
	<div data-bbox="568 243 1045 294" data-label="Section-Header"><h2>Mosul Journal of Nursing</h2></div> <div data-bbox="509 336 1104 405" data-label="Text"><p>Online ISSN: 2663-0311 - Print ISSN: 2311-8784 Website: https://mjn.uomosul.edu.iq</p></div>	
---	--	---

Mental Health Outcomes Among Health and Medicine Undergraduate Students Post-COVID-19 Lockdown: A Cross-Sectional Study from Sulaimani, Iraq

Authors

[Niaz Mustafa Kamal](#)

Affiliation

Pediatric Nursing, Sulaimani Polytechnic University, Sulaimani, Iraq

ARTICLE INFO

Keywords:

Depression
Anxiety
Stress
University Students
COVID-19
Mental Health
Cross-sectional
Study



Abstract

Background: The COVID-19 pandemic has significantly impacted on the mental health of young individuals, particularly university students, who experienced a sudden transition in their mode of education. This study aimed to assess the prevalence of depression, anxiety, and stress among medical students at Sulaimani Polytechnic University following the easing of COVID-19 lockdown restrictions.

Methods: A cross-sectional study was conducted between March and June 2022 among 194 students from the health colleges at Sulaimani Polytechnic University. Data was collected using the Depression, Anxiety, and Stress Scale (DASS-21) via self-administered questionnaires. Statistical analysis was performed using SPSS version 22. Frequencies and percentages were used to describe the severity levels of symptoms across genders. Chi-square tests and multiple logistic regression analyses were applied to explore associations between demographic factors and the prevalence of psychological symptoms.

Results: The mean age of participants was 20.5 years (SD = 3.7). Female students had significantly higher mean scores for depression (mean difference = 3.69), anxiety (3.68), and stress (4.76) compared to males. The prevalence of depression ($p = 0.02$), anxiety ($p = 0.004$), and stress ($p = 0.003$) was significantly higher among females. Female gender was identified as a strong independent predictor of psychological distress: depression (AOR = 2.00), anxiety (AOR = 2.11), and stress (AOR = 2.26).

Conclusion: A considerable prevalence of psychological disorders persists among university students even after the lifting of COVID-19 restrictions. Female students and those in the second academic stage were particularly vulnerable. Universities should implement targeted mental health support services for these at-risk groups. Further studies are warranted to investigate the underlying causes of psychological distress in this population.

What is already known about the topic?

The COVID-19 pandemic and subsequent lockdowns have had a significant psychological impact on university students worldwide, especially those in healthcare-related fields.

* Corresponding author.

[Niaz Mustafa Kamal](#)

E-mail address:

niiaz.kamal@spu.edu.iq

DOI:

[10.33899/mjn.2025.146973.1101](https://doi.org/10.33899/mjn.2025.146973.1101), Authors, 2025, College of Nursing, University of Mosul.

Date

Received 15 July 2024; Received in revised form 20 August 2024; Accepted 19 October 2024, Available online 01 January 2025



This is an open-access article under the CC BY 4.0 license (<http://creativecommons.org/licenses/by/4.0/>).

