



Investigating the Prevalence of Depression, Anxiety, Stress, and Worry, and Its Relationship with the Academic Performance of Medical Students During the COVID-19 Pandemic in Iran

Abdolreza Gilavand ^{1,*}, Behnoosh Khoshouie² and Samaneh Mohamadpour³

¹Department of Medical Education, School of Medicine, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

²Department of Community Medicine, School of Medicine, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

³Department of Psychiatry, School of Medicine, Golestan Hospital, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

*Corresponding author: Department of Medical Education, School of Medicine, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran. Email: gilavand_a@ajums.ac.ir

Received 2023 May 20; Revised 2023 June 12; Accepted 2023 June 14.

Abstract

Background: Students' academic performance and university output can be affected by mental health.

Objectives: The present study aimed to investigate the prevalence of depression, anxiety, stress, and worry and its relationship with the academic performance of medical students during the coronavirus disease 2019 (COVID-19) pandemic in Iran.

Methods: In this descriptive-correlational research, 261 medical students participated in Iran. The standard Depression, Anxiety, and Stress Scale (DASS-21) and the Pennsylvania Standard Worry Questionnaire (PSWQ) were used to collect data. Similarly, students' grade point averages (GPAs) were considered an indicator of their academic performance. The statistical analysis was carried out using IBM's Statistical Package for Social Sciences (SPSS) software version 25.0. The level of statistical significance was reported at $P < 0.05$.

Results: The prevalence of students' worry, depression, anxiety, and stress (moderate to severe levels) was 93.5%, 75.1%, 71.6%, and 50.2%, respectively, revealing the tremendous negative impact of the COVID-19 pandemic on students' mental health. Likewise, there was an inverse relationship between students' anxiety and GPAs. So with the increased anxiety, the students' GPAs decreased. There was a significant relationship between the prevalence of worry, stress, depression, and anxiety among students and their employment, and it was found that employed students had better mental health.

Conclusions: The students' mental health was unfavorable, threatening their academic performance. The current research offers valuable information to parents, educators, and other stakeholders. Consequently, a combination of efforts by the government, universities, and families or communities is needed to reduce the harmful and destructive effects on students' mental health. Indeed, the harmful consequences of this prolonged epidemic require further investigations in the future.

Keywords: Depression, Anxiety, Stress, Worry, Academic Performance, Coronavirus Disease 2019

1. Background

The coronavirus disease 2019 (COVID-19) pandemic and its consequences led to fear, worry, and anxiety worldwide, as it is known as one of the significant challenges of this century (1). Many countries applied various restrictions such as social distancing, quarantine, limiting the transportation system, and closing public spaces to prevent the COVID-19 virus spread (2). The education sectors, particularly universities, were not immune to this fact; therefore, they transformed the conventional education system and replaced traditional education with online education (3). In a systematic review, Xiong et al. reported a comparatively high rate of symptoms of depression, stress, and psychological

distress during the COVID-19 pandemic in China, Spain, Italy, Iran, the United States, Turkey, Nepal, and Denmark (4). Besides, numerous studies have reported the negative effects of the COVID-19 epidemic on students' mental health in several countries, including the United States, China, France, Germany, South Africa, Poland, Pakistan, Oman, Russia, Slovenia, Ukraine, and the Czech Republic (5-12). Severe COVID-19 can cause chronic physical and mental complications in patients (8, 9). Medical jobs are among high-stress jobs, and doctors and medical students are exposed to all kinds of stress and psychological harms caused by their job, so some studies have revealed a higher prevalence of symptoms of psychological harm in medical students than in the general population or other

fields of study (13). In Iran, the healthcare service system and the medical education system are integrated, and medical students, from the third year of study onward, are primarily engaged in studying and treating patients in educational hospitals under the supervision of their professors (14). The researchers mainly consider students' academic performance as an appropriate criterion for assessing the achievements of universities, and students' mental health can play a significant role in achieving these goals (8, 10). Altering the educational system and its fast transition to online education, the lack of preparation of students and the educational system, and imposing some restrictions and preventive measures to stop the COVID-19 virus spread in universities lead to stress that may affect students' academic performance, mental health, and social life.

