor of positive behaviour change was fear of COVID-19, with no effect of politically relevant variables. -GOOD MEASURE OF FEAR 2. Notable moderate +ve correlation behaviour change and COVID-19 fear 3. Small +ve correlation of behaviour change with POMIS anxiety and self-reported risk **4. NO** relation of behaviour change & political views
	1	Yeen Huang & Ning Zhao	To assess the mental health	China	7,236 self-selected	Web-based cross-sectional	1. Younger people reported

3	(2020)	burden of the Chinese public during the outbreak and explore potential influence factors.	03/02 -> 17/02	volunteers through WeChat and mainstream media 54.6% females 35.3 yrs old	survey Demographics COVID-19 knowledge GAD-7 CES-D PSQI (sleep)	a higher prevalence of GAD and depressive symptoms than older people. 2. Age (<35) and time focusing on COVID (3+ h) were associated with GAD. 3. Age: <35 higher risk of depression 4. Healthcare workers are at high risk of mental illness and poor sleep quality.
4 1	Begum Satici, Mehmet Saricalli, Seydi Ahmet Satici & Mark D. Griffiths (2020)	To examine whether intolerance of uncertainty was related to mental well-being and whether this relationship was mediated by rumination and fear of COVID-19.	Turkey	1772 Turkish adults 70% females 18-–73 yrs	Web-based questionnaire Demographics, MEMWBS FCV-19S IUS12 (uncertainty intolerance) RRS (rumination)	1. -ve correlation of mental well-being to intolerance of uncertainty, rumination and covid fear (small but significant effect (approx .25) 2. +ve correlation COVID fear and intolerance of uncertainty & rumination (significant effect (.48) 3. -ve direct effect of intolerance on mental well-being (after controlling for confounding) 4. Intolerance positive

						predictor of rumination and COVID fear 5. Rumination mediates relationship intolerance & mental well-being
5	1	Erick T. Baloran (2020)	To examine students' knowledge, attitudes, anxiety and coping strategies during the COVID-19 pandemic.	Southern Philippines 25/04 -> 08/05	530 students 58.87% female 53.2% 20–25 yrs Snowball technique	Cross-sectional study with online survey	1. Students possessed sufficient knowledge 2. 62.6% considered self at high risk of infection 3. Most were aware of behaviours needed & would agree vaccination 4. Students were satisfied with government's actions to mitigate problems 5. students used various ways to cope with mental health challenges. 6. Majority displayed anxiety
6	1	Yuqing Zhao, Yuanyuan An, Xing Tan & Xiaohui Li (2020)	To investigate the prevalence of anxiety, depression and PTSD among self-isolating general population, in the context of COVID-19.	China 26/01 -> 02/02	515 people, mainly university students 66.4%. female 49.5% under 20	Online questionnaire Sociodemographic SAS SDS PCL-5 (PTSD)	1. 29.7 depression; 14.4% anxiety; 5.6% PTSD 2. Over 45 yrs old significantly lower anxiety (but no age difference in

				WeChat		depression & PTSD 3. No significant effect of recent travels (Spring Festival) 4. Significant correlation between anxiety and depression & depression & PTSD
17	Yeen Huang & Ning Zhao (2020)	To identify high-risk groups whose mental health conditions were vulnerable to the Covid outbreak.	China 03/02 -> 17/02	7,236 self-selected participants (ISEMH longitudinal study WeChat and other social media 54.6% females 31% healthcare	Web-based survey Demographic GAD-7 CES-D PSQI (sleep quality) Knowledge of COVID (time thinkingand knowledge)	1. 78.8% knowledgeable 2. 43.6% focused on COVID for 3+ h/ day 3. Anxiety: 35.1% , depression: 20.1%, poor sleep 18.2% 4. No mh difference in gender 5. Depressive &anxiety symptoms significantly higher in young (<35 yrs) 6. Sleep quality worst in health workers 7. Young people who focused 3+ h/day had higher prevalence of anxiety symptoms
1	Junling Gao, Pinpin Zheng,	To assess the prevalence of	China	4,872 Chinese citizens	Cross-sectional study,	1. Frequent social media