Introduction

A novel coronavirus infection, now designated as "COVID-19," emerged as a new infectious disease first identified in December 2019 in Wuhan city, China. Since its initial detection, the infection has swiftly disseminated, reaching countries worldwide ([Zhu et al., 2020](#)). In the Kurdistan Region of Iraq, a series of unprecedented measures have been implemented to curb the transmission of COVID-19. These measures encompass the suspension of public transport, closure of educational institutions, and prohibition of public gatherings and events including daily and Friday prayers, church gatherings, weddings, and funerals. Additionally, strategies such as the isolation of infected individuals and the quarantine of suspected cases have been enforced as part of the comprehensive response to the pandemic ([Hussein et al., 2020](#)). Several studies have found that during the COVID-19 pandemic, more than half of students suffered depression and anxiety symptoms and that the negative effects of COVID-19 may be worsened by fear and anxiety. Since health measures have primarily focused on the physical aspects of COVID-19 prevention and treatment, unfortunately, the psychosocial aspects of the disease have not been adequately studied ([Ali Moloud et al., 2022](#)). Symptoms of anxiety demonstrated a positive correlation with disruptions in daily life and academic delays. However, the extent of anxiety exhibited a negative association with the availability of social support ([Cao et al., 2020](#)). All these adverse effects on mental health and emotional well-being incorporate happiness, interests in life, satisfaction and quality of life, and the ability to recognize, express, and regulate one's emotions. ([Quek et al., 2017](#)). Poor mental health among university students has been a cause of concern globally . These mental disorders are also one of the underlined factors for dropping out of university before completing their studies ([Harvey et al., 2011](#)). Young people attending university after the COVID-19 crisis are at high risk of mental disorders and severe psychological distress and they experience these problems at higher rates than other young people their age in the population ([Leahy et al., 2010](#); [Storrie et al., 2010](#)). Furthermore, the transition to the university during the time of COVID-19 can be a major source of stress for young adults, who may experience issues such as homesickness, and difficulty balancing high academic workloads with other priorities . The onset of the COVID-19 pandemic brought forth fresh difficulties, notably impacting the daily routines and educational pursuits of students. With universities shuttering physical facilities and shifting to online learning, coupled with stringent limitations on in-person interactions and social activities within campuses and residences, students grappled with

significant disruptions to their studies, financial strains, diminished peer support, and heightened isolation ([Ihm et al., 2021](#)). The prevalence of depression, anxiety, and stress during the COVID-19 outbreak is particularly high among university students ([Jiang et al., 2015](#)), which can be associated with a range of immediate and future negative outcomes including poor academic performance and interpersonal relationships increased risk of suicide and impaired performance in the workplace ([Garlow et al., 2008](#); [Harvey et al., 2011](#); [Salzer, 2012](#)). Furthermore, the prevalence of depression or anxiety among health professions students has also been reported to be higher than in the general population in resource-constrained settings . Factors implicated in psychological morbidity among students include academic pressure, demanding workload, worry about their health, financial concerns, exposure to patients' suffering in the case of medical students ([Bovero et al., 2018](#); [Wege et al., 2016](#)), and student abuse and mistreatment ([Cook et al., 2014](#)). Many studies have reported the prevalence of depression or anxiety above 35% ([Ibrahim et al., 2013](#); [Oppong Asante & Andoh-Arthur, 2015](#)). Meanwhile, depression and anxiety problems are more prevalent among college students . Additional factors affected the college students' emotional well-being was significantly affected by a variety of factors such as monthly household income, ethnicity, social life, parental education and occupations, interests in major, hometown, female sex, age, socioeconomic circumstance, academic, post-graduation plans, and financial difficulties([Teh et al., 2015](#); [Wahed & Hassan, 2017](#)). Psychological distress among students may adversely influence their academic performance and quality of life and may contribute to alcohol and substance abuse decreased empathy, and academic dishonesty ([Ip et al., 2016](#)). Failure to detect and address these emotional disorders will, unfortunately, lead to increased psychological morbidity with undesirable impacts all through their professions and lives([Fuad et al., 2015](#)). Additionally, there is a need to create supportive environments for students who may be having mental health difficulties during their training ([Hope & Henderson, 2014](#)). According to our knowledge, the first study was conducted among university students in Sulaimani city. The study aimed to assess psychological distress (depression, anxiety, and stress) among medical health students after releasing of the COVID-19 restrictions in Sulaimani Iraq.

Materials and methods

Study setting

This descriptive cross-sectional study was conducted from March 2022 to June 2022 at the Sulaimni Polytechnic University the College of Health and Medicine.

Participants

The participants included students at Sulaimani Polytechnic University in the College of Health and Medicine after the lifting of COVID-19 lockdown restrictions in Sulaimani City.

Sample size

All first and second-stage students from the three departments, totaling 240 students, were invited to complete a paper-based structured self-administered questionnaire DASS-21, and only 194 students returned it.