2. Objectives

The current research scrutinized how the COVID-19 pandemic and some of the resulting restrictive policies have affected students' daily lives, particularly their personal and academic aspects. The authors inspected the role of students' mental health and its subsequent impacts on their academic performance.

3. Methods

3.1. Study Design and Setting

The current research is descriptive-correlational. Medical students of Ahvaz Jundishapur University of Medical Sciences, Iran studying in 2022, who at least one year had passed since their education ($n = 261$), participated in this research as a statistical population.

3.2. Participants

The sampling was performed using the convenience sampling method. The data were collected using self-reporting and completing the questionnaire. The questionnaires were provided to the students after obtaining their consent. In addition to the questionnaire, a guide sheet for filling out the questionnaire, a consent form, and how to use the information were also provided to the students. The inclusion criteria included studying as a professional doctorate student in medicine and willingness to participate in the study. The exclusion criteria included the unwillingness to participate in the study and not completing the questionnaires.

3.3. Measurement

In the current research, the standard Depression, Anxiety, and Stress Scale (DASS-21) and the Pennsylvania Standard Worry Questionnaire (PSWQ) were used to collect data. Likewise, the students' GPAs based on their self-declaration were taken into consideration as an indicator of their academic performance.

The standard DASS-21 contains 21 items with phrases related to the symptoms of negative emotions (depression, anxiety, and stress). The depression subscale comprises statements to measure dysphoria, hopelessness, devaluation, life-deprecation, lack of interest/involvement, anhedonia, and inertia. The anxiety subscale has expressions to evaluate autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxiety. The stress subscale includes expressions such as difficulty relaxing, nervous arousal, getting easily upset/agitated, irritable/over-reactive, and impatient. The psychometric evaluation of the Persian version of this questionnaire was carried out by Sahebi et al. in Iran (15).

The Pennsylvania Standardized Worry Questionnaire (PSWQ) is a 16-item self-report questionnaire to measure excessiveness, generality, and uncontrollable dimensions of worry. This questionnaire is a screening tool for generalized anxiety disorder (GAD). The questionnaire's questions are answered based on the Likert scale. The psychometric evaluation of the Persian version of this questionnaire was carried out by Dehshiri et al. in Iran (16).

3.4. Statistical Analysis

The statistical analysis was carried out using IBM's Statistical Package for Social Sciences (SPSS) software version 25.0 (Chicago, IL, United States). Percentage, mean, and Pearson's and Spearman's correlation tests were used. The level of statistical significance was reported at P -value < 0.05 .

3.5. Ethical Considerations

This research has been extracted from the thesis of a medical student (GP) approved by Ahvaz Jundishapur University of Medical Sciences (No. U-00247). This study was approved by the Ethics Committee of Ahvaz Jundishapur University of Medical Sciences (Code: [IR.AJUMS.REC.1400.571](#)). All participants provided written informed consent. All procedures were in accordance with the ethical standards of the responsible committee on human experimentation and the Helsinki Declaration.

Table 1. Examining the Prevalence of Worry, Stress, Depression, and Anxiety Among Students Separately (N = 261)

Situation	Frequency (%)
Worry	
Average	17 (6.5)
Abnormal	244 (93.5)
Total	261 (100.0)
Stress	
Average	130 (49.8)
Weak	40 (15.3)
Medium	43 (16.5)
Strong	23 (9.6)
Solid	23 (8.8)
Total	261 (100.0)
Depression	
Average	65 (24.9)
Weak	41 (15.7)
Medium	78 (29.9)
Strong	38 (14.6)
Solid	39 (14.9)
Total	261 (100.0)
Anxiety	
Average	74 (28.4)
Weak	20 (7.7)
Medium	77 (29.5)
Strong	26 (10.0)
Solid	64 (24.5)
Total	261 (100.0)

