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# Impact of COVID-19 outbreak on the mental health in sport and among society

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The rapid outbreak and spread of the COVID-19 virus in 2019 year in Wuhan, China was officially declared a pandemic by the World Health Organisation (WHO) on March 11, 2020 COVID-19 virus spreads extremely quickly and is highly contagious with 6.9 million deaths and 765 million confirmed cases worldwide as of May 2023 [1]. This outbreak in China has caused an enormous panic and great psychological disturbances [2]. In the face of the very prompt spread of COVID-19 infection the government had to take particularly stringent precautionary measures to reduce the spread of the virus. As a consequence, the pandemic has led not only to potential exposure to COVID-19 infection and its complications, but also to a wide range of restrictions, including the wearing of masks, physical distancing, quarantines, closure of non-essential services and economic consequences [3]. Therefore, during COVID-19 pandemic social relations were disrupted. A reason for that was mainly the need of staying at home as well as limitations concerning personal contacts. Wearing masks was a new situation and society was not used to it. All above caused an impact on an individual's mental state [4]. As the process of achieving group immunity is slow, because it demands 70% to 85% of the world population to be vaccinated, the increase in protective

measures and serious controls has led to mental health concerns [5]. According to the literature, the period of home isolation was accounted as the longest in history [6]. People were obligated to stop having contact with others and many have experienced profound and long-term loneliness, as well as confusion, uncertainty and constant fear of contagion. Governments took decisive measures to combat the spread of the COVID-19 pandemic, such as implementing strict lockdowns, imposing limitations on social interactions, and banning unnecessary travel. These actions had significant consequences for the sports industry and athletes, disrupting their regular training sessions and forcing the cancellation or postponement of sports events. Turgut et al. additionally noted that the decisions to cancel or postpone international sporting events were driven by the need to adhere to global health guidelines and mitigate the spread of the infection [6,7].

The pandemic has played a significant role in altering the previous lifestyle of athletes and has contributed to the occurrence of mental disorders among them as well, due to factors such as isolation and other circumstances that have led to feelings of fear and loneliness. According to the literature, extreme loneliness poses a risk of anxiety, depression, worsening of dementia and general bad health condition [7]. Due to isolation, the reliance on technology and its use as the main mode of communication has increased, and it has largely replaced face-to-face contact. The constant flow of new information about COVID-19 in the media, often also false, generated a lot of stress among people in isolation. Also, the need to conduct online teaching caused a great confusion due to the change in the form of teaching, technical problems and the need for children, parents and teachers to learn and adapt to the use of streaming platforms [8]. Moreover, it was investigated that among many people the frequency of media use has increased before sleeping. The constant use of social media to gain information caused anxiety, overconcern, prolonged stress and depression due to the fear of viruses [9].

During COVID-19 pandemic an increase in domestic violence [10], drug addiction [11], worsening of eating habits [12] and reduction of physical activity has been noted [13]. Moreover, based on survey-data of self-reported mental health problems, the Global Burden of Disease (GDB) evaluated that there was 28% increase in major depressive disorders and a 26% increase in anxiety disorders caused by COVID-19 pandemic [14]. In another study it was suggested that 1 in 7 US adults at the beginning of pandemic, reported psychological distress [15]. Additionally, according to the authors, PTSS were present among 96.2% out of 714 hospitalized but stable patients [16].

Pandemic is not only a medical phenomenon, but as a limiting factor in terms of work, interpersonal contacts, financial opportunities, it affects the mental condition. Disorders associated with COVID-19 pandemic can affect all age groups and a particular increase in mental disorders has been noted in adolescents. Moreover, a professional group particularly vulnerable to mental disorders are health care professionals who are the first line to deal with the pandemic [17]. Most health professionals working in isolation units were not properly prepared and did not receive professional training on how to provide mental health care to patients and other health workers in such situations [18].

As environmental stress plays a huge role in most mental disorders, such as depression, burnout syndrome, anxiety, there is no illusion that pandemic has affected global mental health. Due to the increase in mental disorders due to the COVID-19 pandemic, clinicians should be aware of such disruptions in order to implement treatment appropriately. Therefore, the aim of current narrative review is to summarize the existing literature addressing mental health issues related to the COVID-19 pandemic.

**COVID-19 related mental health problems in sports**

The COVID-19 pandemic has had a significant impact on athletes. Due to lockdowns and restrictions, many sporting events have been canceled or postponed. This has presented a completely new situation for this professional group [19] As risk factors potentially contributing to the occurrence of mental disorders among athletes during the pandemic, several key factors have been identified. These factors include the fear of job loss, reduced earnings, decreased physical activity, as well as isolation [20].

Physical activity has a positive impact on mental health including the control of psychiatric disorders such as anxiety and depression. However, due to the pandemic and the associated restrictions, athletes have been exercising less frequently and for shorter durations, which negatively affects their mental well-being [21]. The disruption of training schedules and the cancellation of sports events due to the COVID-19 epidemic have led to increased stress levels, sleep disturbances, and a decrease in subjective feelings of happiness among athletes [22]. It is suggested that the situation related to the COVID-19 epidemic might have some similarities in impact on the mental health of athletes as injury does. This is because both leads to restricted training, loss of autonomy, and limitations on personal development opportunities [23]. Team sports athletes are more vulnerable to experiencing mental health symptoms compared to individual sports athletes. This is due to their limited contact with

other team members and coaches, as well as the restriction of organized training sessions. Individual sports athletes are more accustomed to training independently, while for team sports athletes, this can cause greater frustration [24]. Athletes, despite experiencing anxiety during lockdown, cope relatively well. This might be because their lifestyle, which involves participating in competitions, requires them to have the skills to deal with stress, which can be helpful in managing the situation of a pandemic and lockdown [25]. Considering the additional psychological burden that athletes face due to the new situation brought about by the pandemic, coaches and sports organizations should strive to provide the best possible psychological support to athletes.

