

Systematic Mapping Study of Covid-19 Psychological Impact

Nikos Tsoukalis-Chaikalis^{1*},
Sophia Faye Demisia²,
Athanasia Stamatopoulou³,
Dimitrios Chaniotis⁴ and
Fragkiskos Chaniotis⁵

Abstract

The COVID-19 (SARS-CoV-2) pandemic constitutes a major health crisis affecting numerous nations, with over 82,994,220 cases and 1,810,360 confirmed deaths reported to date. Such widespread outbreaks are associated with adverse mental health consequences. Hence, it is important to understand the extent and impact of these challenges. In this study, we conducted a Systematic Mapping Study for collecting, cataloguing, and classifying research activities that explore the psychological impact of COVID-19, including anxiety, depression, and stress which seem to be common psychological reactions to the COVID-19 pandemic. Two key research areas were explored as part of our literature review: a) observational studies, reporting on mental health symptoms in particular populations, and b) commentaries and review articles, addressing the psychological impact of COVID-19 on the general population, the healthcare workers, and the high-risk populations. There is the need for a more systematic research approach which could consider associated factors and confounders, such as demographics, sociocultural and health outcomes.

Keywords: Covid-19; Psychological impact; Stress; Anxiety; Public health

Received with Revision March 10, 2021, **Accepted:** March 26, 2021, **Published:** March 31, 2021

Introduction

In the city of Wuhan, China, in December 2019, a new coronavirus disease –officially named by the World Health Organization as COVID-19 (SARS-CoV-2)— was detected, which soon reached the level of a pandemic and is now affecting the entire world. After 7,834 confirmed cases and 170 deaths from the virus worldwide, the World Health Organization (WHO) declared the outbreak of COVID-19 as an emergency of International public health concern on January 30, 2020. As of 1 January 2021, 82.994.220 confirmed cases and 1.810.360 deaths were recorded due to Covid-19. Following this global health crisis, strict public health measures have been implemented to limit the spread of COVID-19 [1-24].

One of those measures that was implemented globally, was the lockdown [25-27]. The COVID-19 pandemic in combination with the lockdown, however, caused a sense of fear and anxiety in most part of the population, both with short and long-term effects on the psychosocial and mental health of children, adolescents, and adults [28]. Besides, the widespread manifestations of infectious diseases, such as COVID-19, are associated with psychological distress and symptoms of mental illness [3].

According to results of the Collaborative Outcomes study on Health and Functioning during Infection Times (COH-FIT Study) involving 29 countries, there was an increase of 25-33% in negative psychosocial effects worldwide [29-34]. Especially for Greece, 66% of the participants showed a statistically significant

- 1 Department of Biomedical Sciences, School of Health & Care Sciences- University of West Attica, Greece
- 2 Health Promotion and Education, Department of Biomedical Sciences- University of West Attica, Greece
- 3 Economist, Department of Biomedical Sciences-University of West Attica, Greece
- 4 Head of Department of Biomedical Sciences-University of West Attica, Greece
- 5 Emeritus Professor of the University of West Attica, Athens, Greece

*Corresponding author:

Nikos Tsoukalis-Chaikalis

✉ ntsoukalis@uniwa.gr

Tel: +306983670621

Department of Biomedical Sciences, School of Health & Care Sciences- University of West Attica, Greece

Citation: Tsoukalis-Chaikalis N, Demisia SF, Stamatopoulou A, Chaniotis D (2021) Systematic Mapping Study of Covid-19 Psychological Impact. Health Sci J. 15 No. 3: 820.

increase in levels of stress, loneliness, and anger [7].

It is important that psychiatrists around the world are aware of the associations, manifestations of mental illness with extensive infectious diseases and create or act with appropriate strategies to manage the above, to meet the needs of specific populations [35]. They should also be aware of gaps in existing literature, which may need to be filled in over time through wider clinical experience and research [24].

In the light of the above considerations, the current Systematic

Mapping Study was designed to summarize the existing literature that includes research studies focused on mental health issues related to the COVID-19 pandemic.