4. Results

According to the results of [Table 1](#), 6.5% of students had normal anxiety, and 93.5% had abnormal anxiety. Likewise, the stress level of 49.8% of students was average, 15.3% was weak, 16.5% was moderate, 9.6% was strong, and 8.8% was solid. Similarly, the depression level of 24.9% of students was average, 15.7% was weak, 29.9% was moderate, 14.6% was strong, and 14.9% was solid. Moreover, the anxiety level of 28.4% of students was average, 7.7% was weak, 29.5% was moderate, 10.0% was strong, and 24.5% was solid.

The mean and standard deviation of stress (16.90 ± 9.53), depression (16.34 ± 10.15), anxiety (13.33 ± 9.36), and worry (25.46 ± 9.69) were also obtained.

According to the results of [Table 2](#), Pearson's correlation test revealed a direct relationship among the main components of the research, i.e., students' worry, stress, depression, and anxiety.

Quantitatively, the limit of Pearson's correlation is 1, and the closer the correlation score is to 1, the more direct the relationship is. As each component increases, other components also increase.

Regarding the results of [Table 3](#), Spearman's test disclosed an inverse relationship between students' anxiety and their GPAs; as students' anxiety increases, their GPAs also decrease. However, the students' anxiety, stress, and depression were not significantly related to their GPAs. According to Spearman's test, the students' worry, stress, depression, and anxiety were not significantly related to their age.

According to [Table 4](#), Pearson's test disclosed a significant relationship between the prevalence of worry, stress, depression, and anxiety among students and their employment, and it was found that employed students had less worry, stress, depression, and anxiety ($P < 0.05$).

Table 2. The Relationship Among the Main Components of the Research (N = 261)

Variables	Stress	Depression	Anxiety	Worry
Stress				
Pearson correlation	1	0.807 ^a	0.776 ^a	0.677 ^a
P-value		0.000	0.000	0.000
N	261	261	261	261
Depression				
Pearson correlation	0.807 ^a	1	0.805 ^a	0.714 ^a
P-value	0.000		0.000	0.000
N	261	261	261	261
Anxiety				
Pearson correlation	0.776 ^a	0.805 ^a	1	0.689 ^a
P-value	0.000	0.000		0.000
N	261	261	261	261
Worry				
Pearson correlation	0.677 ^a	0.714 ^a	0.689 ^a	1
P-value	0.000	0.000	0.000	
N	261	261	261	261

^a Correlation is significant at the 0.01 level (2-tailed). There is a high correlation among the components.

There was a significant relationship between the prevalence of worry, stress, depression, and anxiety among students and their employment, and it was found that employed students had better mental health.

Other results of this research can be stated as follows:

The relationship of the main components of the research with other demographic characteristics of the students was also investigated using Pearson’s test, and the results revealed no significant difference between students’ worry (P = 0.59), stress (P = 0.65), depression (P = 0.31), and anxiety (P = 0.55) and their gender.

Similarly, there was no significant relationship between students’ worry (P = 0.36), stress (P = 0.17), depression (P = 0.66), and anxiety (P = 0.22) and their academic performance.

Besides, there was no significant relationship between students’ anxiety (P = 0.10), depression (P = 0.29), and stress (P = 0.17) and their infection with COVID-19. However, there was a significant relationship between students’ anxiety and their history of being infected with COVID-19 (P = 0.002).

Also, there was no significant relationship between students’ anxiety (P = 0.23), depression (P = 0.051), and stress (P = 0.22) and being indigenous. Nevertheless, there was a significant relationship between students’ anxiety and being indigenous (P = 0.002).