**Which people are most affected by the COVID-19 pandemic?**

Anyone's mental health may be affected by the COVID-19 pandemic, however there are groups of people who may be particularly at risk. These are pregnant women and mothers, children, disabled people, ethnic or racial minority groups, individuals with preexisting substance abuse or mental illnesses, those with financial and housing insecurities as well as health care workers. If someone belongs to more than one of these groups, then is at even greater risk of developing mental health problems [26].

It has been reported that women are generally more likely to develop mental health problems due to COVID-19 pandemic [27,28]. The incidence varies from 44% [29] to 75% [27] that women are more likely to suffer from mental disorders than men. An increased risk of mental health disorders among women might result from the fact that females have been particularly affected by the pandemic from an economic point of view with greater increase in unemployment and uncompensated work [29,30]. Especially women living in poverty as well as immigrants and ethnic minorities are most likely to be the most impacted by COVID-19 pandemic due to lack of social support [31]. In relation to age groups adolescents have been reported to be more affected by pandemic than adults or young children [32,28]. Moreover, in the group of teenagers with preexisting psychiatric disorders, lockdown may lead to sudden break and shift in care [33].

Among patients with pre-existing mental health disorders during COVID-19 pandemic an increase in the occurrence of symptoms has been noticed, which proves that COVID-19 causes stress and risk for this group [27]. Probable reasons for this may be genetic or environmental higher susceptibility to stress. Individuals with mental health disorders are

probably more likely to be influenced by fear and anxiety associated with COVID-19 epidemic, which may result in worsening and breakdown of pre-existing mental health disorders [34]. Among the reasons also stands out the lack of continuity in mental healthcare, which even before the pandemic had staffing and organizational problems, and it worsened during the pandemic [35,36]. Travel and quarantine regulations resulted in difficulties in patients' attendance at regular visits. Additionally, regularity is important for treatment to be effective, and its lack may result in deterioration [34].

According to the research, the group, whose lives have been especially affected by the COVID-19 pandemic, were healthcare workers. Due to COVID-19 pandemic they were exposed to increased workload, environment of death and infection as well as fear to protect themselves and their families from infection [37]. Frontline healthcare workers who were exposed to stressful working conditions as well as seriously ill due to COVID-19 infection were at increased risk of long-term effects on their mental health. A similar phenomenon was observed in nursing homes residents and among those who financially suffered due to pandemic [38].

**Prevalence of Anxiety related to COVID-19 pandemic.**

Anxiety disorders are one of the most widespread mental disorders, characterized by the feeling of fear and anxiety, phobias, panic and social anxiety disorder. Due to the duration of the symptoms, it is usually referred to as a chronic condition and its long-term consequences include an increased release of stress hormones, which can lead to the appearance of symptoms such as headache, dizziness and depression [39].

From the beginning of the COVID-19 pandemic in 2020, a significant increase in mental disorders among women and men has been noted. Since the outbreak of the pandemic, there has been an increase in the number of people suffering from: acute stress disorder, chronic anxiety, insomnia and depression. According to the research, quarantine and lock down were characterized as detrimental to mental health and loneliness, as well as isolation resulted in significant increase in anxiety [40,41]. Another reason for a greater prevalence of anxiety during pandemic could be fear of the virus itself and the disease per se. According to the studies, there is a negative impact of disease pandemic outbreaks and psychological

condition of society [42]. Additionally, because of epidemics, a lot of people were scared of losing their job and thus their finances and job insecurity may increase the prevalence of anxiety [43]. Matthew et al., 2021 investigated that in the first year of the COVID-19 pandemic (from March 2020 to January 2021), approximately 76 million of new patients with anxiety disorders were diagnosed, representing a 25% rise in cases [44]. In one longitudinal study it was found out that anxiety increased by 23% over a 12 weeks of restrictions [45]. Moreover, three research works showed that anxiety level among the population was lower, as soon as rules were eased or when people have been released from quarantine [46,47,48]. In one meta-analysis, 43 studies were analyzed and it was found that rates of anxiety in the general population could be more than 3 times higher during the COVID-19 pandemic and were accounted for 25%. In contrast, percentage of people experiencing anxiety during previous epidemics, such as H1N1 influenza , Ebola or Severe Acute Respiratory Syndrome, ranged between 3.2% and 12.6% (Chew et al., 2020), which show how much impact the COVID-19 epidemic had on the mental state of people. Moreover, in another meta- analysis (Salari et al. 2020), including 17 studies, even greater prevalence of anxiety among society was noted and estimated at 31.9%. In Spain, more than 2000 participants of research were analyzed during the isolation period, and research showed a high incidence of emotions such as physiological distress and fear, as well as problems related to sleep patterns [49]. The level of anxiety among the population was varied and according to the studies healthcare workers, younger population and females were more endangered than others. During the pandemic, the presence of anxiety was the highest at the beginning of the epidemic, with the highest rate among healthcare workers (36%), then university students (34.7%), followed by the general population (34%). The lowest anxiety prevalence was noted among police officers and was estimated at 8,8% [50,51].

In addition, the COVID-19 epidemic has intensified anxiety disorders occurring in some people before the pandemic. These people were more intensified by the additional environmental stress that appeared in connection with the outbreak of the epidemic, the introduction of isolation and many restrictions. Another problem was the difficult access to medical care, which was necessary for people undergoing treatment for mental illnesses.