8	Yingnan Jia, Hao Chen, Yimeng Mao, Suhong Chen, Yi Wang, Hua Fu, Junming Dai (2020)	mental health problems and examine their association with social media exposure during COVID-19.	31/01 -> 02/02	18–85 yrs (47.9% 21–30 yrs) 67.7% women	online survey Demographics WHO-5 (dep) SME (social media exposure)	exposure was positively associated with high odds of anxiety and a combination of depression & anxiety. 2. 48.3% depression (higher 21–30 yrs & lower in ones with higher education) 3. 22.6% anxiety (higher in 31–40 group) 4. No regional difference in anxiety or depression 5. Self-rated health negatively correlated with depression 6. Excellent health had higher proportion of frequent SME than others
9	Ephraim Shapiro, Livia Levine & Avi Kay (2020)	To investigate the effect of COVID-19 on Israelis' mental health	Israel Late April	503 respondents 61% females 18–90 (med 47) yrs	Online survey PHQ-2 (dep) & others?	1. Almost 25% high anxiety/ worry 2. 12% risk for depression 3. Covid stressors: family, friends, economic situation, isolation 4. 6% received MH support (87% thought they did not need it

						5. Immigrants more likely to report anxiety and seek MH help
20	Navdar Dogus Uzun, Mustafa Tekin, Emre Sertel & Alpay Tuncar (2020)	To investigate the psychological and social effects of the COVID-19 epidemic on the healthcare workers serving in the gynaecology and obstetrics department.	Turkey	13 doctors, 52 midwives, 38 nurses working in gynaecology and obstetrics clinics 21–45 yrs (med: 29.38) 56.3% 29 or younger	Cross-sectional, survey forms Sociodemographic BAI SCL-90-R BPRS (psychiatric)	1. Anxiety, hostility, and phobic anxiety were higher in participants over the age of 29 years, though the results were not statistically significant. 2. Depression & other symptoms, GSI and BAI were higher in <29 yrs old 3. Obsessive- Compulsive SCL dimension was highest
21	Rohit C Khanna, Santosh G Honavar, Asha Latha Metla, Amritendu Bhattacharya & Pallab K Maulik (2020)	To evaluate the psychological impact of COVID-19 on ophthalmologists-in-training and practising ophthalmologists during lockdown.	India 15/04 -> 19/04	2,355 ophthalmologists 25–82 yrs old (med: 40) 56.7 % males	Online survey Demographics COVID impact on practice Income impact PHQ-9 (dep)	1. More than half felt that COVID would impact on their training or professional work; 37% had difficulty meeting their living expenses. 2. Depressive symptom prevalence: 32.6%, especially in younger participants. 3. Odds of depression

						decreased by 3% with 1-year increase in age.
2	2	Kaustav Chakraborty & Moumita Chatterjee (2020)	To assess the psychological impact of COVID-19 on the general population in West Bengal.	West Bengal, India 29/03 -> 31/03	507 respondents 75.3% male	Online survey (self-designed) 1.Sociodemographic 2.Knowledge & attitudes on Covid 3.Psychological impact of Covid	1. 71.8% felt more worried in the past weeks. 24.7% depressed 33.1% disturbed sleep 2. Stressors: own and family health, financial loss, contracting Covid 3. More worried and depressed after reading news of covid or social media 4. 2.2% helpline & 2% started medication 5. 8.7% knew exactly what COVID was 77.7% knew options to stop COVID 95.9% recognised symptoms
3	2	Tianya Hou, Taiquan Zhang, Wenpeng Cai, Xiangrui Song, Aibin Chen, Guanghui Deng & Chunyan Ni (2020)	To examine the effect of social support on mental health of health care workers and its underlying mechanisms regarding the mediating role of resilience and moderating role of age during the epidemic.	China 01/02 -> 07/02	1472 healthcare workers 76.5% female 55% middle aged	Online survey SSRS CD-RISC (resilience) SCL-90 (mental health)	1. No association of SLC with demographics (but NOT social support, which is directly correlated, independent of resilience - but it is a better model otherwise) 2. Resilience +vely correlated with age group & -vely correlated with