To sum up, according to Swiss psychiatrist Carl Jung: "Pain itself gives strength for healing [...] and this is the essence of the Greek myth of Asclepius". So, may the right "vein" give strength to all healthcare workers to turn despair into hope [20].

Methodology

Research methodology and selection of bibliography

The research was conducted according to the Systematic Mapping Study standards. A systematic mapping study or scoping study is a process of collecting data and classifying it with the aim of providing an overview of the area or field that requires research [15]. The first step is a detailed literature research, followed by an analysis that allows the results to be classified according to predefined criteria set by researchers [21]. The choice of the systematic mapping study helps to complete the mapping of a field and in the long run will enhance the research work globally. This type of research is mainly used for educational purposes and for the creation of reflections and research hypotheses [14,23].

The PubMed and Google Scholar databases were searched using the search terms "coronavirus", "COVID-19", "Mental Health", "Psychology", "Stress", "Anxiety", "Psychological Impact" in different variants and combinations. In total, 68 studies were retrieved using this method. During the investigation of the above studies, 20 of those were selected.

We included studies that:

- assessed the impact of COVID-19 virus on people's mental health
- were available in English
- were published in 2020

We excluded studies that:

- only their summary was published, and the full text was not available
- were not written in English
- duplicated previous studies

Results

We included 20 studies, 10 of which were empirical studies and 10 were literature reviews which explored the association between COVID-19 and mental health.

Two main themes were identified and were used to organize this mapping study: (a) observational studies reporting mental health symptoms in specific populations and (b) commentary on the psychological impact of COVID-19 on the general population, healthcare workers, high-risk populations, or vulnerable groups. Observational studies came from different countries and continents. The most prevalent countries were United Kingdom, China, Italy, Spain, Saudi Arabia, Bangladesh, United States of

America, Austria, Singapore, and India. The results of the study are displayed in **tables 1 and 2**.

Discussion

Mental health problems associated with COVID-19

Ten (10) are the observational studies that have been included and report mental health symptoms in specific populations. They demonstrate the strong correlation between COVID-19 pandemic and the inevitable protection measures, which have particularly worrying psychosocial implications. As the below analysis demonstrates, consequences can be strong feelings of loneliness, depression, anxiety, stress, insomnia, post-traumatic stress disorder (PTSS), and more.

More specifically, in an online study by Groarke et al [12], on a sample of 1964 citizens of the United Kingdom, 530 stated that they experience strong feelings of loneliness (27%); the younger ones and the divorcees. More vulnerable to feelings of loneliness, appear to be the youngers (OR: 4,67-5,31), the divorcees (OR: 2,29), those who had depressive characteristics before the pandemic (OR: 1,74), those who experience difficulty in controlling their emotions (OR: 1.04) and those who suffer from poor sleep quality due to the wider COVID-19 crisis (OR: 1.30). On the contrary, levels of loneliness were lower in those people with higher levels of social support (OR: 0.92) and those who were married, cohabiting (OR: 0.35), or lived with a larger number of adults (OR: 0.87).

Many studies positively associate the pandemic with depression and anxiety. Precisely, in a survey of 18,147 participants in Italy, 17.3% showed symptoms of depression, 20.8% anxiety and 21.8% high perceived anxiety. Reasons for the occurrence of these unpleasant feelings and anxiety disorders, among others, were quarantine, discontinuation of work due to COVID-19, death of a relative or loved one. Similar percentages occur in a survey of 7,236 participants, conducted in China, with 35.1% reporting anxiety and 20.1% showing depressive symptoms. Likewise, in Austria, according to Pieh et al [22], in an online survey of 1,005 participants, depressive symptoms (21%) and anxiety symptoms (19%) are higher during COVID-19 compared to previous epidemiological data. Moreover, the pandemic and lockdown of COVID-19 seem particularly stressful for younger adults (<35 years old), women, unemployed or low-income people. In Saudi Arabia, 23.6% of survey participants reported a moderate or severe psychological impact of the epidemic. More specifically, 28.3%, 24% and 22.3% reported moderate to severe symptoms of depression, anxiety, and stress, respectively [2]. Another study that links COVID-19 with severe psychological problems and concerns is that of Rodríguez-Reyet al [25] conducted on 3,055 Spaniards. Participants stated that they considered the current health crisis to be quite serious, and the majority considered the COVID-19 crisis to have a serious impact on their daily lives, including changes in their daily routines and postponement of important activities. Approximately 36% of the participants reported moderate to severe psychological impact, 25% reported slight to severe anxiety levels, 41% reported depressive symptoms, and 41% felt stress. Women, young