**Prevalence of Depression in relation to the COVID-19 pandemic.**

The possible mechanism of COVID-19 induced psychiatric symptoms is related to inflammatory response of the immune system to viral infection, potential neuroinflammation as well as induction of psychological stressor [52,53]. Depressive symptoms might be induced by social isolation, fear about the future, media influence and survivor guilt [54,55]. Quarantined patients feel boredom, loneliness, fear about the future and insecurity. In the same way it affects their relatives who are forbidden to visit them [56,57] All above suggest that mental health problems during the pandemic are associated with multiple factors that affect patients and are not present in normal circumstances and these factors should be promptly identified [58]. In addition to the factors mentioned above, the frequency of depression during a COVID-19 pandemic appears to be influenced by specific personality traits such as a negative affect and detachment. Patients who have experienced stressful situations in the past also seem to be more susceptible [59]. When it comes to the frequency of occurrence, the meta-analysis of twelve clinical studies suggests that the average prevalence of depression in the population during the outbreak of the COVID-19 pandemic is approximately 25% and seems to be 7 times higher than in general population before COVID-19 pandemic [60]. For example, the study investigating the prevalence of depression in Polish recovered from COVID-19 infection patients found that approximately 30% had mild depression symptoms. Women proved to be more affected [61]. During previous epidemics such as Ebola and SARS, the prevalence rates of depression in the population ranged from 3% to 73.10%. Most of these rates appear to be lower than during the COVID-19 pandemic outbreak [62]. Unlike COVID-19, the aforementioned epidemics were controlled more quickly, and despite higher mortality rates, they exhibited a lower number of infections, which may explain the aforementioned results [63]. Depression emerging in such circumstances rarely require pharmacological treatment.The COVID-19 epidemic and the lockdown are extraordinary circumstances that demand personal and social adjustments. Therefore, depression related to this specific situation may be resolved through supportive interventions, providing reassurance and information, enabling individuals to make informed decisions, and assisting in establishing a schedule of activities to sustain mental and physical well-being [63]. However the number of clinical studies is increasing, suggesting that the use of antidepressant medications among patients infected with SARS-CoV-2 may be associated with a lower risk of deterioration [64,65]. Both pre-existing depressive symptoms as well as those COVID-19 related are considered to have an impact on SARS-CoV-2 infection. It cause the increase in infection rate, hospitalization and intensive care therapy necessity and mortality [66,67].

To sum up, COVID-19 pandemic spread on a huge scale and affected a large part of the population with a high proportion of post-COVID depressive disorders. All of the above may contribute to making depression a global problem that will affect more people than before. Current evidence suggests that it is important to quickly detect early symptoms of depression in individuals affected by the COVID pandemic and promptly initiate appropriate treatment. The aforementioned actions can prevent subsequent deterioration in quality of life [68].

**PTSD:**

Post-traumatic stress disorder (PTSD) caused by trauma is mainly observed in individuals who have experienced disasters, natural disasters, or mass accidents. According to DSM-5, PTSD is a stressor-related disorder that can cause an intense sense of life-threatening and physical integrity as well as intense fear and helplessness. The COVID-19 pandemic, by definition, would qualify as a traumatic event, since many individuals have experienced immense stress in relation to the fear of infection, illness, or the death of loved ones.

Anxiety, trauma and depression associated with COVID-19 pandemic, as in disasters, cause the increase of Post-Traumatic Stress Disorder (PTSD) risk [69]. According to a systematic review of past pandemics, including SARS, MERS, and the current COVID-19, between 14% to 61% of infected individuals experienced significant psychiatric and neuropsychiatric issues during illness, and 14.8% to 76.9% continued to experience these problems after recovering from the illness [70]. Moreover, a study of American families, which experienced quarantine due to SARS-CoV and H1N1 virus exposure, showed occurrence of PTSD in 30% of quarantined children [33]. The symptoms of PTSD can include memories and recurring thoughts related to the traumatic event, avoidance of stimuli associated with the event, increased arousal and reactivity as well as negative changes in mood and cognition [71]. In the context of COVID-19 pandemic, individuals who have experienced serious illness, hospitalization, or loss of family members may be particularly vulnerable to developing PTSD. Early identification of the symptoms and intervention are essential for preventing PTSD from becoming a chronic and destructive condition. Studies have suggested that early intervention can prevent the progression of PTSD [72]. Therefore, it is important for medical staff to be attentive for signs of emotional numbness or depersonalization, as well as symptoms of stimulation such as irritability, difficulty sleeping or focusing [73].

In conclusion, the COVID-19 pandemic has had a significant impact on mental health, with PTSD being a notable concern among individuals who have contracted the disease or have been otherwise affected by the pandemic. Early identification and intervention are crucial for preventing PTSD from becoming a chronic condition.

**Eating Disorders incidence related to COVID-19 pandemic**

The COVID-19 pandemic has significantly impacted mental health, including an increase in the frequency of eating disorders. Several factors have contributed to the increased frequency of eating disorders, with the main ones being reduced physical activity due to isolation and prolonged stress caused by the pandemic [74]. Restrictions aimed at limiting the transmission of the virus have had negative consequences in relation to eating, physical activity, and sleep disturbances, which also increase the risk of eating disorders. Due to quarantine and the associated change in daily routine, the lack of designated meal times throughout the day creates circumstances that favor the rejection of the structure of previous meals and an increase in the frequency of snacking [75]. Furthermore, restrictions and limited shopping trips due to fear of infection have led to the accumulation of larger food supplies, thereby increasing the frequency of eating and the likelihood of consuming junk food. Due to isolation, restrictions have been imposed on physical activity, mainly due to the inability to use fitness centers and generally due to reduced movement caused by staying at home. The combination of reduced physical activity with unhealthy eating habits during the pandemic significantly increases the risk of overweight and eating disorders [76].