						social support 3. Age mediates -ve relationship resilience & SLC score (younger had stronger rel.)
4	2	Ning Sun, Jun Xing, Ling Shu Geng & Qian Yu Li (2020)	To study the relationship between personality traits and mental health conditions of medical personnel to provide a basis and reference for the implementation of targeted education on mental health.	China 25/01 -> 16/02	548 medical personnel 72% female Most 34- 46 yrs old	Self-report inventory demographics SCL-90	1. The overall mental health status of medical personal is generally higher than that of the norm group (high SLC score) 2. Factors affecting MH (stressors): 1) Suspicion they're infected 2) Family 3) Age 3. Obsessive compulsive dimension highest 4. +ve correlation age and SCL score
5	2	Yenan Wang, Yu Di, Junjie Ye & Wenbin Wie (2020)	To investigate the public's psychological states and their related factors during the COVID outbreak.	China 06/02 -> 09/02	600 psychologically stable respondents 55.5% females 72% 18-40 yrs	Online questionnaire SAS (anx) SDS (dep)	1. Females' anxiety risk was x3.01 higher than males. 2. Non-anxiety and non-depression rates were 93.67% and 82.83%, respectively. 3. 12.17% problems with sleep & 6.6% tired for no reason

						4. Higher risk of anxiety in under 40 5. 83.83% hopeful 6. Education and occupation correlated with depression
6 2	Jessica Marian Goodman-Casanova, Elena Dura-Perez, Jose Guzman-Parra, Antonio Cuesta-Vargas & Fermin Mayoral-Cleries (2020)	To explore the impact of confinement on the health and well-being of community-dwelling older adults with mild cognitive impairment or mild dementia, to provide television- and phone-based support, and to study the effects of said support.	Spain	93 participants From the TV-AssistDem study (both control and experimental group) with mild cognitive impairment 65% women 73.35 yrs old	Phone-based survey using TV-assisted support method Quantitative: Health perception Health management sleep-rest patterns Qualitative: Coping-stress Activity-exercise Relationships	1. During confinement, the mental health and well-being was optimal for most of the vulnerable population 2. Those living alone reported greater negative psychological effects and sleeping problems. 3. Measures adopted to address the negative experiences proved useful. The television-based telehealth support showed potential for cognitive stimulation. 4. 61% overall good well-being 5. 70% maintained sleep quality 6. Stressors: fear of

						becoming infected, fear of family, frustration, boredom, loss of routine, isolation
27	Leilei Liang, Hui Ren, Ruilin Cao, Yueyuang Hu, Zeying Qin, Chuanen Li & Songli Mei (2020)	To assess the youth mental health after the COVID-19 outbreak, and to investigate factors of mental health.	China 30/02	584 youth Snowball on Wechat 74.6% 21–30 yrs old - but range 14–35	Cross-sectional, Online questionnaire COVID knowledge GHQ-12 (mh) PCL-C (PTSD) SCSQ (coping style)	1. 40.4% of the sampled youth were found to be prone to psychological problems, and 14.4% with PTSD symptoms. 2. Youth mental health was shown to be significantly related to being less educated and using negative coping styles. 3. Most had full knowledge of health info 4. Males had higher GHQ, PTSD and -ve coping (but no effect of age) 5. Low education, PTSD, enterprise employee & -ve coping style – more likely to have psychological disorders
28	Ülkü Figen Demir (2020)	To determine the sleep-related disturbances and the level of anxiety in a Turkish population and compare the outcomes between the genders and working status	Turkey May 2020	100 adult volunteers 52% female	Phone-based cross-sectional semi-structured questionnaire Sleep performance Anxiety	1. Males reported more of a change in waking hours, and an increased need for daytime sleep & alcohol intake. 2. Anxiety levels were higher