Table 1 Bibliography dealing with the observation of mental health problems related to COVID-19.

Author	Country of Research	Sample	Methodology	Research Methods	Results
Groarke et al [12]	United Kingdom	1,964	Online Survey	Generalised Anxiety Disorder scale (GAD-7), Patient Health Questionnaire (PHQ-9), Post-Traumatic Stress Disorder (PTSD) Checklist for DSM-5 (PCL-5), The Difficulties in Emotion Regulation Scale—Short Form (DERS-SF), Sleep Quality Scale	Loneliness 27% Risk factors for loneliness: age, divorce, depressive characteristics, greater difficulty in regulating emotions, poor sleep quality.
Rossi et al [26]	Italy	18,147	Web-based survey	The Global Psychotrauma Screen, post-traumatic stress symptoms subscale (GPS-PTSS), Patient Health Questionnaire (PHQ-9), Generalized Anxiety Disorder scale (GAD-7), Insomnia Severity Index (ISI), International Adjustment Disorder Questionnaire (IADQ), Perceived Stress Scale (PSS)	PTSS 37%, depression 17.3%, stress 20,8%. Specifically: insomnia 7,3% high perceived anxiety 21.8%, adjustment disorder 22,9%.
Tan et al [29]	Singapore	470 healthcare workers (looked after people with Covid-19), medical staff	Self-administered questionnaire, cross sectional	Depression, Anxiety, and Stress Scales (DASS-21), the Impact of Events Scale–Revised (IES-R)	14,5% anxiety, 8,9% depression, 6,6% stress, 7,7% PTSD (Post-traumatic stress disorder).
Chew et al [6]	Singapore and India	906 healthcare workers that participate in the care of patients with Covid-19 from 5 major hospitals in Singapore and India	Self-administered questionnaire	Depression Anxiety Stress Scales (DASS-21) and the Impact of Events Scale-Revised (IES-R)	5,3% moderate-severe Depression Symptoms: emotional distress, signs of depression, anxiety, and stress.
Huang and Zhao [13]	China	7,236 (4,980 members of public and 2256 healthcare workers)	Web-based cross-sectional survey	National Internet Survey on Emotional and Mental Health (NISEMH)	Anxiety 35,1%, depression 20,1%, bad sleep 18,2%.
Gallagher et al [11]	United States of America	565 (adults)	amazon mechanical turk (MTURK), an online data collection platform	Overall Anxiety Severity and Impairment Scale (OASIS) and Overall Depression Severity and Impairment Scale (ODSIS)	Symptoms of stress, depression, anxiety and functional-physical impairment. Increased demand for mental health services
Rodríguez-Rey et al [25]	Spain	3,055 (adults)	Cross-sectional Design using online forms platforms	Impact of Event Scale-Revised (IES-R), Depression, Anxiety, and Stress Scales (DASS-21)	Impact on their daily lives, including changes in their daily routines and cancellation of important activities. 36% moderate to severe psychological impact, 25% mild to severe stress levels, 41% depressive symptoms and 41% felt stress
Pieh et al [22]	Austria	1,005	Online survey through Qualtrics	World Health Organisation Quality-of-life (WHO-QOL BREF), World Health Organisation- Five Well-Being Index (WHO-5), Patient Health Questionnaire (PHQ-9), Generalized Anxiety Disorder 7 scale (GAD-7), Perceived Stress Scale (PSS-10), Insomnia Severity Index (ISI)	Symptoms of depression 21%, anxiety 19%, moderate or severe clinical insomnia 16%.
Alkhamees et al [2]	Saudi Arabia	N=1160	Online survey	Impact of Event Scale-Revised (IES-R), Depression, Anxiety, and Stress Scales (DASS-21)	-23.6% reported moderate or severe psychological impact of the epidemic, -28.3% reported moderate to severe symptoms of depression, 24% anxiety and 22.3% stress.
Mamun and Griffiths [18]	Bangladesh	N=10067	Online survey	Questionnaire was pre-validated and edited by a previous pilot study assessing 245 participants of different age groups	-5.0% suicidal ideation, 33.3% depression.