Another factor, which is the stress associated with the fear of virus infection and personal health, as well as the new situation related to the new rules in force during the pandemic, has significantly contributed to the increased frequency of eating disorders. Social support and interpersonal contacts are protective factors in the context of experiencing stress and its negative consequences, and isolation significantly limits social support [77].

To sum up, the restrictions and limitations associated with the COVID-19 pandemic have led to an increase in perceived stress and its negative effects, as well as increased feelings of loneliness and lack of social support, which are risk factors for eating disorders. Stress may have contributed to increased pathological overeating and distorted body perception, but further research is needed on this topic.

## Conclusion

In conclusion, the COVID-19 pandemic has not only affected physical health but has also resulted in a significant impact on mental health, which should be considered as the second pandemic. The high incidence of mental health issues such as anxiety, depression, PTSD, and eating disorders has been observed in different groups, including athletes and medical professionals. Therefore, it is crucial to adopt strategies and policies that consider both epidemiological context and mental health conditions of the population. It is also essential to implement systems-based interventions to manage burnout and PTSD in medical personnel. In addition, psychiatrists and mental health professionals should focus on assessing the nutritional habits of their patients as part of their daily routine. Furthermore, it is essential to closely observe and provide appropriate hospital referrals for individuals with mental health conditions who contract COVID-19, in order to counteract limited access to healthcare services. From a clinical standpoint, we indicate that routine psychopathology analysis of the individuals who have survived COVID-19 will be the key to diagnosis and treatment of emerging mental health conditions.

## Author Contributions

Conceptualization, K.K., I.M.; supervision and project administration, K.K., I.M., A.A., J.Z.; T.H.A and A.A.A., I.M., K.K.; Methodology, K.K., I.M.; Software, A.A., J.Z.; Validation, K.K., I.M.; formal analysis, A.A., M.B.; investigation, M.B.; resources, K.K., I.M.; writing-original draft preparation, K.K., I.M., A.A., J.Z., M.B.; writing- review and editing and visualization, K.K., I.M., A.A., J.Z., M.B.

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Not applicable.

**Conflicts of Interest**

The authors declare no conflict of interest.

[1] WHO Coronavirus (COVID-19) Dashboard (WHO, 2022; https://covid19.who.int/ [Google Scholar]

[2] Dragioti E, Li H, Tsitsas G, Lee KH, Choi J, Kim J, et al. A large-scale meta-analytic atlas of mental health problems prevalence during the COVID-19 early pandemic. J Med Virol. 2022 May;94(5):1935-1949. doi: 10.1002/jmv.27549. Epub 2022 Jan 9. PMID: 34958144; PMCID: PMC9015528.

[3] Asmundson GJG, Taylor S. Coronaphobia: Fear and the 2019-nCoV outbreak. J Anxiety Disord. 2020 Mar;70:102196. doi: 10.1016/j.janxdis.2020.102196. Epub 2020 Feb 10. PMID: 32078967; PMCID: PMC7134790.

[4] Xie Y, Xu E, Al-Aly Z. Risks of mental health outcomes in people with covid-19: cohort study. BMJ. 2022 Feb 16;376:e068993. doi: 10.1136/bmj-2021-068993. PMID: 35172971; PMCID: PMC8847881.

[5] Clemente-Suárez V.J., Hormeño-Holgado A., Jiménez M., Benitez-Agudelo J.C., Navarro-Jiménez E., Perez-Palencia N., et al. Dynamics of Population Immunity Due to the Herd Effect in the COVID-19 Pandemic. *Vaccines.* 2020;**8**:236. doi: 10.3390/vaccines8020236. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]

[6] Pillay L, van Rensburg DCCJ, van Rensburg AJ, Ramagole DA, Holtzhausen L, Dijkstra HP, Cronje T. Nowhere to hide: the significant impact of coronavirus disease 2019 (COVID-19) measures on elite and semi-elite South African athletes. *J Sci Med Sport.* 2020;23(7):670–679. doi: 10.1016/j.jsams.2020.05.016. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

[7] Turgut M, Soylu Y, Metin SN. Physical activity, night eating, and mood state profiles of athletes during the COVID-19 pandemic. *Prog Nutr.* 2020;22(2):2020019. [Google Scholar]

[6] Choukér A., Stahn A.C. COVID-19—The largest isolation study in history: The value of shared learnings from spaceflight analogs. *NPJ Microgravity.* 2020;**6**:1–7. doi: 10.1038/s41526-020-00122-8. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]

[7] Banerjee D, Rai M. Social isolation in Covid-19: The impact of loneliness. Int J Soc Psychiatry. 2020 Sep;66(6):525-527. doi: 10.1177/0020764020922269. Epub 2020 Apr 29. PMID: 32349580; PMCID: PMC7405628.

[8] Khobragade SY, Soe HHK, Khobragade YS, Abas ALB. Virtual learning during the COVID-19 pandemic: What are the barriers and how to overcome them? J Educ Health Promot. 2021 Sep 30;10:360. doi: 10.4103/jehp.jehp_1422_20. PMID: 34761046; PMCID: PMC8552260.