Likewise, there was no significant relationship

between students’ anxiety (P = 0.56), depression (P = 0.39), stress (P = 0.24), and a history of mental disorders. Nonetheless, students’ anxiety was significantly related to a history of mental disorders (P = 0.05).

5. Discussion

The notable results of the present research were as follows:

First: The prevalence of worry, depression, anxiety, and stress among students (moderate to severe levels) was 93.5%, 75.1%, 71.6%, and 50.2%, respectively, revealing that in the COVID-19 pandemic, students’ mental health state was not good.

Second: There was a direct relationship among the main components of the research, i.e., students’ worry, stress, depression, and anxiety.

Third: There was an inverse relationship between students’ anxiety and their GPAs (considered an indicator of their academic performance), so as students’ anxiety increased, their GPAs decreased. However, there was no significant relationship between students’ anxiety, stress, and depression and their GPAs.

Fourth: There was a significant relationship between the prevalence of worry, stress, depression, and anxiety among students and their employment, and it was found that employed students had better mental health.

Table 3. The Relationships of the Main Components of the Research with the Students' GPAs and Age (N = 261)

Spearman's rho	Stress	Depression	Anxiety	Worry	Mean	Age
Stress						
Correlation coefficient	1.000	0.776 ^b	0.722 ^b	0.628 ^b	- 0.091	- 0.008
P-value	.	0.000	0.000	0.000	0.144	0.898
N	261	261	261	261	260	261
Depression						
Correlation coefficient	0.776 ^b	1.000	0.780 ^b	0.682 ^b	- 0.104	- 0.011
P-value	0.000	.	0.000	0.000	0.093	0.859
N	261	261	261	261	260	261
Anxiety						
Correlation coefficient	0.722 ^b	0.780 ^b	1.000	0.674 ^b	- 0.145 ^a	- 0.024
P-value	0.000	0.000	.	0.000	0.020	0.705
N	261	261	261	261	260	261
Worry						
Correlation coefficient	0.628 ^b	0.682 ^b	0.674 ^b	1.000	- 0.095	- 0.001
P-value	0.000	0.000	0.000	.	0.125	0.986
N	261	261	261	261	260	261
mean						
Correlation coefficient	- 0.091	- 0.104	- 0.145 ^a	- 0.095	1.000	0.129 ^a
P-value	0.144	0.093	0.020	0.125	.	0.037
N	260	260	260	260	260	260
age						
Correlation coefficient	- 0.008	- 0.011	- 0.024	- 0.001	0.129 ^a	1.000
P-value	0.898	0.859	0.705	0.986	0.037	.
N	261	261	261	261	260	261

^a Correlation is significant at the 0.05 level (2-tailed).
^b Correlation is significant at the 0.01 level (2-tailed).

Table 4. The Relationship Between the Prevalence of Worry, Stress, Depression, and Anxiety Among Students and Their Employment

Being Employed	N	Mean ± SD	P-Value
Stress			0.00
No	185	13.78 ± 7.54	
Yes	76	24.50 ± 9.64	
Depression			0.00
No	185	12.92 ± 8.14	
Yes	76	24.66 ± 9.78	
Anxiety			0.00
No	185	10.43 ± 7.27	
Yes	76	20.36 ± 10.16	
Worry			0.00
No	185	23.17 ± 8.65	
Yes	76	31.04 ± 9.86	

Fifth: There was a significant relationship between students' anxiety and their history of being infected with COVID-19, a history of mental disorders, and being indigenous. So individuals suffering from COVID-19 had no mental disorder, and indigenous students had less anxiety.

Sixth: There was no significant relationship among other research components and variables.