Table 2 Bibliography dealing with the impact of COVID-19 on the mental health of the general population, healthcare workers and vulnerable groups.

Author	Sample	Results
Singh et al [28]	Children, Adolescence	Need to meet the psychosocial and mental demands of children and adolescents during and after the pandemic.
Zhai and Du [38]	Chinese foreign students	They felt fear for their families, experienced discrimination, isolation, and stigma, and were even considered potential carriers of the virus because of their origin.
Kontoangelos et al [16]	Children and the elderly	They feel fear, anxiety, stress. Older people feel exposed to the virus.
Caparros-Gonzalez RA and Alderdice F [5]	Pregnant women	They experience anxiety with immediate and long-term mental and physical health consequences for both the mother and the baby.
Van Bavel et al [32]	Pregnant women	There is an instinctive need of connection between pregnant women and other people.
Brooks et al [4]	Pregnant women	There is reduced support from family and friends, increased financial difficulties and an increase in domestic violence.
Galbraith et al [10]	Medical community	High levels of work stress occur.
Tsai and Wilson [31]	Homeless	They have a strong fear of being inadvertently admitted or even imprisoned.
Zhu et al [39]	Patients with pre-existing mental illnesses	Cooperation between psychiatrists and other public health bodies with the purpose of preventing this social group
Yao et al [36]	Patients with pre-existing mental illnesses	They seem to be at greater risk of relapse or even new episodes of stress-related disorder due to COVID-19.
Zandifar and Badrfam [37]	General population	Risk of misinformation and social isolation. Increase levels of stress and mental illness.
Shigemura et al [27]	General population	Financial impact of COVID-19 and its impact on human well-being, as well as potentially high levels of fear and panic.

people, and those who lost their jobs during the health crisis showed more severe psychological symptoms. What seems to worry Spaniards the most is the possibility of an economic crisis caused by the pandemic. The increased need for mental health services due to COVID-19 demonstrates another study involving 565 adult Americans, which found that COVID-19 experiences are associated with a higher chance of being diagnosed with anxiety and depression (ORs ≥ 3.0). Anxiety related to COVID-19 also showed high variability ($R^2 \geq 30$) in stress, depression, anxiety, and functional-physical impairment, while personal experiences associated with the diagnosis of COVID-19, death of a family member and the stress of having COVID-19 relates to a very high risk of symptomatic emotional disorder.

Lower, but noteworthy, were the rates of anxiety and depression experienced by medical staff and healthcare workers in general who looked after people with COVID-19, on a study conducted in Singapore. Particularly, 14.5% reported experiencing high levels of anxiety, 6.6% stress and 8.9% identified symptoms of depression. Anxiety was higher among healthcare workers than on medical staff (20.7% vs. 10.8%) [29]. Another study focusing on healthcare workers involved in caring for COVID-19 patients was that of Chew et al [6]. The participants were 906 in total, from 5 major hospitals in Singapore and India, and according to self-completed questionnaires 5.3% of respondents showed symptoms of moderate to very severe depression. In this research, significant correlations were found between physical symptoms and psychological effects (including depression, anxiety, and stress). In addition, they experienced a higher frequency of physical symptoms due to emotional distress compared to other Chinese groups, while a large number (32.3%) of respondents reported headaches.