[9]. Gabarron E, Oyeyemi SO, Wynn R. COVID-19-related misinformation on social media: a systematic review. Bull World Health Organ. 2021 Jun 1;99(6):455-463A. doi: 10.2471/BLT.20.276782. Epub 2021 Mar 19. PMID: 34108756; PMCID: PMC8164188.

[10] Kliem S, von Thadden A, Lohmann A, Kröger C, Baier D. The Effect of the Covid-19 Pandemic on Domestic Violence in Germany: A Comparison of Three Representative Population Surveys. J Interpers Violence. 2023 Jun;38(11-12):7296-7314. doi: 10.1177/08862605221143194. Epub 2023 Jan 13. PMID: 36636865; PMCID: PMC9849116.

[11] Dubey MJ, Ghosh R, Chatterjee S, Biswas P, Chatterjee S, Dubey S. COVID-19 and addiction. Diabetes Metab Syndr. 2020 Sep-Oct;14(5):817-823. doi: 10.1016/j.dsx.2020.06.008. Epub 2020 Jun 9. PMID: 32540735; PMCID: PMC7282772.

[12] Rodgers RF, Lombardo C, Cerolini S, Franko DL, Omori M, Fuller-Tyszkiewicz M, et al. The impact of the COVID-19 pandemic on eating disorder risk and symptoms. Int J Eat

Disord. 2020 Jul;53(7):1166-1170. doi: 10.1002/eat.23318. Epub 2020 Jun 1. PMID: 32476175; PMCID: PMC7300468.

[13] Wunsch K, Kienberger K, Niessner C. Changes in Physical Activity Patterns Due to the Covid-19 Pandemic: A Systematic Review and Meta-Analysis. Int J Environ Res Public Health. 2022 Feb 16;19(4):2250. doi: 10.3390/ijerph19042250. PMID: 35206434; PMCID: PMC8871718.

[14] COVID-19 Mental Disorders Collaborators. Global prevalence and burden of depressive and anxiety disorders in 204 countries and territories in 2020 due to the COVID-19 pandemic. Lancet. 2021 Nov 6;398(10312):1700-1712. doi: 10.1016/S0140-6736(21)02143-7. Epub 2021 Oct 8. PMID: 34634250; PMCID: PMC8500697.

[15] McGinty E.E., Presskreischer R., Han H., Barry C.L. Psychological Distress and Loneliness Reported by US Adults in 2018 and April 2020. *JAMA.* 2020;**324**:93. doi: 10.1001/jama.2020.9740. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]

[16] Bo H.-X. Posttraumatic stress symptoms and attitude toward crisis mental health services among clinically stable patients with COVID-19 in China. *Psychol. Med.* 2020;1–7 doi: 10.1017/S0033291720000999. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]

[17] Gupta N, Dhamija S, Patil J, Chaudhari B. Impact of COVID-19 pandemic on healthcare workers. Ind Psychiatry J. 2021 Oct;30(Suppl 1):S282-S284. doi: 10.4103/0972-6748.328830. Epub 2021 Oct 22. PMID: 34908710; PMCID: PMC8611576.

[18] Lee YJ, Yun J, Kim T. Stress- and Work-Related Burnout in Frontline Health-Care Professionals During the COVID-19 Pandemic. Disaster Med Public Health Prep. 2021 Aug 31;17:e38. doi: 10.1017/dmp.2021.279. PMID: 34462045; PMCID: PMC8576136.

[19] Malcolm D, Velija P. COVID-19, exercise and bodily self-control. Sociología Del Deporte. 2020;1(1):29–34. doi: 10.46661/socioldeporte.5011.

[20] Shukla A, Dogra DK, Bhattacharya D, Gulia S, Sharma R. Impact of COVID-19 outbreak on the mental health in sports: a review. Sport Sci Health. 2023 Apr 20:1-15. doi: 10.1007/s11332-023-01063-x. Epub ahead of print. PMID: 37360974; PMCID: PMC10116474.

[21] Peluso MAM, de Andrade LHSG. Physical activity and mental health: the association between exercise and mood. Clinics. 2005;60(1):61–70. doi: 10.1590/S1807-59322005000100012.

[22] Pitacho L, da Palma PJ, Correia P, Cordeiro JP. From Passion to Abyss: The Mental Health of Athletes during COVID-19 Lockdown. European Journal of Investigation in Health, Psychology and Education. 2023; 13(3):613-625. https://doi.org/10.3390/ejihpe13030047

[23] Garcia-Mas A, Aguado F, Cuartero J, Calabria E, Jimenez R, Pérez P. Sueño, descanso, y rendimiento en jovenes deportistas de competición. *Revista de Psicología del Deporte* (2003) 12:181–95.

[24] Salles, J.I., Silva, C., Wolff, A. *et al.* Anxiety, insomnia, and depression during COVID-19 lockdown in elite individual and team sport athletes. *Psicol. Refl. Crít.* 35, 33 (2022). https://doi.org/10.1186/s41155-022-00233-z

[25] Pensgaard AM, Duda JL. Sydney 2000: the interplay between emotions, coping, and the performance of olympic-level athletes. *Sport Psychologist.* 2003;17:253–267. doi: 10.1123/tsp.17.3.253.

[26] Mental Health During the COVID-19 Pandemic https://covid19.nih.gov/covid-19-topics/mental-health#mental-health-resources-by-topic

[27] Robinson E, Sutin AR, Daly M, Jones A. A systematic review and meta-analysis of longitudinal cohort studies comparing mental health before versus during the COVID-19 pandemic in 2020. J Affect Disord. 2022 Jan 1;296:567-576. doi: 10.1016/j.jad.2021.09.098. Epub 2021 Oct 1. PMID: 34600966; PMCID: PMC8578001.

