

Association of COVID-19 pandemic and depression occurrence in university students worldwide

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Abstract: Many studies have shown that the Covid-19 pandemic is followed by psychological problems in students; However, the exact effects of the Covid-19 pandemic on student depression are not entirely clear. Accordingly, the present review study examines the relationship between the Covid-19 pandemic and the incidence of depression in students worldwide. During this library and documentary research, 95 sources including books, articles and online references were examined. The inclusion criteria were based on viral infectious diseases, Covid-19 and the incidence of depressive mental disorder. The validity of the sources was evaluated according to the indexes and the use of validation sites, and after ensuring their validity, information was collected. Finally, the information was categorized using descriptive statistics. The Covid-19 pandemic in different countries has had a significant effect on the incidence of depression in students, however, the severity of mental disorders associated with the Covid-19 pandemic in underdeveloped countries is significantly higher than developed countries. Occurrence of psychological disorders in the corona pandemic period is completely different in students according to the length of the quarantine period, social restrictions, field of study, age and gender, and economic and social level of students. The results of this study showed that the corona pandemic has been significantly effective in the incidence of depression in students worldwide, and therefore it is very important and vital to consider counseling and psychological support programs for students in universities.

Keywords: COVID-19 pandemic, Depression, Students

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1 Introduction

The new coronavirus, Covid-19, is a contagious disease that has infected large numbers of people around the world. The disease is spreading rapidly. The mortality rate of this disease is various in different countries and its prevalence and mortality rate is variable. There is a positive relationship between prevalence and mortality. The prevalence of this disease was the same between men and women. Gender differences affect vulnerability and mortality, with more deaths reported in men than women. The mortality rate of this disease varies between 2 and 3%. Infection rates are more common in men over 60 (Meo et al., 2020; Madabhavi et al., 2020; Kazemi-Karyani et al., 2020; Jin et al., 2020; Wenham et al., 2020). Elderly people show more severe symptoms than children if they have the disease, while these symptoms are less in young people, including students, and students than employed and non-employed adults (Yuki et al., 2020). Coronaviruses are single-stranded RNA viruses that infect humans and a wide range of animals. The corona virus includes four species, alpha, beta, gamma and delta. Alpha and beta viruses are apparently derived from mammals, especially bats and gamma and delta viruses, from pigs and birds. Beta viruses can cause death and severe disease, while alpha viruses have Symptoms are mild or asymptomatic (Velavan and Meyer, 2020) In late December 2019, Chinese health officials reported an outbreak of pneumonia of unknown origin in Wuhan, Hubei Province, and a few days later the genome of the new corona virus was temporarily released. -2019, but is now called SARS-COV-2, a virus that has spread worldwide and killed thousands (Ciotti et al., 2019). In bats, it can be concluded that bats may be the source of the corona virus, but how it is transmitted from bats to humans is still unclear (Madabhavi et al., 2020). There are actually six types of corona viruses that can infect humans. Four of them cause mild respiratory symptoms, while the other two, MERS and SARS, cause epidemics and high mortality rates. Measles and SARS viruses can be transmitted to other people through unprotected close contact with the respiratory droplets of infected people, causing severe pneumonia symptoms such as fever, dry cough, fatigue, and respiratory distress. Coronaviruses infect lung epithelial cells, but SARC-COV-2 has also been observed in patients' respiratory, fecal, and blood samples (Paez et al., 2020; Xu et al., 2020). Covid-19 is a disease that can have long-term effects on health, causing damage to the respiratory, gastrointestinal, kidney, and central nervous systems (Mohammadkhanizadeh and Nikbakht, 2021). Almost all countries have used methods such as testing, quarantining suspects, restricting large gatherings, etc. to prevent the spread of the virus (Chakraborty and Maity, 2020). Quarantine and stay at home, social isolation, closure of educational institutions, reduction of labor force, fear of infection, disease transmission and isolation increase psychological disorders, damage to public health, economic and political damage and concerns increase psychological problems of people all over The world has become. Economic activities have become unfavorable due to the epidemic, causing thousands of people to lose their jobs; But social support from those around them has been very effective in reducing people's psychological problems. Some countries have been more vulnerable than others. In Africa, countries in South Africa and Egypt, in Europe, Germany and Italy, in Asia and the Pacific, India, Iran, Pakistan, Saudi Arabia, Turkey and Russia, and in Brazil, the United States, Chile, and Mexico. And Peru has been one of the most

vulnerable countries. Studies have shown that Covid-19 has a dual effect on human mental health. One of the complications of this disease is its psychological complications such as social stigma against people of certain ethnicities as well as those who are thought to have been associated with the Corona virus, including patients, nurses, doctors, patients' families, etc. Is (Noorbala et al., 2021; Hossain, 2021; Moore and Lucas, 2021; Shrestha et al., 2020; Chen et al., 2020; Jahangasht, 2020). Students have also always faced psychological, economic and social consequences with the outbreak of this disease and living in quarantine (Khodabakhshikoolae, 2020). University students are vulnerable to the Covid-19 pandemic because they are seeking a corona outbreak and the closure of universities and the start of e-learning with economic problems and financial worries such as internet and hardware purchases, declining social connections, declining Emotional relationships that result from the reduction of close face-to-face relationships, which is especially effective in the young age group, as well as fear of the future increase psychological problems. In this regard, the results of studies have shown that students who reported their financial problems during the Covid-19 epidemic, especially students who had lower social and financial status, were more at risk of mental health problems (Mohammadi et al., 2021; Kohls et al., 2021; Eisenberg et al., 2007). Although social distance is important in times of crisis to prevent the spread of the Corona virus, it can also lead to psychological problems. Studies of students have shown that factors such as female gender, staying home, a history of illness, and poor social support can increase students' chances of developing mental health problems such as depression and anxiety. Research in various countries, especially the United States and Europe, has shown that students have consumed a lot of alcohol during the closure of universities and scientific centers, which in itself may indicate that students have psychological problems (Kohls et al., 2021; Eisenberg et al., 2007; Saltzman et al., 2020; Aylie et al., 2020; Lechner et al., 2020; Karing, 2021). Overall, reports indicate that individuals in various social sectors, especially students, have experienced significant mental disorders, including depression due to the prevalence of Covid-19 (Shahyad and Mohammadi, 2020; Richards, 2011). In fact, depression is a mental disorder with symptoms such as loss of interest and energy, feelings of failure, guilt, difficulty concentrating, isolation, anorexia, self-loathing, thoughts of death and suicide, insomnia or oversleeping and Malfunction is identified. Symptoms should be such that they interfere with a person's ability to attend work, school, and perform daily tasks. According to the Statistical and Diagnostic Manual of Mental Disorder Version 5 (DSM-5), the hallmark of a period of depression is a period that lasts at least 14 days, during which the patient is constantly in the pathological spectrum of symptoms. Depression can be divided into two main subgroups, major depression and dysthymia. Major depression includes mood swings, loss of pleasure and loss of energy, which depending on the number and severity of symptoms, a period of depression can be divided into severe, moderate and mild. Continuous or chronic dysthymia is a mild depression whose symptoms are similar to those of depression but are milder and last longer (Lépine and Briley, 2011; Depression, 2017; Izadi tameh et al., 2014; Hosseini et al., 2019). The prevalence of major depressive disorder in women is almost twice that of men (Noble, 2005). Depression is one of the most common chronic diseases that several factors such as exposure to natural and unnatural disasters, family history, especially in adolescents, exposure to psychological and social stress, as well as genetic and physiological background can increase the risk of