Physical symptoms such as difficulty in breathing, dizziness, headache, and fever were also shown in a high rate of participants

in a study conducted in Saudi Arabia by Alkhamees et al [2].

Another negative impact of the COVID-19 pandemic and the protection measures adopted by most countries, is poor quality of sleep and insomnia, moderate or even clinical in some cases [26] with healthcare workers showing higher rates of poor sleep quality compared to other professional groups [13].

Several of the studies show that COVID-19 and quarantine are associated with post-traumatic stress disorder (PTSD) and subsequent symptoms (PTSS) [26,29], whereas, according to Rossi et al [26], there is a positive correlation with adjustment disorder. Finally, in one of the surveys included, the sample showed a percentage of people having thoughts of self-destructive behavior. The study, which was conducted in Bangladesh, involved 10,067 people and besides 33.3% of the participants who showed symptoms of depression, increased rates of suicidal thoughts were observed at 5% of the sample.

Impact of COVID-19 on the mental health of the general population, healthcare workers and vulnerable groups

One study [28] analyzed and presented the effects on the mental health of children and adolescents in areas affected by the COVID-19 pandemic and the imposition of national or regional exclusions which intended to prevent further spread of the infection. The impact of the above on minors is determined by several factors, such as age, educational status, pre-existing mental health problems, financial problems, or quarantine due to infection or fear of infection. The conclusions of this research study show the urgent need to plan long-term development studies and implement a detailed action plan to meet the psychosocial and mental needs of children and adolescents during and after the pandemic. There is a need to improve the access for people of this

age group to mental health support services, and furthermore, states - and not only - should be directed towards providing support measures to create health mechanisms to deal with the current crisis. To achieve this innovative policy of supporting the mental health of children and adolescents, there must be both in-person and digital collaboration between psychiatrists, psychologists, pediatricians, and community volunteers [36,37].

Young people, especially Chinese students studying away from their families, are a social group that has been of great concern to researchers. According to Zhai and Du [38] from 12 February 2020, in many countries where Chinese students study, a travel ban to countries with COVID-19 was announced. China's international students have lived in fear that their families could be at risk of the virus (SARS-CoV-2) without themselves being able to help them. During this time, they experienced discrimination, isolation, and stigmatization, and were even considered potential carriers of the virus. These conditions led them to anxiety and other related disorders. In these cases, close co-operation between local authorities and health workers is essential.

Furthermore, Kontoangelos et al [16] in a study that examined 65 tasks - using the Medline computer database - concluded that children are more likely to experience anxiety, stress, and fear. In addition, the results of the study showed that the elderly are the social group that has been identified as the most vulnerable to COVID-19 and often feel terrified and frightened.

Rafael A. Caparros-Gonzalez and Fiona Alderdice [5], in their study, address the issue of perinatal mental health. Stress associated with events such as pandemics, earthquakes, and famines, may be associated with immediate and long-term mental and physical health consequences for both mother and baby. Slowing down the transmission of a virus during pandemics requires significant behavioral changes, some of which can be detrimental to mental health. For example, a key strategy for slowing down the COVID-19 pandemic is social isolation. However, there is an instinctive need for connection between people [32]. Pregnant women have been identified as vulnerable groups and are among those most concerned about the spread or infection of SARS-CoV-2 [4]. Measures to reduce the virus have led to lower support from relatives and friends, increased financial difficulties and increased domestic violence. It is emphasized that due to the aforementioned concerns, the support of each pregnant woman and questions regarding her mental health in the prenatal and postnatal appointments by her doctor, is of high importance.