Inclusion criteria

All undergraduate students in the first- and second-year across the three Health College departments were eligible to participate, regardless of their age or gender was included in the study.

Exclusion criteria

The two newly formed departments, Anesthesia and Laboratory Sciences, which had not yet established the third and fourth stages, as well as the Community Health department's third and fourth grades, which were marked by very low student enrollment, were not included in the study. In addition, the questionnaires were collected on the same day therefore students who were absent on the data collection day were excluded.

Tools of the study

The self-administered questionnaires consisted of 2 sections: student demographic data and Depression Anxiety Stress Scales-21 (DASS-21). Participation was voluntary, questionnaires were anonymized, names were not collected, and privacy and confidentiality were respected. The demographic data consisted of questions on age, gender, study year, study department, and residence. Self-reported depression, anxiety, and stress were measured using the Kurdish version of DASS-21. Depression Anxiety Stress Scale (DASS-21) is a standard 21-item (statements) tool with three sub-scales for evaluating symptoms of depression, anxiety, and stress during the previous week ([Lovibond, \(1995\)](#)). Each statement is rated on a scale of 4, never (0 point), sometimes (1 point), often (2 points), and almost always (3 points). The scores of each subscale are summed and multiplied by 2 to represent the total for the subscale. Higher scores indicate higher levels of the psychological disorder. We categorized the total scores of each subscale

according to scoring guidelines to indicate levels of symptoms (normal, mild, moderate, severe, and extremely severe). As the two last levels were not common, we combined severe and extremely severe levels. To check the reliability of the scale we calculated Cronbach's alpha for the entire scale and the three subscales. In our study, alpha was 0.91 for the entire scale, 0.82 depression scale, 0.74 anxiety scale, and 0.83 for the stress scale, all of which indicate good internal consistency and reliability.

Statistical analysis

We used statistical software SPSS version 22. Initially, descriptive statistics was used to present the mean and standard deviations of the scores. Then the severity of the symptoms was presented (normal, mild, moderate, severe, and extremely severe) in frequencies and percentages for males and females separately. For further analysis, the levels were dichotomized into presence and absence (prevalence) of the condition by combining all 4 severity levels into one category. The association of socio-demographic characteristics with the prevalence of depression, anxiety, and stress was evaluated using a Chi-square test followed by multiple logistic regressions to calculate adjusted odds ratios.

Results

Out of 240 students, a total of 194 students completed the DASS-21 questionnaire and were included in the study for the assessment of their psychological condition. The mean age of the students was 20.5 (SD 3.7) years with a range of 17 to 39 years old. Almost 74% of the respondents were females and 26% were males. The majority 52.1% studied in the anesthesia department, 55.2% were in the first year and 56.7% were residents of Sulaimani City Table 1.

Table 1: Descriptive statistics of socio-demographic factors among medical undergraduates (n=194)

Characteristics	Number	Percentages
Sex		
Male	51	26.3%
Female	143	73.7%
Age		
≤22 years	171	88.1%
> 22 years	23	11.9%
Departments		
Community health medicine	27	13.9%
Medical analysis Laboratory	66	34%
Anesthesia	101	52.1%
Study year		
First-year	107	55.2%
Second-year	87	44.8%
Residence		
Inside Sulaimani	110	56.7%
Outside Sulaimani	84	43.3%

Table 2 shows the mean score of the three subscales for depression, anxiety, and stress, overall and by sex. Scores for all three conditions were significantly higher for female students compared to male students. The mean difference in scores between males and females was 3.69 ($p=0.02$) for depression, 3.68 ($p=0.04$) for anxiety, and 4.76 ($p=0.02$) for stress.