developing the disease (Gonda and Petschner, 2021; Ran and Peng, 2021; Thapar et al., 2012; Zalar et al., 2018; Żmudzka et al., 2018; Colle et al., 2020). Depression can have many adverse effects on a person's quality of life over a long period of time, and in particular can increase the risk of suicide (Ran and Peng, 2021; Thapar et al., 2012; Zalar et al., 2018; Żmudzka et al., 2018; Colle et al., 2020; Gao and Zhang, 2021). Studies have shown that physical presence in social and educational activities plays a role not only in preventing depression but also in treating it (Cruwys et al., 2013).

Considering the importance of studying the occurrence of mental disorders in different demographic levels, especially students, and also because the occurrence of mental disorders in students can have long-term effects on them and if not investigated, identified, announced and warned by researchers can have consequences. Therefore, it is very important to conduct studies, especially review studies that provide a comprehensive study of the subject under study. Based on this, the present review study examines the relationship between the prevalence of Covid-19 and the incidence of depression in students worldwide.

2 Materials and Methods

During this library and documentary research, 95 sources including books, scientific journals and scientific articles including research articles, reviews, short reports, interpretations, editorials, peer review, letters, overviews as well as reports of seminars and conferences using Google sites Scholars, University Jihad and Mag Iran were examined. The inclusion criteria were based on viral infectious diseases, Covid-19 and the incidence of mental disorders, especially depression. The validity of the sources was evaluated according to the indexes and the use of validation sites, and after ensuring their validity, information was collected. Finally, the information was categorized using descriptive statistics. 47.3% of the resources were related to 2020, 32.6% to 2021 and 20.1% to other years.

3 Results and Discussions

Studies have shown that infectious diseases have a significant impact on a wide range of psychological disorders such as schizophrenia or major depression (Chew et al., 2020; Müller, 2014). Studies of medical staff in 57 countries have shown that epidemics of infectious diseases have a significant impact on the incidence of their psychological disorders (Fiest et al., 2021; Benros et al., 2013). In fact, the prevalence of viral infectious diseases such as Ebola, H1N1, HIV and acute respiratory syndrome have had a significant impact on the development of mental disorders such as depression, anxiety and stress (Chew et al., 2020; Mohammed et al., 2015; Brietzke et al., 2020; Okusaga et al., 2011; Chong et al., 2018; Gale et al., 2018; Sherr et al., 2011; Stamu-O'Brien et al., 2020). Research findings have shown that people with corona disease are likely to suffer from many psychological consequences (Fardin, 2020). The results of studies conducted in different countries of the world have shown that the prevalence of Covid-19 pandemic has a significant impact on the population of these countries and has put these people

at risk of mental illness (Alyami et al., 2021; Zhang et al., 2021; Khawar et al., 2021; Fathi et al., 2020; Jadoo, 2020; Yuan et al., 2020). However, some research denies the profound effect of Covid-19 on mental disorders. In this regard, the results of studies conducted in 2025 adults over 18 years of age in the United Kingdom showed that corona disease did not have a profound effect on the prevalence of mental illness, including depression (Shevlin et al., 2020).

Research findings from the study of the effects of coronary artery disease on the incidence of mental disorders in Iran have shown that the prevalence of corona disease, quarantine and restrictions have caused economic problems, and the epidemic of this disease has a significant effect on depression in individuals including students. (Salimi et al., 2020). Research findings in Australia have shown that the prevalence of Covid-19 has significantly increased psychological problems, especially depression, among the population, including students (Zhou et al., 2021). Also, the results of a study conducted in the United States indicate that Covid-19 and its constraints and social distances have increased depression in individuals (Daly et al., 2021), which, of course, students have also been affected in this regard. Findings from a survey of 15,704 people over the age of 18 in Germany showed that the prevalence of corona disease had a significant impact on the incidence of depression among the general public, including students (Bäuerle et al., 2020). A study of 2,708 people in Japan found that the prevalence of corona disease increased depression by 2 to 9 times (Fukase et al., 2021). A study of 1,039 people in the UAE also found that the corona virus epidemic had significant effects on people's mental health and increased the incidence of depression (Thomas et al., 2020). Research findings from the study of the effects of the Covid-19 outbreak on students in Bangladesh have shown that in addition to stressors during the epidemic, economic conditions during and after the corona have a negative impact on students' lives has had a significant effect on their mental health (Dhar et al., 2020). Also, the research findings of a study conducted on 2270 university students in China indicate that the prevalence of corona disease has a significant impact on the psychological disorders of these students (Zhang et al., 2021). In another study examining the effects of the prevalence of Covid-19 on Pakistani students and on 2,220 students at Pakistani universities, the findings showed that Covid-19 caused a significant range of psychological distress in students (Khawar et al., 2021). Research findings from the study on the effects of Covid-19 outbreak on students in Jordan have also shown that the quarantine of university students in order to prevent the outbreak of corona disease has caused high psychological pressure on students and they stated in their statements that disorders they suffer from psychosis and depression (Saadeh et al., 2021). In this regard, studies conducted on university students in Egypt also showed that students are prone to mental health problems during the corona disease epidemic and the epidemic of this disease has had significant negative effects on students' mental health (El-Monshed et al., 2021). Examination of the incidence of depression in university students in Spain also showed that following the outbreak of coronation in Spain and during the first week of quarantine, students have experienced high levels of depression (Odrizola-González et al., 2020). Another study of 2,485 students at six universities in China during quarantine found that students experienced high levels of depression, a warning that the consequences of Covid-19 could be very serious and students need psychological interventions (Tang et al., 2020). On the other hand, the findings of a study on the development of mental disorders during corona disease in medical students of Hamadan University have