		of the subjects during the COVID-19 pandemic.			Life satisfaction	among females, and the causes of said anxiety were different between the two groups. 3. Overall scores for well-being and life satisfaction were lower among females. 4. Impaired sleep: 42% females & 40% males 5. Home confinement changes waking hours (later) 6. Most stated change in well-being and anxiety
9	2	Araz Ramazan Ahmad & Hersh Rasool Murad (2020)	To determine how social media affects self-reported mental health and the spread of panic about COVID-19 in the Kurdistan Region in Iraq.	Iraq	516 social media users 57% male 65% 18–35 yrs old	Online questionnaire Spreading panic about COVID on social media	1. Facebook was the most used platform for spreading panic in Iraq. 2. The majority of youths aged 18-35 are facing psychological anxiety. 3. 26.6% considered fake news as the most panic creating 4. 75.7% variance in COVID panic is explained by social media
	3	Hui-yao Wang, Qian Xia,	To investigate the general	China	1599	Cross-sectional	1. General population's

0	Zhen-zhen Xiong, Zhi-xiong Li, Wei-yi Xiang, Yi-wen Yuan, Ya-ya Liu & Zhe Li (2020)	population's psychological distress and coping styles in the early stages of the COVID-19 outbreak.	01/02 -> 04/02	participants Snowballing 66.8% female 18-84 (m:33.9)	online surveys K6 SCSQ (coping style)	psychological distress was different depending on age, marriage, epidemic contact characteristics, media concern, but NOT gender. 2. Age, marriage, epidemic contact, perceived impacts and coping style explain 86.2% of psychological distress (K6) 3. Those who had a history of visiting Wuhan were more concerned and had a higher level of psychological distress.
3 1	Sarah Alonzi, Adelaide La Torre & Madison W. Silverstein (2020)	To identify young adult subgroups who are at increased risk for mental health difficulties to develop targeted interventions to mitigate emotional distress.	United States 48.1% females	620 young adults	Anxiety and depression short-form Demographics PROMIS (anx and dep)	1. For both depression and anxiety, nonbinary participants reported the highest levels, followed by female participants. (gender = 24.6% variance in anxiety) 2. For health status, those with both mental and physical health conditions reported the highest anxiety and depression, followed by those with mental health conditions, physical health conditions, and no health conditions.

2	3	Wenjun Cao, Ziwei Fang, Guoqiang Huo, Mei Han, Xinrong Xu, Jiaxin Dong & Jianzhong Zheng (2020)	To evaluate the mental situation of university students during the epidemic.	China Changzhi medical university	7,143 university students Cluster sampling 67% women	Online structured questionnaire Demographics Covid behaviours GAD-7	1. Almost a fourth of participants reported some form of anxiety. 2. Living in urban areas, living with parents, and family income stability were protective factors against anxiety. 3. Gender had no effect on anxiety 4. Stressors: economic effects, effects on daily life, as well as delays in academic activities, were positively associated with anxiety symptoms.
3	3	Stephen X. Zhang, Yifei Wang, Andreas Rauch & Feng Wie (2020)	To assess the health and well-being of normal adults living and working after one month of confinement to contain the COVID-19 outbreak in China.	China 20/02 -> 21/02	369 adults 25.2% stopped working	Cross-sectional survey SF12 (physical & mental health)	1. Adults who did not work during the outbreak were worse in mental and physical health, distress, and life satisfaction. 2. Physically active people might be more susceptible to well-being issues during the lockdown. 3. No difference in body pain, physical function, social function between working and not working.

DISCUSSION

In this systematic review, we aimed to describe the impact of COVID-19 on the mental health of various populations, with special reference to the issues of anxiety and depression. Even though unfortunately there is a dearth of available literature assessing these impacts, due to the emerging nature of the research topic, the available studies in this review have provided sufficient evidence to illuminate the mental health needs of people affected with COVID-19. The findings from this review indicate that the mental health of the populations cited has been greatly and negatively affected by the outbreak of the COVID-19, predominantly showing the symptoms associated with anxiety and depression.