Table 2: Mean scores for depression, anxiety, stress, and overall by sex

Scale	All (n=194) Mean ± SD	Male (n=51) Mean ± SD	Female (n=143) Mean ± SD	Score difference	t	p-value
Depression	14.2 ± 9.5	11.5 ± 9.7	15.2 ± 9.3	3.69	-2.39	0.02
Anxiety	10.4 ± 7.8	7.7 ± 7.9	11.4 ± 7.6	3.68	-2.94	0.04
Stress	15.2 ± 9.3	11.6 ± 8.3	16.4 ± 9.4	4.76	-3.19	0.02
All	39.8 ± 23.7	30.9 ± 23.0	43.0 ± 23.2	12.13	-3.2	0.02

Table 3 shows the severity levels of the three conditions overall by male and female. In terms of severity levels, 37.1% had no depression, 12.9% had mild, 26.8 had moderate, 23.2% had severe/extremely severe symptoms of depression and 62.9% had depression of any severity. As for anxiety, 38.1% were normal, 13.4% had mild symptoms, 24.2% had moderate symptoms, 24.2% had severe/extremely severe symptoms and 61.9% had anxiety of any severity. Stress was less common with 54.6% normal, 11.3% mild, 16.5% moderate, 17.5% severe/extremely severe stress, and 45.4% with stress of any severity.

Table 3: Prevalence of severity levels of depression, anxiety, and stress (n=194)

		Normal (0-4)	Mild (5-6)	Moderate (7-10)	Severe (11-13)	All (Mild-severe) (0-13)
		Number (%)	Number (%)	Number (%)	Number (%)	Number (%)
Depression	Male	26(51.0)	7(13.7)	12(23.5)	6(11.8)	25(49.0)
	Female	46(32.2)	18(12.6)	40(28.0)	39(27.3)	97(67.8)
	Overall	72 (37.1)	25(12.9)	52(26.8)	45(23.2)	122(62.9)
Anxiety	Male	28(54.9)	7(13.7)	7(13.7)	9(17.7)	23(45.1)
	Female	46(32.2)	19(13.3)	40(28.0)	38(26.6)	97(67.8)
	Overall	74(38.1)	26(13.4)	47(24.2)	47(24.2)	120(61.9)
Stress	Male	37(72.6)	3(5.9)	6(11.8)	5(9.8)	14(27.4)
	Female	69(48.3)	19(13.3)	26(18.2)	29(20.3)	74(51.7)
	Overall	106(54.6)	22(11.3)	32(16.5)	34(17.5)	88 (45.4)

Table 4 presents the analyses of the prevalence of the three conditions by sex, age, study year, academic department, and residence. Noteworthy, the study found no statistically significant differences in the prevalence of depression, anxiety, and stress across variables such as (age, study years, department, and residence). However, there were differences in the three conditions' prevalence between the sexes. It was found the prevalence of depression is significantly higher

among female students than males (67.8% vs. 49%, $p=0.02$). The same is true for anxiety (67.8% vs. 45.1%, $p=0.004$) and stress (51.8% vs. 27.5%, $p=0.003$).

Table 4: Analysis of the prevalence of depression, anxiety, and stress as binary variables by demographic characteristics of participants

Characteristics	Depression		Anxiety		Stress	
Sex	Number (%)	χ^2 p	Number (%)	χ^2 p	Number (%)	χ^2 p
Male	25 (49.0)	5.7, 0.02	23 (45.1)	8.2, 0.004	14 (27.5)	9.0, 0.003
Female	97 (67.8)		97 (67.8)		74 (51.8)	
Age in years						
≤ 22 years	61 (63.5)	0.03, 0.85	64 (66.8)	1.9, 0.17	47 (49.0)	1.0, 0.32
> 22 years	61 (62.9)		56 (57.1)		41 (41.8)	
Study year						
First-year	61 (57.0)	3.5, 0.06	63 (58.9)	0.89, 0.34	47 (43.9)	0.2, 0.66
Second-year	61 (70.1)		57 (65.5)		41 (47.1)	
Department						
Medical analysis Laboratory	42 (63.6)	0.18, 0.92	44 (66.7)	1.2, 0.56	35 (53.0)	4.3, 0.12
Community Health medicine	16 (59.3)		17 (63.0)		8 (26.6)	
Anesthesia	64 (63.4)		59 (58.4)		45 (44.6)	
Residence						
Inside Sulaimani	73 (66.4)	1.3, 0.25	68 (61.8)	1.1, 0.99	54 (49.1)	1.4, 0.23
Outside Sulaimani	49 (62.9)		52 (61.9)		34 (45.4)	

Table 5 shows the results of multiple logistic regressions of depression with binary variables for a model including sex, age, class, department, and residence as risk factors. Female sex still remained the most important independent factor for higher levels of depression (adjusted odds ratio 2.0, $p=0.05$). Also, the second stage is at greater risk of depression (adjusted odds ratio 3.13, $P=0.01$).