shown that the occurrence of psychological complications such as depression and anxiety during corona disease pandemic are very common among students and thus Planning to intervene in this vulnerable group is essential to reduce the consequences of mental disorders (Miri et al., 2021). Research on students at a university in Bangladesh during the Corona epidemic also showed that Covid-19 increased depression in students and they suffered from severe depression (Islam et al., 2020). Findings from a study on the effects of Covid-19 on the mental health of students in Poland also showed that students showed high levels of depression during the Covid19 pandemic. Interestingly, female students had higher levels of depression than male students (Debowska et al., 2020). Studies of the effects of the prevalence of Covid-19 on the incidence of mental disorders in students in Switzerland found that more than a quarter of students in the country suffer from depressive symptoms (Volken et al., 2021). The findings of another study examining the effects of quarantine due to the Covid-19 epidemic on 1,000 students in Greece showed that the corona and quarantine epidemics caused a significant increase in depression among students (Kaparounaki et al., 2020). The results of studies conducted in African countries, including Egypt, on university students showed that the prevalence of corona disease has significant negative effects on students' mental health and the percentage of depression in students has increased significantly (Ghazawy et al., 2021). In a study of university students in France, the results showed that although students experienced some degree of depression before the outbreak of the corona virus, the prevalence of the disease increased depression among them (Le Vigouroux et al., 2021). Studies of 619 university students in India between the ages of 19 and 25 also showed that the prevalence of corona disease caused moderate to severe depressive symptoms in university students (Gecaite-Stonciene et al., 2021). Findings from a study of 501 students in Italy, the first European country to quarantine due to the outbreak of the coronavirus, showed that the outbreak of coronavirus has exposed students to stress and that depression has increased significantly (Villani et al., 2021). Also, the results of studies conducted on 2349 university students comparatively between 9 countries of Colombia, Czech Republic, Germany, Israel, Poland, Russia, Slovenia, Turkey and Ukraine showed that the highest rate of depression due to the prevalence of corona disease is in Turkey and low The highest rate of depression is in the Czech Republic (Ochnik et al., 2021).

Some studies also show a lack of significant effect of corona disease outbreak on the incidence of depression in students, so that the findings of a study on 1135 students at a university in Brazil showed that in the early months of quarantine, the prevalence of Covid-19 had a direct and significant effect has not caused depression (Amaral-Prado et al., 2020). Also, a study of 500 students in internship and internship through Beck Anxiety Questionnaire and Beck Depression Inventory online at Tehran University of Medical Sciences showed that depression and anxiety in students before and after the Covid-19 pandemic were not significantly different (Nakhostin-Ansari et al., 2020). Overall, the findings indicate that significant effects of corona outbreak on the incidence of depression among students in different countries depending on the severity of the prevalence of Covid-19, the duration of quarantine and social constraints, and cultural and social differences between different communities.

Studies have shown that the prevalence of corona disease causes a significant increase in depression in students around the world, and this is important in terms of mental health,

academic and career advancement. In this regard, the results of a study on the psychological effects of the Covid-19 pandemic among university students in southwestern Ethiopia as a cross-sectional study indicate that 322 students participating in this study showed a high prevalence of depression. (Aylie et al., 2020) Therefore, it seems that the incidence of depression in students during the Covid-19 pandemic depends on various family, economic and social factors. Also, the prevalence and prediction of anxiety, depression and stress among university students in the first quarantine period in Germany showed that out of 2548 students participating in this study, 35.9% of them had moderate to severe levels of depression (Karing, 2021) This also indicates that a significant proportion of students have not been negatively affected by the Covid-19 pandemic, which may be due to the shorter quarantine period or more social and family support for the majority of students. Also, a study on students in quarantine conditions and psychological and social effects and strategies to deal with Covid-19 cross-sectionally in Egypt on 612 students using the loneliness questionnaire (UCLA), the third version of the stress-anxiety-depression questionnaire (DASS-21) and Coping Preference Questionnaire (COPE) showed that students are prone to mental problems during the corona disease epidemic and the epidemic of this disease has a significant impact on students so that 74.5% of them have a degree of Depression (El-Monshed et al., 2021), which shows that, unlike in European countries, in underdeveloped societies, the prevalence of Covid-19 on the incidence of depression in students is much higher, and this in itself can be a serious and long-term threat to mental health. Also study the psychological effects of the Covid-19 outbreak and quarantine among students and university staff in Spain on 2,530 people in the first week of quarantine due to corona disease using the Stress-Anxiety-Depression Inventory (DASS- 21) has shown that students experience a high level of depression.

Depression is more common in the humanities and arts than in engineering and architecture (Odriozola-González et al., 2020). This suggests that students in different disciplines are likely to be affected differently by the Covid-19 pandemic, and therefore the method of therapeutic intervention and support for students in different disciplines should be considered differently.

In the research conducted by Larestan Higher Complex, the status of students' academic achievement during the corona period has been examined. The average scores of 529 undergraduate students in the face-to-face exams of the first semester and the virtual exams of the second semester of 2019-2020 (before and after Covid 19) have been compared with each other. The computer software was SPSS and the findings were expressed according to the results of T-test.

Students' GPA in the fields of psychology in the online semester compared to the in- person semester had a decrease of 0.83, which is significant at the level of 0.0001. Students' GPA in urban engineering and computer science in the online exams has increased significantly.

Students' GPA in the fields of industrial engineering, mechanical engineering, electrical engineering and chemical engineering did not show a significant difference.

Conclusion: It seems that in the field of psychology, which is a sub-branch of the humanities, learning requires participation in the discussion, due to the passivity of virtual education has suffered losses and in the field of urban planning and computer, it seems that due to the existing problems, more negligence has been done by professors, which has led to an

increase in students' GPA (Gholami et al., 2021).

The study of stress, anxiety, depression and sleep disorders in medical students of Hamadan University of Medical Sciences during the Covid-19 epidemic showed a high prevalence of mental and psychological complications such as depression and anxiety during the epidemic of this disease. The Standard Stress-Anxiety-Depression Inventory (DAAS) and Item Insomnia Severity Index-7 on 257 students online indicated that early interventions are important to maintain the mental health of this vulnerable group (Miri et al., 2021). Depression and anxiety among students during the Covid-19 epidemic online in Bangladesh as a cross-sectional study using a standard questionnaire on 476 students showed that the disease epidemic increased student depression and they suffered from severe depression. Brand (Islam et al., 2020) and this indicates the weak impact and economic strength of communities on the severity of mental disorders during epidemics. On the other hand, a study on stress, depression, anxiety and suicide in the early stages of the Covid-19 pandemic in Polish University students showed that students showed high levels of depression during the Covid-19 epidemic, especially female students. They had a higher score in depression than boys, while students aged 18 to 24 years showed higher rates of depression than students aged 25 years and older (Debowska et al., 2020). Thus, this study shows that gender and age group are also very effective in the incidence of depression in students. Research on the factors affecting depression and mental disorders related to Covid-19 among Chinese university students online and cross-sectionals shows the prevalence of psychological problems and depression among students so that they have shown mild to severe depression. (Yu et al., 2021) As well as the effect of the Covid-19 epidemic on the mental health of Italian university students, the results showed that students with moderate to severe levels had depressive symptoms (Di Consiglio et al., 2021) and these cases indicate that depending on genetic predisposition, the condition Family, economic level and emotional support of students, the severity of depression varies in them. A study of the positive role of peer emotional support and the experience of depressive symptoms during the Covid-19 epidemic on 255 students online at Hong Kong University showed that students showed high symptoms of depression during the epidemic, but support Emotional has played an effective role in reducing the incidence of depressive symptoms among students (Sun et al., 2020).