At the heart of the pandemic is, of course, the entire medical community. Employees in the specific industry face high levels of work stress even under normal circumstances. The disease and the COVID-19 crisis in general put additional pressure on doctors and the healthcare system, and research [10] shows that such pressure poses a greater risk of psychological stress for doctors. For this reason, authorities and healthcare leaders need to show strong leadership and support the doctors and their families during the COVID-19 pandemic, as well as to make efforts to reduce mental health problems in healthcare workspaces. This can be achieved by adding a "Mental health support process to healthcare staff" even on a daily basis. Likewise, the study of Kontoangelos et al [16] states that medical staff and healthcare

workers are under great physical and psychological pressure. Stressors will appear or worsen, while many health workers will be adversely affected psychologically. According to two aforementioned studies [29] medical staff in Singapore and India show relatively high rates of anxiety and depression symptoms.

Another vulnerable group investigated during the pandemic is homeless people. These people live in environments that are conducive to an epidemic disease as they live in places (formal or informal) that may not have access to basic hygiene, which may facilitate the transmission of the virus. These individuals should therefore be considered a vulnerable group, as research shows that even under the age of 65, they are five to ten times more likely to die than the general population. In the age of coronavirus and quarantine, according to Tsai and Wilson [31], the homeless have a strong fear of being inadvertently admitted or even imprisoned, events that may hamper their mental health care.

Of particular interest are two reports from China [36,39] on COVID-19 and patients with pre-existing mental illness. In March, about 50 patients and 30 employees of a psychiatric hospital had been sick and quarantined due to Covid-19. Reasons for this may include overcrowding, lack of medical facilities and psychiatric hospitals, lack of knowledge among mental health professionals and difficulty in ensuring cooperation of patients suffering from psychotic disorders [39]. Patients with pre-existing mental disorders seem to be at greater risk of recurrence or new episodes of the disorder due to the stress associated with COVID-19 [36]. During this pandemic, it is vital that psychiatrists become familiar with virus control procedures and work closely with doctors and public health experts, thus minimizing the risks faced by their patients [39].

Finally, a study examined the potential impact of the COVID-19 pandemic on the general population. The study [37] highlighted the role of unpredictable, uncertain, and serious disease, which often leads to misinformation and social isolation, while contributing to stress and mental morbidity. The authors stressed the need for mental health services, especially for vulnerable groups, as well as the need to generally support society in order to reduce the adverse psychological effects of this pandemic. A study from Japan [27] emphasized on the economic impact of COVID-19 and its effect on human well-being, as well as the possible high levels of fear and panic behaviors on the general population. This study identified some social groups at higher risk for adverse effects on their mental health, including COVID-19 patients and their families, people with mental or physical illness, and health care workers.

Conclusions

The COVID-19 pandemic has affected the mental health of vulnerable groups as well as that of the general population. Psychiatrists and other professionals in the field, provide their services continuously and in a daily basis to patients and people in need. However, while mental health is clearly taken into consideration in multiple levels, research has shown that there is a larger need to support the mental health sector with innovative solutions or with further support to the existing infrastructure.

Although large-scale observational studies are available in this field, to date, the available literature is relatively incomplete. Yet, it still contains numerous and valuable observations and suggestions for all professionals working in the field of mental health, related to psychiatry, to general hospitals or working in community services. As the number of patients affected by this pandemic continues to increase, mental health professionals worldwide are facing a challenge and an experiencing an opportunity. The challenge refers to addressing the numerous obstacles and limitations identified in the literature cited in this manuscript, while, the opportunity relates to at least implementing the existing advice or recommendations wherever possible. An additional significant issue, however, is that understanding and properly managing COVID-19 and its implications, may still take quite a long time. This requires a coordinated effort not only by psychiatrists but by the healthcare system as a whole [19].

Undoubtedly, there is a need for further research, even in the form of preliminary or pilot studies, to assess the extent of this pandemic in other countries, especially in those where mental health infrastructure is less developed and the impact is likely to be more severe [8]. Research should also focus on other vulnerable populations, such as children and adolescents in rural areas who face barriers to accessing healthcare or those from lower socioeconomic backgrounds. Finally, there is a need to develop mental health interventions that can be taught to healthcare workers and volunteers.