[28] Patel K, Robertson E, Kwong ASF, Griffith GJ, Willan K, Green MJ, et al. Psychological Distress Before and During the COVID-19 Pandemic Among Adults in the United Kingdom

Based on Coordinated Analyses of 11 Longitudinal Studies. JAMA Netw Open. 2022 Apr 1;5(4):e227629. doi: 10.1001/jamanetworkopen.2022.7629. PMID: 35452109; PMCID: PMC9034408.

[29] McKinsey & Company COVID-19 impact on women and gender equality. July 15, 2020. https://www.mckinsey.com/featured-insights/future-of-work/covid-19-and-gender-equality-countering-the-regressive-effects

[30] Graeber D, Kritikos AS, Seebauer J. COVID-19: a crisis of the female self-employed. J Popul Econ. 2021;34(4):1141-1187. doi: 10.1007/s00148-021-00849-y. Epub 2021 Jun 11. PMID: 34131364; PMCID: PMC8192686.

[31] Goldin C. In: Investment in women's human capital and economic development. Schultz TP, editor. University of Chicago Press; Chicago, IL, USA: 1995. The U-shaped female labor force function in economic development and economic history; pp. 61–90. [Google Scholar] [Ref list]

[32] Racine N, McArthur BA, Cooke JE, Eirich R, Zhu J, Madigan S. Global Prevalence of Depressive and Anxiety Symptoms in Children and Adolescents During COVID-19: A Meta-analysis. JAMA Pediatr. 2021 Nov 1;175(11):1142-1150. doi: 10.1001/jamapediatrics.2021.2482. PMID: 34369987; PMCID: PMC8353576.

[33] Sprang G, Silman M. Posttraumatic stress disorder in parents and youth after health-related disasters. Disaster Med Public Health Prep. 2013 Feb;7(1):105-10. doi: 10.1017/dmp.2013.22. PMID: 24618142.

[34] Yao H, Chen JH, Xu YF. Patients with mental health disorders in the COVID-19 epidemic. Lancet Psychiatry. 2020 Apr;7(4):e21. doi: 10.1016/S2215-0366(20)30090-0. PMID: 32199510; PMCID: PMC7269717.

[35] Herrman H, Patel V, Kieling C, Berk M, Buchweitz C, Cuijpers P, et al. Time for united action on depression: a Lancet-World Psychiatric Association Commission. Lancet. 2022 Mar 5;399(10328):957-1022. doi: 10.1016/S0140-6736(21)02141-3. Epub 2022 Feb 15. PMID: 35180424.

[36] Jorm AF, Patten SB, Brugha TS, Mojtabai R. Has increased provision of treatment reduced the prevalence of common mental disorders? Review of the evidence from four countries. World Psychiatry. 2017 Feb;16(1):90-99. doi: 10.1002/wps.20388. PMID: 28127925; PMCID: PMC5269479.

[37] Penninx BWJH, Benros ME, Klein RS, Vinkers CH. How COVID-19 shaped mental health: from infection to pandemic effects. Nat Med. 2022 Oct;28(10):2027-2037. doi: 10.1038/s41591-022-02028-2. Epub 2022 Oct 3. PMID: 36192553; PMCID: PMC9711928.

[38] Taquet M., Luciano S., Geddes J.R., Harrison PJ. Bidirectional associations between COVID-19 and psychiatric disorder: retrospective cohort studies of 62 354 COVID-19 cases in the USA. Lancet Psychiatry. 2021;8(2):130–140. [PMC free article] [PubMed] [Google Scholar]

[39] Kasper S. Anxiety disorders: under-diagnosed and insufficiently treated. Int J Psychiatry Clin Pract. 2006;10 Suppl 1:3-9. doi: 10.1080/13651500600552297. PMID: 24931537.

[40] Chen L., Zhao H., Razin D., Song T., Wu Y., Ma X., et al. Anxiety levels during a second local COVID-19 pandemic breakout among quarantined people: A cross sectional survey in China. J. Psychiatr. Res. 2021;135:37–46. doi: 10.1016/j.jpsychires.2020.12.067. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]

[41] Fisher J.R., Tran T.D., Hammarberg K., Sastry J., Nguyen H., Rowe H., et al. Mental health of people in Australia in the first month of COVID-19 restrictions: A national survey. Med. J. Aust. 2020;213:458–464. doi: 10.5694/mja2.50831. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]

[42] Jalloh M.F., Li W., Bunnell R.E., Ethier K.A., O'Leary A., Hageman K.M., et al. Impact of Ebola experiences and risk perceptions on mental health in Sierra Leone, July 2015. BMJ

Glob Health. 2018;3 doi: 10.1136/bmjgh-2017-000471. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]

[43] Boya F.O., Demiral Y., Ergör A., Akvardar Y., De Witte H. Effects of perceived job insecurity on perceived anxiety and depression in nurses. Ind. Health. 2008;46:613–619. doi: 10.2486/indhealth.46.613. [PubMed] [CrossRef] [Google Scholar] [Ref list]

[44] Matthew P., Joanne M., Patrick B., Isabelle B., Tammy H., Cynthia M., et al. 26th Cochrane Colloquium, Santiago, Chile. Vol. 0. 2021. PRISMA 2020 statement: updated guidelines for reporting systematic reviews and meta analyses. (0) [CrossRef] [Google Scholar] [Ref list]