In contrast to the research findings that indicate the profound negative impact of the Covid-19 epidemic on the incidence of mental disorders in students, some research findings indicate the lack of significant effect of the Covid-19 epidemic on the incidence of mental disorders, especially depression among students. In this regard, the results of a study on the effect of restrictions on psycho-social behaviors caused by Covid-19 among Brazilian academics indicate that in the early months of quarantine, the prevalence of Covid-19 did not have a direct and significant effect on depression. (Amaral-Prado et al., 2020). Also, research on 500 students in internships and internships through Beck Anxiety Questionnaire and Beck Depression Inventory online at Tehran University of Medical Sciences showed that depression and anxiety in students before and after the pandemic were not significantly different (Nakhostin-Ansari et al., 2020) This may be due to the fact that some of the academics who were involved in medical activities during the Covid-19 epidemic and did not have work restrictions were less likely to suffer from mental disorders. On the other hand, factors such as field of study, gender and age

(Xie et al., 2020; Jing et al., 2021) also play an important role in the occurrence of mental disorders in students during the Covid-19 epidemic. On the other hand, because students are not able to attend university during the corona outbreak, this has in some cases delayed their graduation, as well as social distance and staying at home has not only reduced social interactions with peers but also caused spending a lot of time with family members, which increases the likelihood of conflict with family members (Luo et al., 2021), and these cases are generally effective in causing mental disorders. On the other hand, students who have been studying in another country during the Covid-19 epidemic should be left completely alone away from home, and as a result, with social withdrawal, the possibility of depressive symptoms among these students is increased (Nomura et al., 2021).

The complications and conflicts that arose in university education during the Covid-19 pandemic in Iran and the rest of the world were studied and analyzed in 29 items. In today's world, distance learning has many advantages, but on the other hand, due to the absence of students and lack of exchange with each other, management methods must be applied that can improve the results of education in times of crisis such as Covid-19 (Gharari et al., 2021).

4 Conclusion

Overall, the results of this study showed that the prevalence of corona disease can be significantly effective in the incidence of depression in students. According to the study of the incidence of depression associated with the prevalence of Covid-19 in university students in different countries, the results indicate that the incidence of mental disorders associated with the prevalence of Covid-19 in different countries is significantly different and this rate in underdeveloped countries is significantly more than developed countries, and if the authorities of underdeveloped countries do not pay attention and plan to prevent and treat students' mental disorders, the consequences can seriously endanger the future of these countries. On the other hand, the incidence of mental disorders in students is completely different according to their field of study, age and gender, and their economic and social level, and therefore, these factors should be considered in planning social and medical support.

Resistance to adversity, community support and optimism have a major impact on student anxiety, and should be considered by psychologists in order to reduce the adverse effects of Covid-19 (Eyni et al., 2020).

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Conflict of interests

The authors state that there are no conflicts of interests regarding the publication of this article.

References

- Alyami, H. S., Naser, A. Y., Dahmash, E. Z., Alyami, M. H., & Alyami, M. S. (2021). Depression and anxiety during the COVID-19 pandemic in Saudi Arabia: a cross-sectional study. *International Journal of Clinical Practice*, 75(7), e14244. <https://doi.org/10.1111/ijcp.14244>
- Amaral-Prado, H. M., Borghi, F., Mello, T. M. V. F., & Grassi-Kassisse, D. M. (2021). The impact of confinement in the psychosocial behaviour due COVID-19 among members of a Brazilian university. *International Journal of Social Psychiatry*, 67(6), 720-727. <https://doi.org/10.1177/0020764020971318>
- Aylie, N. S., Mekonen, M. A., & Mekuria, R. M. (2020). The psychological impacts of COVID-19 pandemic among university students in Bench-Sheko Zone, South-west Ethiopia: a community-based cross-sectional study. *Psychology Research and Behavior Management*, 13, 813. doi: 10.2147/PRBM.S275593
- Bäuerle, A., Teufel, M., Musche, V., Weismüller, B., Kohler, H., Hetkamp, M., Dörrie, N., Schweda, A., & Skoda, E. M. (2020). Increased generalized anxiety, depression and distress during the COVID-19 pandemic: a cross-sectional study in Germany. *Journal of Public Health*, 42(4), 672-678. <https://doi.org/10.1093/pubmed/fdaa106>
- Benros, M. E., Waltoft, B. L., Nordentoft, M., Østergaard, S. D., Eaton, W. W., Krogh, J., & Mortensen, P. B. (2013). Autoimmune diseases and severe infections as risk factors for mood disorders: a nationwide study. *JAMA Psychiatry*, 70(8), 812-820. doi: 10.1001/jamapsychiatry.2013.1111
- Brietzke, E., Magee, T., Freire, R. C., Gomes, F. A., & Milev, R. (2020). Three insights on psychoneuroimmunology of mood disorders to be taken from the COVID-19 pandemic. *Brain, Behavior, & Immunity-Health*, 5, 100076. <https://doi.org/10.1016/j.bbih.2020.100076>
- Chakraborty, I., & Maity, P. (2020). COVID-19 outbreak: Migration, effects on society, global environment and prevention. *Science of the Total Environment*, 728, 138882. <https://doi.org/10.1016/j.scitotenv.2020.138882>