Acknowledgement

This paper and the research behind it would not have been possible without the exceptional support of Fragkiskos Chaniotis. His enthusiasm, knowledge and exacting attention to detail have been an inspiration and kept our work on track.

References

- 1 Adhikari SP, Meng S, Wu YJ, Mao YP, Ye RX, et al. (2020) Epidemiology, causes, clinical manifestation and diagnosis, prevention and control of coronavirus disease (COVID-19) during the early outbreak period: a scoping review. *Infect Dis Poverty* 9: 1-12.
- 2 Alkhamees AA, Alrashed SA, Alzunaydi AA, Almohimeed AS, Aljohani MS (2020) The psychological impact of COVID-19 pandemic on the general population of Saudi Arabia. *Compr Psychiatry* 102: 152192.
- 3 Bao Y, Sun Y, Meng S, Shi J, Lu L (2020) 2019-nCoV epidemic: address mental health care to empower society. *Lancet* 395: e37–e38.
- 4 Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, et al. (2020) The psychological impact of quarantine and how to reduce it: Rapid review of the evidence. *Lancet* 395: 912–920.
- 5 Caparros-Gonzalez RA, Alderdice F (2020) The COVID-19 pandemic and perinatal mental health. *J Reprod Infant Psychol* 38: 223-225.
- 6 Chew NW, Lee GK, Tan BY, Jing M, Goh Y, et al. (2020) A multinational, multicentre study on the psychological outcomes and associated physical symptoms amongst healthcare workers during COVID-19 outbreak. *Brain Behav Immun* 88: 559-565.
- 7 COH-FIT (2020) The Collaborative Outcomes study on Health and Functioning during Infection Times (COH-FIT).
- 8 Duan L, Zhu G (2020) Psychological interventions for people affected by the COVID-19 epidemic. *Lancet Psychiatry* 7: 300–302.
- 9 European Centre for Disease Prevention and Control (ECDC) COVID-19 situation update worldwide.
- 10 Galbraith N, Boyda D, McFeeters D, Hassan T (2020) The mental health of doctors during the COVID-19 pandemic. *BJPsych bulletin* pp: 1-4.
- 11 Gallagher MW, Zvolensky MJ, Long LJ, Rogers AH, Garey L (2020) The impact of Covid-19 experiences and associated stress on anxiety, depression, and functional impairment in American adults. *Cognit Ther Res* 44: 1043-1051.
- 12 Groarke JM, Berry E, Graham-Wisener L, McKenna-Plumley PE, McGlinchey E, et al. (2020) Loneliness in the UK during the COVID-19 pandemic: Cross-sectional results from the COVID-19 Psychological Wellbeing Study. *PLoS one* 15: e0239698.
- 13 Huang Y, Zhao N (2020) Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. *Psychiatry Res* 288: 112954.
- 14 James KL, Randall NP, Haddaway NR (2015) Methodology for systematic mapping in environmental sciences. *Environ Evid* 5: 7.
- 15 Kitchenham B, Charters S (2007) Guidelines for Performing Systematic Literature Reviews in Software Engineering. EBSE Technical Report EBSE-2007-01.
- 16 Kontoangelos K, Economou M, Papageorgiou C (2020) Mental health effects of COVID-19 pandemic: a review of clinical and psychological traits. *Psychiatry investig* 17: 491-505.
- 17 Liem A, Wang C, Wariyanti Y, Latkin CA, Hall BJ (2020) The neglected health of international migrant workers in the COVID-19 epidemic. *Lancet Psychiatry* 7: e20.
- 18 Mamun MA, Sakib N, Gozal D, Bhuiyan AI, Hossain S, et al. (2020) The COVID-19 pandemic and serious psychological consequences in Bangladesh: a population-based nationwide study. *J Affect Disord* 279: 462-472.
- 19 Maunder RG (2009) Was SARS a mental health catastrophe? *Gen Hosp Psychiatry* 31: 316–317.
- 20 Ng QX, De Deyn MLZQ, Lim DY, Chan HW, Yeo WS (2020) The wounded healer: A narrative review of the mental health effects of the COVID-19 pandemic on healthcare workers. *Asian J Psychiatr* 54: 102258.
- 21 Petersen K, Feldt R, Mujtaba S, Mattsson M (2008) Systematic mapping studies in software engineering, in: 12th International Conference on Evaluation and Assessment in Software Engineering pp: 68–77.
- 22 Pieh C, Budimir S, Probst T (2020) The effect of age, gender, income, work, and physical activity on mental health during coronavirus disease (COVID-19) lockdown in Austria. *J Psychosom Res* 136: 110186.
- 23 Pretorius R, Budgen D (2008) A mapping study on empirical evidence related to the models and forms used in the uml. In Proceedings of the Second ACM-IEEE international symposium on Empirical software engineering and measurement pp: 342-344.