[45] Batterham P.J., Calear A.L., McCallum S.M., Morse A.R., Banfield M., Farrer L.M., et al. Trajectories of depression and anxiety symptoms during the COVID-19 pandemic in a representative Australian adult cohort. Med. J. Aust. 2021;214:462–468. doi: 10.5694/mja2.51043. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]

[46] Bendau A., Plag J., Kunas S., Wyka S., Strohle A., Petzold M.B. Longitudinal changes in anxiety and psychological distress, and associated risk and protective factors during the first three months of the COVID-19 pandemic in Germany. Brain Behav. 2021;11:e01964. doi: 10.1002/brb3.1964. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]

[47] Canet-Juric L., Andres M.L., Del Valle M., Lopez-Morales H., Poo F., Galli J.I., et al. A Longitudinal Study on the Emotional Impact Cause by the COVID-19 Pandemic Quarantine on General Population. Front. Psychol. 2020;11:565688. doi: 10.3389/fpsyg.2020.565688. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]

[48] Lu P., Li X., Lu L., Zhang Y. The psychological states of people after Wuhan eased the lockdown. PLoS ONE. 2020;15:e0241173. doi: 10.1371/journal.pone.0241173. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]

[49] Rodríguez-Muñoz A., Antino M., Ruíz-Zorrilla P., Sanz-Vergel A. Los Efectos Psicológicos de la Cuarentena por el COVID-19: Un estudio Longitudinal [Proyecto de

Investigación en Ejecución] Universidad Complutense; Madrid, Spain: 2020. [Google Scholar] [Ref list]

[50] Mattila E, Peltokoski J, Neva MH, Kaunonen M, Helminen M, Parkkila AK. COVID-19: anxiety among hospital staff and associated factors. Ann Med. 2021 Dec;53(1):237-246. doi: 10.1080/07853890.2020.1862905. PMID: 33350869; PMCID: PMC7877952.

[51] Saeed H, Eslami A, Nassif NT, Simpson AM, Lal S. Anxiety Linked to COVID-19: A Systematic Review Comparing Anxiety Rates in Different Populations. Int J Environ Res Public Health. 2022 Feb 15;19(4):2189. doi: 10.3390/ijerph19042189. PMID: 35206374; PMCID: PMC8871867.

[52] Troyer EA, Kohn JN, Hong S. Are we facing a crashing wave of neuropsychiatric sequelae of COVID-19? Neuropsychiatric symptoms and potential immunologic mechanisms. Brain Behav Immun. 2020 Jul;87:34-39. doi: 10.1016/j.bbi.2020.04.027. Epub 2020 Apr 13. PMID: 32298803; PMCID: PMC7152874.

[53] Passavanti M, Argentieri A, Barbieri DM, Lou B, Wijayaratna K, Foroutan Mirhosseini AS, et al. The psychological impact of COVID-19 and restrictive measures in the world. J Affect Disord. 2021;15(283):36–51. doi: 10.1016/j.jad.2021.01.020. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]

[54] Singh S, Roy D, Sinha K, Parveen S, Sharma G, Joshi G. Impact of COVID-19 and lockdown on mental health of children and adolescents: A narrative review with recommendations. Psychiatry Res. 2020 Nov;293:113429. doi: 10.1016/j.psychres.2020.113429. Epub 2020 Aug 24. PMID: 32882598; PMCID: PMC7444649.

[55] Guo Q, Zheng Y, Shi J, Wang J, Li G, Li C, et al. Immediate psychological distress in quarantined patients with COVID-19 and its association with peripheral inflammation: A mixed-method study. Brain Behav Immun. 2020 Aug;88:17-27. doi: 10.1016/j.bbi.2020.05.038. Epub 2020 May 19. PMID: 32416290; PMCID: PMC7235603.

[56] Cava MA, Fay KE, Beanlands HJ, McCay EA, Wignall R. The experience of quarantine for individuals affected by SARS in Toronto. Public Health Nurs. 2005 Sep-Oct;22(5):398-406. doi: 10.1111/j.0737-1209.2005.220504.x. PMID: 16229732.

[57] Xin M, Luo S, She R, Yu Y, Li L, Wang S, et al. Negative cognitive and psychological correlates of mandatory quarantine during the initial COVID-19 outbreak in China. Am Psychol. 2020 Jul-Aug;75(5):607-617. doi: 10.1037/amp0000692. PMID: 32673008.

[58] Zhu C, Zhang T, Li Q, Chen X, Wang K. Depression and Anxiety During the COVID-19 Pandemic: Epidemiology, Mechanism, and Treatment. Neurosci Bull. 2023 Apr;39(4):675-684. doi: 10.1007/s12264-022-00970-2. Epub 2022 Nov 21. PMID: 36411394; PMCID: PMC9685018.

[59] Mazza, C.; Ricci, E.; Biondi, S.; Colasanti, M.; Ferracuti, S.; Napoli, C.; et al. A Nationwide Survey of Psychological Distress among Italian People during the COVID-19 Pandemic: Immediate Psychological Responses and Associated Factors. Int. J. Environ. Res. Public Health 2020, 17, 3165. https://doi.org/10.3390/ijerph17093165

[60] Bueno-Notivol J, Gracia-García P, Olaya B, Lasheras I, López-Antón R, Santabárbara J. Prevalence of depression during the COVID-19 outbreak: A meta-analysis of community-based studies. Int J Clin Health Psychol. 2021 Jan-Apr;21(1):100196. doi: 10.1016/j.ijchp.2020.07.007. Epub 2020 Aug 31. PMID: 32904715; PMCID: PMC7458054.