- Chen, B., Liang, H., Yuan, X., Hu, Y., Xu, M., Zhao, Y., Zhang, B., Tian, F., & Zhu, X. (2020). Roles of meteorological conditions in COVID-19 transmission on a worldwide scale. *MedRxiv*. doi: <https://doi.org/10.1101/2020.03.16.20037168>
- Chew, Q. H., Wei, K. C., Vasoo, S., Chua, H. C., & Sim, K. (2020). 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*, 61(7), 350. doi: 10.11622/smedj.2020046
- Chong, L. W., Hsu, C. C., Lee, C. Y., Chou, R. H., Lin, C. L., Chang, K. H., & Hsu, Y. C. (2018). Association of viral hepatitis and bipolar disorder: a nationwide population-based study. *Journal of Translational Medicine*, 16(1), 1-10. doi: 10.1186/s12967-018-1542-3
- Ciotti, M., Angeletti, S., Minieri, M., Giovannetti, M., Benvenuto, D., Pascarella, S., Sagnelli, C., Bianchi, M., Bernardini, S., & Ciccozzi, M. (2019). COVID-19 outbreak: an overview. *Chemotherapy*, 64(5-6), 215-223. <https://doi.org/10.1159/000507423>
- Colle, R., Masson, P., Verstuyft, C., Fève, B., Werner, E., Boursier-Neyret, C., Walther, B., David, D. J., Boniface, B., Falissard, B., Chanson, P., Corruble, E., & Becquemont, L. (2020). Peripheral tryptophan, serotonin, kynurenine, and their metabolites in major depression: A case-control study. *Psychiatry and Clinical Neurosciences*, 74(2), 112-117. <https://doi.org/10.1111/pcn.12944>
- Cruwys, T., Dingle, G. A., Haslam, C., Haslam, S. A., Jetten, J., & Morton, T. A. (2013). Social group memberships protect against future depression, alleviate depression symptoms and prevent depression relapse. *Social Science & Medicine*, 98, 179-186. <https://doi.org/10.1016/j.socscimed.2013.09.013>
- Daly, M., Sutin, A. R., & Robinson, E. (2021). Depression reported by US adults in 2017–2018 and March and April 2020. *Journal of Affective Disorders*, 278, 131-135. <https://doi.org/10.1016/j.jad.2020.09.065>
- Debowska, A., Horeczy, B., Boduszek, D., & Dolinski, D. (2020). A repeated cross-sectional survey assessing university students' stress, depression, anxiety, and suicidality in the early stages of the COVID-19 pandemic in Poland. *Psychological Medicine*, 1-4. doi: 10.1017/S003329172000392X
- Depression, W. H. O. (2017). Other common mental disorders: global health estimates. *Geneva: World Health Organization*, 24.
- Dhar, B. K., Ayithey, F. K., & Sarkar, S. M. (2020). Impact of COVID-19 on psychology among the university students. *Global Challenges*, 4(11), 2000038. <https://doi.org/10.1002/gch2.202000038>

- Di Consiglio, M., Merola, S., Pascucci, T., Violani, C., & Couyoumdjian, A. (2021). The impact of COVID-19 pandemic on Italian university students' mental health: changes across the waves. *International Journal of Environmental Research and Public Health*, 18(18), 9897. <https://doi.org/10.3390/ijerph18189897>
- Eisenberg, D., Gollust, S. E., Golberstein, E., & Hefner, J. L. (2007). Prevalence and correlates of depression, anxiety, and suicidality among university students. *American Journal of Orthopsychiatry*, 77(4), 534-542. <https://doi.org/10.1037/0002-9432.77.4.534>
- El-Monshed, A. H., El-Adl, A. A., Ali, A. S., & Loutfy, A. (2021). University students under lockdown, the psychosocial effects and coping strategies during COVID-19 pandemic: a cross sectional study in Egypt. *Journal of American College Health*, 1-12. <https://doi.org/10.1080/07448481.2021.1891086>
- Eyni, S., Ebadi, M., & Torabi, N. (2020). Developing a model of corona anxiety in students based on optimism and resilience: The mediating role of the perceived social support. *Counseling Culture and Psychotherapy*, 11(43), 1-32. doi: 10.22054/QCCPC.2020.51656.2376
- Fardin, M. A. (2020). COVID-19 and anxiety: A review of psychological impacts of infectious disease outbreaks. *Arch Clin Infect Dis*, 15(COVID-19), 1. doi: 10.5812/archcid.102779
- Fathi, A., Sharifirahmo, S., Rostami, H., & Abbasikasani, H. (2020). Prediction of Computer Voyeurism and Stigma of the First Wave of the Coronavirus Disease-2019 Pandemic based on the Dimensions of Internet Addiction among Youth. *Avicenna Journal of Clinical Medicine*, 27(2), 124-132. doi: 10.29252/ajcm.27.2.124
- Fiest, K. M., Parsons Leigh, J., Krewulak, K. D., Plotnikoff, K. M., Kemp, L. G., Ng-Kamstra, J., & Stelfox, H. T. (2021). Experiences and management of physician psychological symptoms during infectious disease outbreaks: a rapid review. *BMC Psychiatry*, 21(1), 1-14. doi: 10.1186/s12888-021-03090-9
- Fukase, Y., Ichikura, K., Murase, H., & Tagaya, H. (2021). Depression, risk factors, and coping strategies in the context of social dislocations resulting from the second wave of COVID-19 in Japan. *BMC Psychiatry*, 21(1), 1-9. doi: 10.1186/s12888-021-03047-y
- Gale, S. D., Berrett, A. N., Erickson, L. D., Brown, B. L., & Hedges, D. W. (2018). Association between virus exposure and depression in US adults. *Psychiatry Research*, 261, 73-79. <https://doi.org/10.1016/j.psychres.2017.12.037>
- Gao, K., & Zhang, J. (2021). Depression, anxiety, and quality of life. In *The Neuroscience of Depression* (pp. 415-424). Academic Press. <https://doi.org/10.1016/B978-0-12-817935-2.00016-7>

- Gecaite-Stonciene, J., Saudargiene, A., Pranckeviciene, A., Liaugaudaite, V., Griskova-Bulanova, I., Simkute, D., Naginiene, R., Dainauskas, L. L., Ceidaite, G., & Burkauskas, J. (2021). Impulsivity mediates associations between problematic internet use, anxiety, and depressive symptoms in students: a cross-sectional COVID-19 study. *Frontiers in Psychiatry, 12*, 17. <https://doi.org/10.3389/fpsy.2021.634464>
- Gharari, M., Mohammadi, R., & Ghorbani, M. (2021). Investigating the Damages and Challenges of Coronavirus Pandemic on Education. *Iranian Journal of Epidemiology, 16*(5), 29-37. URL: <http://irje.tums.ac.ir/article-1-6914-en.html>
- Ghazawy, E. R., Ewis, A. A., Mahfouz, E. M., Khalil, D. M., Arafa, A., Mohammed, Z., Mohammed, E. N. F., Hassan, E. E., Hamid, S. A., Ewis, S. A., & Mohammed, A. E. N. S. (2021). Psychological impacts of COVID-19 pandemic on the university students in Egypt. *Health Promotion International, 36*(4), 1116-1125. <https://doi.org/10.1093/heapro/daaa147>
- Gholami, S., Talezadeh, L. A., & Nejati, J. M. (2021). Assessing the academic achievement of students during the corona pandemic; *First National Congress of University and Covid - 19- Tehran. Sharif University of Technology Counseling and Psychological Services.*
- Gonda, X., & Petschner, P. (2021). Genes, depression, and nuclear DNA. In *The Neuroscience of Depression* (pp. 15-23). Academic Press. <https://doi.org/10.1016/B978-0-12-817935-2.00040-4>
- Hossain, M. (2021). The effect of the Covid-19 on sharing economy activities. *Journal of Cleaner Production, 280*, 124782. <https://doi.org/10.1016/j.jclepro.2020.124782>
- Hosseini, S. E., Pooyan, M., Valizadeh, A., & Moradi, A. (2019). Dynamic Modeling of the Effectiveness of Third Wave Cognitive Behavioral Therapy and Antidepressants Drugs on Major Depressive Disorder. *Journal of Research in Psychological Health, 12*(4), 16-27. doi: 10.52547/rph.12.4.16
- Islam, M. A., Barna, S. D., Raihan, H., Khan, M. N. A., & Hossain, M. T. (2020). Depression and anxiety among university students during the COVID-19 pandemic in Bangladesh: A web-based cross-sectional survey. *PloS One, 15*(8), e0238162. <https://doi.org/10.1371/journal.pone.0238162>
- Izadi tameh, A., Naderi far, M., Naderi far, A., & Nikbakht, R. (2014). Depression in patients with diabetes: A review article. *Journal of Diabetes Nursing, 2*(2), 77-83. URL: <http://jdn.zbmu.ac.ir/article-1-73-en.html>
- Jadoo, S. A. A. (2020). COVID-19 pandemic is a worldwide typical biopsychosocial crisis. *Journal of Ideas in Health, 3*(2), 152-154. doi: 10.47108/JIDHEALTH.VOL3.ISS2.58