Internal and external influences

Almost all the studies included in this review have demonstrated that COVID-19 has some influence, almost certainly initially negative, on the mental well-being of the participants; not only those affected by the virus (i.e., patients) but also those who were involved in providing care to these patients, such as healthcare professionals (HCPs) and caregivers. The common external and internal influences that contributed to the psychological burden included: (a) being an HCP in an at-risk group of contracting COVID-19, (b) having a lower socioeconomic background, and (c) spending in excess of three hours per day on social media accessing or watching COVID-19 related news.

Several studies in high-income countries have shown the symptoms associated with anxiety and depression as an outcome of COVID-19, regardless of the respondents being infected or not with the virus (Bacon & Corr, 2020; Fitzpatrick et al., 2020; Satici et al., 2020). In relation to this issue of anxiety and depression, it was found that various internal and external factors interplay within the life of the participants, influencing their mental health and well-being. Four of the studies (Ahmad & Murad, 2020; Chakraborty & Chatterjee, 2020; Gao et al., 2020; Wang et al., 2020) that we reviewed established that the negative impact of COVID-19 on participants' mental health and well-being was predominantly due to overexposure to and of the news, together with updates associated with COVID-19 that were available on social media. The above 33 studies used a variety of sample sizes and populations, and hence their findings and conclusions may not always be generalizable. However, other studies found how, in similar contexts, the mental health of people could be negatively impacted and how people react negatively to media channels, particularly when a fatal illness, in this case COVID-19, is prevalent in the region (Chavez et al., 2019; Maunder et al., 2003).

The findings of this review also indicate the high prevalence of anxiety and depression among certain groups or populations, such as HCPs, in dealing with COVID-19 patients. The finding of COVID-19 causing anxiety and concern among HCPs and the general population is similar to other studies that have been conducted (Hao et al., 2020; Ni et al., 2020). The findings from this review indicate that the anxiety levels were much higher among patients and family members/caregivers of those with pre-existing conditions and those suffering from COVID-19 symptoms than HCPs and the general population. This outcome could be due to the active progression of the disease and the uncertainty associated with the prognosis (Durodié, 2020; Parlapani et al., 2020; Rettie & Daniels, 2020). Previous similar studies have supported that the anxiety levels are comparatively higher among those with pre-existing mental health challenges or are experiencing a stressful lifestyle when compared to those with new symptoms (Alonzi et al., 2020; Liang et al., 2020; Pan et al., 2020; Santos & Relojo-Howell, 2020). Findings from this review suggested that there was no decrease in the levels of stress and fear among HCPs and the general population concerning contracting COVID-19. Therefore, regardless of which population experienced higher levels of anxiety, stress and fear remain the dominant mental health outcomes when responding to the perceived threat of COVID-19.

Impacts on health and well-being

The impact of COVID-19 on a person's health and well-being does not only focus on the mental health of the affected population (Bacon & Corr, 2020; Shevlin et al., 2020). Participants reported some of the physical impacts that occurred, and which were shown to have a direct relationship with COVID-19, such as somatic and gastrointestinal symptoms. There are, however, mixed impacts from COVID-19 on the physical health (e.g., muscle pain) and physical functionality of the working population, according to one of the qualitative studies in this review (Zhang et al., 2020). This finding

may not be generalizable, and therefore, the physical effects due to COVID-19 need to be investigated further since the focus of this review is on mental health.

The other common indicator of physical impact reported across several studies in this review was the issue of "poor sleep quality," which was found to be more evident among HCPs than people working in other professions (Xiong et al., 2020). Also, it was noted that there was a range of challenges associated with disturbed sleep reported within the general population, as Goodman-Casanova et al. (2020) observed. The study, conducted with an elderly population, noted that the participants were able to maintain their sleep quality without difficulty.