By reviewing 30 articles in a systematic review, Conteh et al. evaluated and compared the prevalence of depression, anxiety, stress, and post-traumatic stress disorder (PTSD) among 1,477,923 Chinese students before and after the early stages of the COVID-19 pandemic. The results indicated a significant increase in mental disorders among students (17). Son et al. investigated the effect of COVID-19 on students' mental health in America, where 71% of students reported increased stress and anxiety due to the COVID-19 spread. In their study, the students mentioned fear and worry about their health and their loved ones, difficulty concentrating, disruption of sleep patterns, reduced social interactions due to quarantine and social distancing, and increased concern about academic performance as the most important factors (5). Ochnik et al. compared depression and anxiety among college students in 9 countries during the COVID-19 pandemic and found that the highest risk of depression and anxiety occurred in Turkey, the lowest depression in the Czech Republic, and the lowest anxiety in Germany, and that the roles of gender and cultural differences in increasing depression and anxiety were noticeable (12). Ma et al. investigated the impact of COVID-19 on students' mental health in China. In this study, symptoms of acute stress, anxiety, and depression were prevalent during the COVID-19 pandemic. Students stated factors such as fear of family members being infected, exposure to mass media, low social support, problems of old age, and previous mental health as influential factors in increasing their mental health problems (6). Wathelet et al. investigated the effect of COVID-19 on the mental health of students in France and observed a high prevalence of mental health issues among students who experienced quarantine (7). Browning et al. evaluated the impact of COVID-19 on students' mental health in the United States of America and showed that female or non-white Asian students those with lower economic levels or those who were in contact with individuals infected with COVID-19 suffered more emotional injuries than others (18).

The results of the above studies are consistent with the results of our research. Another result of our research was an inverse relationship between students' anxiety and their GPAs (considered an indicator of their academic performance), so the students' GPAs decreased

with increasing anxiety.

The results of Amendola et al.'s study entitled "A Longitudinal Study on Generalized Anxiety among University Students during the First Wave of the COVID-19 Pandemic in Switzerland" revealed that the student's scores significantly decreased compared to the beginning of the pandemic period, which is consistent with the results of our research. In this research, reasons such as old age, being a woman, having a nationality other than Switzerland, and loneliness played a role in the severity of anxiety (19). Rogowska et al.'s study on Polish university students during the COVID-19 pandemic disclosed that 65% of students experienced moderate to severe anxiety, and students whose grades dropped more than in the pre-pandemic era suffered a higher level of anxiety (9). The results of this study are consistent with the results of our research.

Savarese et al. investigated psychological problems among Italian students quarantined due to COVID-19, reporting high levels of anxiety and stress, concentration, and learning disorders, and ultimately students' academic performance was affected (2). The results of this study are also consistent with the results of our research. Jiang et al.'s study in China revealed that academic and family stress significantly led to depression in students, negatively affecting their academic performance and learning results (3).

5.1. Limitations

Despite all efforts of the present study's researchers to precisely record students' mental health status and measure its impact on students' academic performance during the COVID-19 pandemic, they believe that the current research may not have examined all aspects of students' mental health because the long-term effects and the harmful consequences of this prolonged epidemic undoubtedly need further investigations in the future.

5.2. Conclusions

The students' mental health was not satisfactory, threatening their academic performance. The present research offers valuable information to parents, educators, and other stakeholders. Our research highlights the need for relevant health interventions and preventive strategies to address students' mental health. Likewise, innovation and transformation of the curriculum and additional academic support can also be used to preserve and improve the students' mental health and academic performance. Consequently, a combination of efforts by the government, universities, and families or communities is needed to reduce the harmful and

destructive effects on students' mental health. The harmful consequences of this prolonged epidemic indeed need further investigations in the future.

Acknowledgments

This research is the result of the thesis of a medical student (GP) (No. U-00247), and researchers would like to express their deep gratitude to Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

Footnotes

Authors' Contribution: Research design and conduct, writing the manuscript, and responsibility for final content: A. G.; B. Kh.: Data analysis; S. M.: Manuscript review and revision. All the authors read and approved the final manuscript.

Conflict of Interests: All authors declared no conflict of interest.