- Jahangasht, K. (2020). Social stigma: the social consequences of COVID-19. *Journal of Marine Medicine*, 2(1), 59-60. doi: 10.30491/2.1.9
- Jin, J. M., Bai, P., He, W., Wu, F., Liu, X. F., Han, D. M., Liu, S., & Yang, J. K. (2020). Gender differences in patients with COVID-19: focus on severity and mortality. *Frontiers in Public Health*, 152. <https://doi.org/10.3389/fpubh.2020.00152>
- Jing, Y., Han, W., Wang, Y., Zhang, J., Qin, W., Jing, X., Niu, A., & Xu, L. (2021). Network-Based Online Survey Exploring Self-Reported Depression Among University and College Students During the Early Days of the COVID-19 Outbreak. *Frontiers in Psychiatry*, 12, 595. <https://doi.org/10.3389/fpsy.2021.658388>
- Kaparounaki, C. K., Patsali, M. E., Mousa, D. P. V., Papadopoulou, E. V., Papadopoulou, K. K., & Fountoulakis, K. N. (2020). University students' mental health amidst the COVID-19 quarantine in Greece. *Psychiatry Research*, 290, 113111. <https://doi.org/10.1016/j.psychres.2020.113111>
- Karing, C. (2021). Prevalence and predictors of anxiety, depression and stress among university students during the period of the first lockdown in Germany. *Journal of Affective Disorders Reports*, 5, 100174. <https://doi.org/10.1016/j.jadr.2021.100174>
- Kazemi-Karyani, A., Safari-Faramani, R., Amini, S., Ramezani-Doroh, V., Berenjian, F., Dizaj, M. Y., Hashempour, R., & Dizaj, J. Y. (2020). World one-hundred days after COVID-19 outbreak: Incidence, case fatality rate, and trend. *Journal of Education and Health Promotion*, 9. doi: 10.4103/jehp.jehp_483_20
- Khawar, M. B., Abbasi, M. H., Hussain, S., Riaz, M., Rafiq, M., Mehmood, R., Sheikh, N., Amaan, H. N., Fatima, S., Jabeen, F., Ahmad, Z., & Farooq, A. (2021). Psychological impacts of COVID-19 and satisfaction from online classes: disturbance in daily routine and prevalence of depression, stress, and anxiety among students of Pakistan. *Heliyon*, 7(5), e07030. <https://doi.org/10.1016/j.heliyon.2021.e07030>
- Khodabakhshi-koolae, A. (2020). Living in home quarantine: analyzing psychological experiences of college students during Covid-19 pandemic. *Journal of Military Medicine*, 22(2), 130-138. doi: 10.30491/JMM.22.1.1
- Kohls, E., Baldofski, S., Moeller, R., Klemm, S. L., & Rummel-Kluge, C. (2021). Mental health, social and emotional well-being, and perceived burdens of university students during COVID-19 pandemic lockdown in Germany. *Frontiers in Psychiatry*, 12, 441. <https://doi.org/10.3389/fpsy.2021.643957>

- Le Vigouroux, S., Goncalves, A., & Charbonnier, E. (2021). The psychological vulnerability of French university students to the COVID-19 confinement. *Health Education & Behavior, 48*(2), 123-131. <https://doi.org/10.1177/1090198120987128>
- Lechner, W. V., Laurene, K. R., Patel, S., Anderson, M., Grega, C., & Kenne, D. R. (2020). Changes in alcohol use as a function of psychological distress and social support following COVID-19 related University closings. *Addictive Behaviors, 110*, 106527. <https://doi.org/10.1016/j.addbeh.2020.106527>
- Lépine, J. P., & Briley, M. (2011). The increasing burden of depression. *Neuropsychiatric Disease and Treatment, 7*(Suppl 1), 3. doi: 10.2147/NDT.S19617
- Luo, W., Zhong, B. L., & Chiu, H. F. K. (2021). Prevalence of depressive symptoms among Chinese university students amid the COVID-19 pandemic: a systematic review and meta-analysis. *Epidemiology and Psychiatric Sciences, 30*. <https://doi.org/10.1017/S2045796021000202>
- Madabhavi, I., Sarkar, M., & Kadakol, N. (2020). COVID-19: a review. *Monaldi Archives for Chest Disease, 90*(2). <https://doi.org/10.4081/monaldi.2020.1298>
- Meo, S. A., Al-Khlaiwi, T., Usmani, A. M., Meo, A. S., Klonoff, D. C., & Hoang, T. D. (2020). Biological and epidemiological trends in the prevalence and mortality due to outbreaks of novel coronavirus COVID-19. *Journal of King Saud University-Science, 32*(4), 2495-2499. <https://doi.org/10.1016/j.jksus.2020.04.004>
- Miri, Z., Razavi, Z., & Mohammadi, S. (2021). Evaluation of Stress, Anxiety, Depression, and Sleep Disorders in Medical Students of Hamadan University of Medical Sciences, Iran, during the COVID-19 Pandemic. *Avicenna Journal of Clinical Medicine, 27*(4), 232-238. doi: 10.29252/ajcm.27.4.238
- Mohammadi, M., Keshavarzi, F., Naseri Jahromi, R., Mirqafari, F., Naseri Jahromi, R., Roosta, F., & Khosrozadeh, M. (2021). Experiences of post-graduate students of Shiraz University regarding online education during Covid-19 crisis: A phenomenological approach. *Educational Development of Judishapur, 12*(1), 281-295.
- Mohammadkhanizadeh, A., & Nikbakht, F. (2021). Investigating the potential mechanisms of depression induced-by COVID-19 infection in patients. *Journal of Clinical Neuroscience, 91*, 283-287. <https://doi.org/10.1016/j.jocn.2021.07.023>
- Mohammed, A., Sheikh, T. L., Gidado, S., Poggensee, G., Nguku, P., Olayinka, A., Oluabunwo, C., Waziri, N., Shuaib, F., Adeyemi, J., Uzoma, O., Ahmed, A., Doherty, F., Nyanti, S. B., Nzuki, C. K., Nasidi, A., Oyemakinde, A., Oguntimehin, O., Abdus-salam, I. A., & Obiako, R. O. (2015). An evaluation of psychological distress and social support of survivors and