[61] Dankowski R., Sacharczuk W., Duszyńska D., Mikołajewska W., Szałek-Goralewska A., & Łojko-Dankowska A. et al. (2021). Depression and anxiety in patients recently recovered from coronavirus disease (COVID-19). Neuropsychiatria i Neuropsychologia/Neuropsychiatry and Neuropsychology, 16(1), 11-16. https://doi.org/10.5114/nan.2021.108028

[62] Qian Hui Chew1, BSocSci(Hons), Ker Chiah Wei2, MBBS, MMed, Shawn Vasoo3, et al. Narrative synthesis of psychological and coping responses towards emerging infectious disease outbreaks in the general population: Practical considerations for the COVID-19 pandemic.Singapore Medical Journal. Advance online publication, (2020), http://dx.doi.org/10.11622/smedj.2020046

[63] Huremović, Damir. “Social Distancing, Quarantine, and Isolation.” Psychiatry of Pandemics (2019): n. pag. DOI:10.1007/978-3-030-15346-5_8

[64] Facente SN, Reiersen AM, Lenze EJ, Boulware DR, Klausner JD. Fluvoxamine for the early treatment of SARS-CoV-2 infection: a review of current evidence. Drugs. 2021;81(18):2081–2089. doi: 10.1007/s40265-021-01636-5. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]

[65] Hashimoto Y, Suzuki T, Hashimoto K. Mechanisms of action of fluvoxamine for COVID-19: a historical review. Mol Psychiatry. 2022 doi: 10.1038/s41380-021-01432-3. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]

[66] Vai B, Mazza MG, Delli Colli C, Foiselle M, Allen B, Benedetti F, et al. Mental disorders and risk of COVID-19-related mortality, hospitalisation, and intensive care unit admission: a systematic review and meta-analysis. Lancet Psychiatry. 2021;8(9):797–812. doi: 10.1016/S2215-0366(21)00232-7. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]

[67] Ceban F, Nogo D, Carvalho IP, Lee Y, Nasri F, Xiong J, et al. Association between mood disorders and risk of COVID-19 infection, hospitalization, and death: a systematic review and meta-analysis. JAMA Psychiat. 2021;78(10):1079–1091. doi: 10.1001/jamapsychiatry.2021.1818. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]

[68] Mazza MG, Palladini M, Poletti S, Benedetti F. Post-COVID-19 Depressive Symptoms: Epidemiology, Pathophysiology, and Pharmacological Treatment. CNS Drugs. 2022 Jul;36(7):681-702. doi: 10.1007/s40263-022-00931-3. Epub 2022 Jun 21. PMID: 35727534; PMCID: PMC9210800.

[69] Douglas PK, Douglas DB, Harrigan DC, Douglas KM. Preparing for pandemic influenza and its aftermath: mental health issues considered. Int J Emerg Ment Health. 2009 Summer;11(3):137-44. PMID: 20437844.

[70] Giannopoulou I, Galinaki S, Kollintza E, Adamaki M, Kympouropoulos S, Alevyzakis E, Tsamakis K, Tsangaris I, Spandidos DA, Siafakas N, Zoumpourlis V, Rizos E. COVID-19 and post-traumatic stress disorder: The perfect 'storm' for mental health (Review). Exp Ther Med. 2021 Oct;22(4):1162. doi: 10.3892/etm.2021.10596. Epub 2021 Aug 11. PMID: 34504607; PMCID: PMC8392877.

[71] American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (DSM-5®). American Psychiatric Pub.

[72] Rothbaum BO, Kearns MC, Price M, Malcoun E, Davis M, Ressler KJ, et al. Early intervention may prevent the development of posttraumatic stress disorder: a randomized pilot civilian study with modified prolonged exposure. Biol Psychiatry. 2012 Dec 1;72(11):957-63. doi: 10.1016/j.biopsych.2012.06.002. Epub 2012 Jul 4. PMID: 22766415; PMCID: PMC3467345.

[73] van der Kolk B. Posttraumatic stress disorder and the nature of trauma. Dialogues Clin Neurosci. 2000 Mar;2(1):7-22. doi: 10.31887/DCNS.2000.2.1/bvdkolk. PMID: 22034447; PMCID: PMC3181584.

[74] Rodgers RF, Lombardo C, Cerolini S, Franko DL, Omori M, Fuller-Tyszkiewicz M, et al. The impact of the COVID-19 pandemic on eating disorder risk and symptoms. Int J Eat Disord. 2020 Jul;53(7):1166-1170. doi: 10.1002/eat.23318. Epub 2020 Jun 1. PMID: 32476175; PMCID: PMC7300468.

[75] Bakaloudi DR, Jeyakumar DT, Jayawardena R, Chourdakis M. The impact of COVID-19 lockdown on snacking habits, fast-food and alcohol consumption: A systematic review of the evidence. Clin Nutr. 2022 Dec;41(12):3038-3045. doi: 10.1016/j.clnu.2021.04.020. Epub 2021 Apr 17. PMID: 34049747; PMCID: PMC8052604.

[76] McLean CP, Utpala R, Sharp G. The impacts of COVID-19 on eating disorders and disordered eating: A mixed studies systematic review and implications. Front Psychol. 2022 Sep 6;13:926709. doi: 10.3389/fpsyg.2022.926709. PMID: 36148134; PMCID: PMC9487416.

[77] Leonidas C, Dos Santos MA. Social support networks and eating disorders: an integrative review of the literature. Neuropsychiatr Dis Treat. 2014 May 21;10:915-27. doi: 10.2147/NDT.S60735. PMID: 24899810; PMCID: PMC4039404.