In relation to mental health impacts, the most common indicators reported in this review are anxiety, depression, and fearfulness (Fitzpatrick et al., 2020; Satici, 2020; Shapiro et al., 2020; Wang et al., 2020; Zhao et al., 2020). It has been found that patients with pre-existing conditions or those who have encountered the virus (i.e., a positive COVID test or showing symptoms) have significantly higher levels of anxiety, depression, and fearfulness than the general population. It was also revealed that HCWs dealing with patients in this pandemic were fearful and showed clear signs of anxiety (Alonzi et al., 2020; Korajlija & Jokic-Begic, 2020; Ning et al., 2020). These findings are similar to other studies that were conducted during the outbreak of SARS, Ebola, and H1N1, findings which showed a high prevalence of psychological symptoms, i.e., anxiety and depression, in frontline medical workers, the general public, and patients with pre-existing health conditions (Maunder et al., 2003; Wu et al., 2009). This point is supported by other literature, according to which the prevalence of anxiety and depression was significantly higher among patients compared to healthy people and even HCPs (Hao et al., 2020).

Although our review does not indicate whether the anxiety and depression levels among HCPs and members of the general public (worldwide) were similar, there were some levels of distress observed among this population following those who were active patients, having COVID-19 symptoms. This finding is supported by a study conducted in China, in which the prevalence of anxiety and depression was similar between HCWs and the general public (Ni et al., 2020). In contrast, other studies from China supported the prevalence of anxiety and depression to be greater among HCPs than in other populations (Zhang et al., 2020). Therefore, the findings from this review suggest that when targeting psychological assessments and appropriate interventions, it is important to consider the impact COVID-19 can have on the health and well-being of at-risk groups, such as those with pre-existing conditions and those living with mental health challenges.

Coping strategies

The present review also identified the importance of adopting certain coping strategies, health behaviours, and interventions that can help deal with the negative impact of COVID-19 on the mental health of patients, HCPs, caregivers, students, and the general public. Various coping strategies, resilience techniques, and support systems have been identified and proposed in order to reduce the negative impact of COVID-19, and its ramifications such as lockdown, on people's mental health (Bacon & Corr, 2020; Liang et al., 2020; Umucu & Lee, 2020; Wang et al., 2020). It should also be noted that the indicators of mental health challenges, such as anxiety and depression, not only have a long-lasting effect on the mental health of the general population but particularly on those more exposed to danger and stress, such as HCPs. Such a situation can significantly affect the delivery of mental health services as well as influencing the quality of decisions taken by HCPs when responding to the urgent mental health needs of the population.

Another coping mechanism identified is accessing bona fide knowledge and information (rather than the false news variety). The findings of this review indicate that having accurate and up-to-date information and knowledge on preventative measures could facilitate the reduction of mental health challenges for members of the general population (Bacon & Corr, 2020; Baloran, 2020; Chakraborty & Chatterjee, 2020; Huang & Zhao, 2020; Korajlija & Jokic-Begic, 2020; Liang et al., 2020). This conclusion indicates that at the government level, an efficient public health system is required. Such a system ideally should ensure the provision of appropriate knowledge to the general population in order for them to take necessary precautionary measures towards their mental health care provision. As a result, it should be possible to decipher which mental health impacts could be minimised and which coping mechanisms enhanced and/or strengthened in dealing with this pandemic.

Strength and limitations

This systematic review aims to reduce the dearth of research on COVID-19 and mental health. The paper emphasises the impact of the pandemic on people's health and well-being, and the coping styles that individuals have adopted. However, this study will need further evidence from longitudinal research in order to gain information regarding people's experiences over time.

CONCLUSION

This review sought to contribute to the discussion on the effects of COVID-19 on people's overall health and well-being by examining both quantitative, qualitative, and mixed method studies regarding the effects of COVID-19 on individuals' mental health. Using a critical appraisal of the papers, we examined how COVID-19 impact on mental health. The review identified three main themes: (1) the internal and external influences on COVID-19 behaviour, (2) the impact of COVID-19 on health and well-being and (3) coping strategies. This study contributes to addressing the gap in the literature on the effect of COVID-19 on mental health as well as serving as a guide for important factors to consider during COVID-19 and similar future pandemics. Additionally, the review examined strategies that could potentially help minimise the impact of COVD-19 on a person's psychological well-being. This potential is beneficial since some countries have experienced second and even third waves of COVID-19, as well as some variants of the COVID-19 virus.

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