- contacts of Ebola virus disease infection and their relatives in Lagos, Nigeria: a cross sectional study– 2014. *BMC Public Health*, 15(1), 1-8. doi: 10.1186/s12889-015-2167-6
- Moore, K. A., & Lucas, J. J. (2021). COVID-19 distress and worries: The role of attitudes, social support, and positive coping during social isolation. *Psychology and Psychotherapy: Theory, Research and Practice*, 94(2), 365-370. doi: 10.1111/papt.12308
- Müller, N. (2014). Infectious diseases and mental health. *Comorbidity of Mental and Physical Disorders*, 99. <https://doi.org/10.1159/000365542>
- Nakhostin-Ansari, A., Sherafati, A., Aghajani, F., Khonji, M. S., Aghajani, R., & Shahmansouri, N. (2020). Depression and anxiety among Iranian medical students during COVID-19 pandemic. *Iranian Journal of Psychiatry*, 15(3), 228. doi: 10.18502/ijps.v15i3.3815
- Noble, R. E. (2005). Depression in women. *Metabolism*, 54(5), 49-52. <https://doi.org/10.1016/j.metabol.2005.01.014>
- Nomura, K., Minamizono, S., Maeda, E., Kim, R., Iwata, T., Hirayama, J., Ono, K., Fushimi, M., Goto, T., Mishima, K., & Yamamoto, F. (2021). Cross-sectional survey of depressive symptoms and suicide-related ideation at a Japanese national university during the COVID-19 stay-home order. *Environmental Health and Preventive Medicine*, 26(1), 1-9. doi: 10.1186/s12199-021-00953-1
- Noorbala, A. A., Fathi Ashtiani, A., Niknam, M. H., Emami Razavi, S. H., Ramezankhani, A., & Khayamzadeh, M. (2021). COVID-19 Epidemic and Mental Health, *Journal of Culture and health promotion (Academy of Medical Sciences of Islamic Republic of Iran)*, 4(4), 426-435.
- Ochnik, D., Rogowska, A. M., Kuśnierz, C., Jakubiak, M., Schütz, A., Held, M. J., Arzenšek, A., Benatov, J., Berger, R., Korchagina, E. V., Pavlova, I., Blažková, I., Konečná, Z., Aslan, I., Çinar, O., Cuero-Acosta, Y. A., & Wierzbik-Strońska, M. (2021). A comparison of depression and anxiety among university students in nine countries during the COVID-19 pandemic. *Journal of Clinical Medicine*, 10(13), 2882. <https://doi.org/10.3390/jcm10132882>
- Odrizola-González, P., Planchuelo-Gómez, Á., Irurtia, M. J., & de Luis-García, R. (2020). Psychological effects of the COVID-19 outbreak and lockdown among students and workers of a Spanish university. *Psychiatry Research*, 290, 113108. <https://doi.org/10.1016/j.psychres.2020.113108>
- Okusaga, O., Yolken, R. H., Langenberg, P., Lapidus, M., Arling, T. A., Dickerson, F. B., Scrandis, D. A., Severance, E., Cabassa, J. A., Balis, T., & Postolache, T. T. (2011). Association of seropositivity for influenza and coronaviruses with history of mood disorders and suicide attempts. *Journal of Affective Disorders*, 130(1-2), 220-225. <https://doi.org/10.1016/j.jad.2010.09.029>

- Paez, D., Gnanasegaran, G., Fanti, S., Bomanji, J., Hacker, M., Sathekge, M., Bom, H. S., Cerci, J. J., Chiti, A., Herrmann, K., Scott, A. M., Czernin, J., El-Haj, N., Estrada, E., Pellet, O., Orellana, P., Giammarile, F., & Abdel-Wahab, M. (2020). COVID-19 pandemic: guidance for nuclear medicine departments. *European Journal of Nuclear Medicine and Molecular Imaging*, 47(7), 1615-1619. doi: 10.1007/s00259-020-04825-8
- Ran, M. S., & Peng, M. M. (2021). Depression in disasters and traumatic events. In *The Neuroscience of Depression* (pp. 69-77). Academic Press. <https://doi.org/10.1016/B978-0-12-817933-8.00039-6>
- Richards, D. (2011). Prevalence and clinical course of depression: a review. *Clinical Psychology Review*, 31(7), 1117-1125. <https://doi.org/10.1016/j.cpr.2011.07.004>
- Saadeh, H., Saadeh, M., Almobaideen, W., Al Refaei, A., Shewaikani, N., Al Fayez, R. Q., Khawaldah, H., Abu-Shanab, S., & Al-Hussaini, M. (2021). Effect of COVID-19 quarantine on the sleep quality and the depressive symptom levels of university students in Jordan during the spring of 2020. *Frontiers in Psychiatry*, 12, 131. <https://doi.org/10.3389/fpsy.2021.605676>
- Salimi, R., Gomar, R., & Heshmati, B. (2020). The COVID-19 outbreak in Iran. *Journal of Global Health*, 10(1). doi: 10.7189/jogh.10.010365
- Saltzman, L. Y., Hansel, T. C., & Bordnick, P. S. (2020). Loneliness, isolation, and social support factors in post-COVID-19 mental health. *Psychological Trauma: Theory, Research, Practice, and Policy*, 12(S1), S55. <https://doi.org/10.1037/tra0000703>
- Shahyad, S., & Mohammadi, M. T. (2020). Psychological impacts of Covid-19 outbreak on mental health status of society individuals: a narrative review. *Journal of Military Medicine*, 22(2), 184-192. <https://doi.org/10.30491/JMM.22.2.184>
- Sherr, L., Clucas, C., Harding, R., Sibley, E., & Catalan, J. (2011). HIV and depression—a systematic review of interventions. *Psychology, Health & Medicine*, 16(5), 493-527. doi: 10.1080/13548506.2011.579990
- Shevlin, M., McBride, O., Murphy, J., Miller, J. G., Hartman, T. K., Levita, L., Mason, L., Martinez, A. P., McKay, R., Stocks, T., Bennett, K. M., Hyland, P., Karatzias, T., & Bentall, R. P. (2020). Anxiety, depression, traumatic stress and COVID-19-related anxiety in the UK general population during the COVID-19 pandemic. *BJPsych Open*, 6(6). doi: <https://doi.org/10.1192/bjo.2020.109>
- Shrestha, N., Shad, M. Y., Ulvi, O., Khan, M. H., Karamehic-Muratovic, A., Nguyen, U., Baghbanzadeh, M., Wardrup, R., Aghamohammadi, N., Cervantes, D., Nahiduzzaman, K.