Data Reproducibility: All authors have read and approved the final version of the manuscript. The corresponding author had full access to all data in this study and is completely responsible for the data integrity and accuracy of the data analysis and datasets used and analyzed.

Ethical Approval: This study was approved by the Ethics Committee of Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran (Code: [IR.AJUMS.REC.1400.571](#)).

Funding/Support: This study was financially supported by the deputy of research and technology of Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

References

- Ahorsu DK, Lin CY, Imani V, Saffari M, Griffiths MD, Pakpour AH. The fear of COVID-19 scale: Development and initial validation. *Int J Ment Health Addict*. 2022;**20**(3):1537–45. [PubMed ID: [32226353](#)]. [PubMed Central ID: [PMC7100496](#)]. <https://doi.org/10.1007/s11469-020-00270-8>.
- Savarese G, Curcio L, D'Elia D, Fasano O, Pecoraro N. Online university counselling services and psychological problems among Italian students in lockdown due to Covid-19. *Healthcare (Basel)*. 2020;**8**(4). [PubMed ID: [33137963](#)]. [PubMed Central ID: [PMC7712388](#)]. <https://doi.org/10.3390/healthcare8040440>.
- Jiang Z, Jia X, Tao R, Dorduncu H. COVID-19: A source of stress and depression among university students and poor academic performance. *Front Public Health*. 2022;**10**:898556. [PubMed ID: [35592075](#)]. [PubMed Central ID: [PMC9112039](#)]. <https://doi.org/10.3389/fpubh.2022.898556>.
- Xiong J, Lipsitz O, Nasri F, Lui LMW, Gill H, Phan L, et al. Impact of COVID-19 pandemic on mental health in the general population: A systematic review. *J Affect Disord*. 2020;**277**:55–64. [PubMed ID: [32799105](#)]. [PubMed Central ID: [PMC7413844](#)]. <https://doi.org/10.1016/j.jad.2020.08.001>.
- Son C, Hegde S, Smith A, Wang X, Sasangohar F. Effects of COVID-19 on college students' mental health in the United States: Interview survey study. *J Med Internet Res*. 2020;**22**(9). e21279. [PubMed ID: [32805704](#)]. [PubMed Central ID: [PMC7473764](#)]. <https://doi.org/10.2196/21279>.
- Ma Z, Zhao J, Li Y, Chen D, Wang T, Zhang Z, et al. Mental health problems and correlates among 746 217 college students during the coronavirus disease 2019 outbreak in China. *Epidemiol Psychiatr Sci*. 2020;**29**. e181. [PubMed ID: [33185174](#)]. [PubMed Central ID: [PMC7681173](#)]. <https://doi.org/10.1017/S2045796020000931>.
- Wathelet M, Duhem S, Vaiva G, Baubet T, Habran E, Veerapa E, et al. Factors associated with mental health disorders among university students in France confined during the COVID-19 pandemic. *JAMA Netw Open*. 2020;**3**(10). e2025591. [PubMed ID: [33095252](#)]. [PubMed Central ID: [PMC7584927](#)]. <https://doi.org/10.1001/jamanetworkopen.2020.25591>.
- Holm-Hadulla RM, Mayer CH, Wendler H, Kremer TL, Kotera Y, Herpertz SC. Fear, depression, and well-being during COVID-19 in German and South African students: A cross-cultural comparison. *Front Psychol*. 2022;**13**:920125. [PubMed ID: [36405127](#)]. [PubMed Central ID: [PMC9671164](#)]. <https://doi.org/10.3389/fpsyg.2022.920125>.