- 24 Rajkumar RP (2020) COVID-19 and mental health: A review of the existing literature. *Asian J Psychiatr* 52: 102066.
- 25 Rodríguez-Rey R, Garrido-Hernansaiz H, Collado S (2020) Psychological impact and associated factors during the initial stage of the coronavirus (COVID-19) pandemic among the general population in Spain. *Front psychol* 11: 1540.
- 26 Rossi R, Socci V, Talevi D, Mensi S, Niolu C, et al. (2020) COVID-19 pandemic and lockdown measures impact on mental health among the general population in Italy. *Front Psychiatry* 11: 790.
- 27 Shigemura J, Ursano RJ, Morganstein JC, Kurosawa M, Benedek DM (2020) Public responses to the novel 2019 coronavirus (2019–nCoV): mental health consequences and target populations. *Psychiatry Clin Neurosci* 74: 281-282.
- 28 Singh S, Roy D, Sinha K, Parveen S, Sharma G, et al. (2020) Impact of COVID-19 and lockdown on mental health of children and adolescents: A narrative review with recommendations. *Psychiatry Res* 293: 113429.
- 29 Tan BY, Chew NW, Lee GK, Jing M, Goh Y, et al. (2020) Psychological impact of the COVID-19 pandemic on health care workers in Singapore. *Ann Intern Med* pp: M20-1083.
- 30 Triantafyllidou M (2020) The COVID-19 pandemic and its impact on mental health. *Rostrum of Asclepius/Vima tou Asklipiou* 19.
- 31 Tsai J, Wilson M (2020) COVID-19: a potential public health problem for homeless populations. *Lancet Public Health* 5: e186-e187.
- 32 Van Bavel JJ, Baicker K, Boggio PS, Capraro V, Cichocka A, et al. (2020) Using social and behavioural science to support COVID-19 pandemic response. *Nature Human Behaviour* 4: 460–471.
- 33 WHO (2020) Statement on the second meeting of the International Health Regulations (2005) Emergency Committee regarding the outbreak of novel coronavirus (2019-nCoV). Geneva.
- 34 World Health Organization (WHO) Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19). Geneva.
- 35 Yang Y, Li W, Zhang Q, Zhang L, Cheung T, et al. (2020) Mental health services for older adults in China during the COVID-19 outbreak. *Lancet Psychiatry* 7: e19.
- 36 Yao H, Chen JH, Xu YF (2020) Rethinking online mental health services in China during the COVID-19 epidemic. *Asian J Psychiatr* 51: 102015.
- 37 Zandifar A, Badrfam R (2020) Iranian mental health during the COVID-19 epidemic. *Asian J Psychiatr* 51: 101990.
- 38 Zhai Y, Du X (2020) Mental health care for international Chinese students affected by the COVID-19 outbreak. *Lancet Psychiatry* 7: e22.
- 39 Zhu Y, Chen L, Ji H, Xi M, Fang Y, et al. (2020) The risk and prevention of novel coronavirus pneumonia infections among inpatients in psychiatric hospitals. *Neurosci Bull* 36: 299-302.