- M., Zaki, R. A., & Haque, U. (2020). The impact of COVID-19 on globalization. *One Health, 11*, 100180. <https://doi.org/10.1016/j.onehlt.2020.100180>
- Stamu-O'Brien, C., Carniciu, S., Halvorsen, E., & Jafferany, M. (2020). Psychological aspects of COVID-19. *Journal of Cosmetic Dermatology, 19*(9), 2169-2173. doi: 10.1111/jocd.13601
- Sun, Y., Lin, S. Y., & Chung, K. K. H. (2020). University students' perceived peer support and experienced depressive symptoms during the COVID-19 pandemic: The mediating role of emotional well-being. *International Journal of Environmental Research and Public Health, 17*(24), 9308. <https://doi.org/10.3390/ijerph17249308>
- Tang, W., Hu, T., Hu, B., Jin, C., Wang, G., Xie, C., Chen, S., & Xu, J. (2020). Prevalence and correlates of PTSD and depressive symptoms one month after the outbreak of the COVID-19 epidemic in a sample of home-quarantined Chinese university students. *Journal of Affective Disorders, 274*, 1-7. <https://doi.org/10.1016/j.jad.2020.05.009>
- Thapar, A., Collishaw, S., Pine, D. S., & Thapar, A. K. (2012). Depression in adolescence. *The Lancet, 379*(9820), 1056-1067. [https://doi.org/10.1016/S0140-6736\(11\)60871-4](https://doi.org/10.1016/S0140-6736(11)60871-4)
- Thomas, J., Barbato, M., Verlinden, M., Gaspar, C., Moussa, M., Ghorayeb, J., Menon, A., Figueiras, M. J., Arora, T., & Bentall, R. P. (2020). Psychosocial correlates of depression and anxiety in the United Arab Emirates during the COVID-19 pandemic. *Frontiers in Psychiatry, 11*, 564172. <https://doi.org/10.3389/fpsy.2020.564172>
- Velavan, T. P., & Meyer, C. G. (2020). The COVID-19 epidemic. *Tropical Medicine & International Health, 25*(3), 278. doi: 10.1111/tmi.13383
- Villani, L., Pastorino, R., Molinari, E., Anelli, F., Ricciardi, W., Graffigna, G., & Boccia, S. (2021). Impact of the COVID-19 pandemic on psychological well-being of students in an Italian university: a web-based cross-sectional survey. *Globalization and Health, 17*(1), 1-14. doi: 10.1186/s12992-021-00680-w
- Volken, T., Zysset, A., Amendola, S., Klein Swormink, A., Huber, M., von Wyl, A., & Dratva, J. (2021). Depressive symptoms in Swiss university students during the COVID-19 pandemic and its correlates. *International Journal of Environmental Research and Public Health, 18*(4), 1458. <https://doi.org/10.3390/ijerph18041458>
- Wenham, C., Smith, J., & Morgan, R. (2020). COVID-19: the gendered impacts of the outbreak. *The Lancet, 395*(10227), 846-848. [https://doi.org/10.1016/S0140-6736\(20\)30526-2](https://doi.org/10.1016/S0140-6736(20)30526-2)
- Xie, L., Luo, H., Li, M., Ge, W., Xing, B., & Miao, Q. (2020). The immediate psychological effects of Coronavirus Disease 2019 on medical and non-medical students in China. *International Journal of Public Health, 65*(8), 1445-1453. doi: 10.1007/s00038-020-01475-3

- Xu, B., Gutierrez, B., Mekaru, S., Sewalk, K., Goodwin, L., Loskill, A., Cohn, E. L., Hswen, Y., Hill, S. C., Cobo, M. M., Zarebski, A. E., Li, S., Wu, C. H., Hulland, E., Morgan, J. D., Wang, L., O'Brien, K., Scarpino, S. V., Brownstein, J. S., Pybus, O. G., Pigott, D. M., & Kraemer, M. U. (2020). Epidemiological data from the COVID-19 outbreak, real-time case information. *Scientific Data*, 7(1), 106. <https://doi.org/10.1038/s41597-020-0448-0>
- Yu, Y., She, R., Luo, S., Xin, M., Li, L., Wang, S., Ma, L., Tao, F., Zhang, J., Zhao, J., Li, L., Hu, D., Zhang, G., Gu, J., Lin, D., Wang, H., Cai, Y., Wang, Z., You, H., Hu, G., & Lau, J. T. F. (2021). Factors influencing depression and mental distress related to COVID-19 among university students in China: online cross-sectional mediation study. *JMIR Mental Health*, 8(2), e22705. doi: 10.2196/22705
- Yuan, B., Li, W., Liu, H., Cai, X., Song, S., Zhao, J., Hu, X., Li, Z., Chen, Y., Zhang, K., Liu, Z., Peng, J., Wang, C., Wang, J., & An, Y. (2020). Correlation between immune response and self-reported depression during convalescence from COVID-19. *Brain, Behavior, and Immunity*, 88, 39-43. <https://doi.org/10.1016/j.bbi.2020.05.062>
- Yuki, K., Fujiogi, M., & Koutsogiannaki, S. (2020). COVID-19 pathophysiology: A review. *Clinical Immunology*, 215, 108427. <https://doi.org/10.1016/j.clim.2020.108427>
- Zalar, B., Haslberger, A., & Peterlin, B. (2018). The role of microbiota in depression-a brief review. *Psychiatria Danubina*, 30(2), 136-141. <https://doi.org/10.24869/psyd.2018.136>
- Zhang, X., Shi, X., Wang, Y., Jing, H., Zhai, Q., Li, K., Zhao, D., Zhong, S., Song, Y., Zhang, F., & Bao, Y. (2021). Risk Factors of Psychological Responses of Chinese University Students During the COVID-19 Outbreak: Cross-sectional Web-Based Survey Study. *Journal of Medical Internet Research*, 23(7), e29312. doi: 10.2196/29312
- Zhou, J., Zogan, H., Yang, S., Jameel, S., Xu, G., & Chen, F. (2021). Detecting community depression dynamics due to covid-19 pandemic in australia. *IEEE Transactions on Computational Social Systems*, 8(4), 982-991. doi: 10.1109/TCSS.2020.3047604
- Żmudzka, E., Sałaciak, K., Sapa, J., & Pytka, K. (2018). Serotonin receptors in depression and anxiety: Insights from animal studies. *Life Sciences*, 210, 106-124. <https://doi.org/10.1016/j.lfs.2018.08.050>