- Rogowska AM, Ochnik D, Kusnierz C, Chilicka K, Jakubiak M, Paradowska M, et al. Changes in mental health during three waves of the COVID-19 pandemic: A repeated cross-sectional study among polish university students. *BMC Psychiatry*. 2021;**21**(1):627. [PubMed ID: [34911485](#)]. [PubMed Central ID: [PMC8672339](#)]. <https://doi.org/10.1186/s12888-021-03615-2>.
- Baloch GM, Sundarasan S, Chinna K, Nurunnabi M, Kamaludin K, Khoshaim HB, et al. COVID-19: Exploring impacts of the pandemic and lockdown on mental health of Pakistani students. *PeerJ*. 2021;**9**. e10612. [PubMed ID: [33604167](#)]. [PubMed Central ID: [PMC7866897](#)]. <https://doi.org/10.7717/peerj.10612>.
- Al Rawahi SH, Al Harthy NS, Singh G, Al Isamili MI. Impact of COVID-19 on student's dental education and life. *Oman Med J*. 2022;**37**(6). e436. [PubMed ID: [36458242](#)]. [PubMed Central ID: [PMC9637048](#)]. <https://doi.org/10.5001/omj.2022.102>.
- Ochnik D, Rogowska AM, Kusnierz C, Jakubiak M, Schutz A, Held MJ, et al. A comparison of depression and anxiety among university students in nine countries during the covid-19 pandemic. *J Clin Med*. 2021;**10**(13). [PubMed ID: [34209619](#)]. [PubMed Central ID: [PMC8269122](#)]. <https://doi.org/10.3390/jcm10132882>.
- Baldassin S, Alves TC, de Andrade AG, Nogueira Martins LA. The characteristics of depressive symptoms in medical students during medical education and training: A cross-sectional study. *BMC Med Educ*. 2008;**8**:60. [PubMed ID: [19077227](#)]. [PubMed Central ID: [PMC2621219](#)]. <https://doi.org/10.1186/1472-6920-8-60>.
- Gilavand A, Mehralizadeh Y, Hosseinpour M, Torabipour A. [Proposing an effective model for improving integration the medical education system with health services at Iran's Ministry of Health and Medical Education]. *Future Med Educ J*. 2021;**11**(2):8–15. Persian.
- Sahebi A, Asghari MJ, Salari RS. [Validation of depression anxiety and stress scale (DASS-21) for an Iranian population]. *J Appl Dev Psychol*. 2005. Persian.
- Dehshiri G, Golzari M, Borjali A, Sohrabi F. [Psychometrics particularity of Farsi version of Pennsylvania State Worry questionnaire for college students]. *J Clin Psychol*. 2009;**14**(4):67–75. Persian.
- Conteh I, Yan J, Dovi KS, Bajinka O, Massey IY, Turay B. Prevalence and associated influential factors of mental health problems among Chinese college students during different stages of COVID-19 pandemic: A systematic review. *Psychiatry Res Commun*. 2022;**2**(4):100082. [PubMed ID: [36405955](#)]. [PubMed Central ID: [PMC9659281](#)]. <https://doi.org/10.1016/j.psycom.2022.100082>.

18. Browning M, Larson LR, Sharaievska I, Rigolon A, McAnirlin O, Mullenbach L, et al. Psychological impacts from COVID-19 among university students: Risk factors across seven states in the United States. *PLoS One*. 2021;**16**(1). e0245327. [PubMed ID: [33411812](https://pubmed.ncbi.nlm.nih.gov/33411812/)]. [PubMed Central ID: [PMC7790395](https://pubmed.ncbi.nlm.nih.gov/PMC7790395/)]. <https://doi.org/10.1371/journal.pone.0245327>.
19. Amendola S, von Wyl A, Volken T, Zysset A, Huber M, Dratva J. A longitudinal study on generalized anxiety among university students during the first wave of the COVID-19 pandemic in Switzerland. *Front Psychol*. 2021;**12**:643171. [PubMed ID: [33776867](https://pubmed.ncbi.nlm.nih.gov/33776867/)]. [PubMed Central ID: [PMC7990874](https://pubmed.ncbi.nlm.nih.gov/PMC7990874/)]. <https://doi.org/10.3389/fpsyg.2021.643171>.