Table 5: Regression analysis of factors associated with depression scores

Risk factor	Depression		
	Adjusted OR	95% CI	P-Value
Sex			
Male	Reference		
Female	2.01	1.0-40.05	0.05
Age			
≤22 years	Reference		
> 22 years	0.8	0.37-1.7	0.37
Grade			
First-year	Reference		
Second-year	3.13	1.28-7.71	0.01
Departments			
Medical analysis Laboratory	Reference		
Community health medicine	0.36	0.10-1.24	0.1
Anesthesia	0.59	0.26-1.33	
Residence			
Inside Sulaimani	Reference		
Outside Sulaimani	0.76	0.4-1.44	0.4
Model statistics	N=194, Log likelihood= -121.1, p=0.03, Pseudo R2=0.05		

Table 6 shows the results of multiple logistic regressions of anxiety with binary variables for a model including sex, age, class, department, and residence as risk factors. The female sex was found risk factor for higher levels of anxiety (adjusted odds ratio 2.11, p= 0.04). Also, the second stage is the most important factor for a higher level of anxiety (adjusted odds ratio 2.57, p= 0.04).

Table 6: Regression analysis of factors associated with anxiety scores

Risk factor	Anxiety		
	Adjusted OR	95% CI	P-Value
Sex			
Male	Reference		
Female	2.11	1.06-4.2	0.04
Age			
≤22 years	Reference		
> 22 years	0.58	0.27-1.22	0.15
Grade			
First-year	Reference		
Second-year	2.57	1.51-6.25	0.04
Departments			
Medical analysis Laboratory	Reference		
Community health medicine	0.56	0.16-1.9	0.36
Anesthesia	0.52	0.23-1.19	0.12
Residence			
Inside Sulaimani	Reference		
Outside Sulaimani	0.95	0.5-1.8	0.87
Model statistics	N=194, Log likelihood= -122.1, p=0.04, Pseudo R2=0.05		

Table 7 shows the results of multiple logistic regressions of stress with binary variables for a model including sex, age, class, department, and residence as risk factors. The female sex was found at high risk for level of stress (adjusted odds ratio 2.26, $p=0.05$), in addition to the second stage (adjusted odds ratio 2.43, $p=0.05$).

Table 7: Regression analysis of factors associated with stress scores

Risk factor	Stress		
	Adjusted OR	95% CI	P-Value
Sex			
Male	Reference		
Female	2.26	1.22-5.4	0.01
Age			
≤22 years	Reference		
> 22 years	0.88	0.42-1.84	0.74
Grade			
First-year	Reference		
Second-year	2.43	1.0-5.9	0.05
Departments			
Medical analysis Laboratory	Reference		
Community health medicine	0.18	0.05-0.67	0.06
Anesthesia	0.45	0.20-1.04	0.06
Residence			
Inside Sulaimani	Reference		
Outside Sulaimani	0.7	0.37-1.32	0.27
Model statistics	N=194, Log likelihood= -124.3, p=0.005, Pseudo R²=0.07		

Discussion

The study examined the psychological condition among 194 medical students of Polytechnic University aged 17-39 with a mean age was 20.5 years after the easing of the COVID-19 pandemic in Iraq to find out the prevalence of depression, anxiety, and stress. The prevalence of overall depression in males 49% was lower in contrast to 68.7% of females, the finding is in line with the study done at Punjab University, Chandigarh([Singh et al., 2017](#)). Furthermore, the study found the prevalence of overall anxiety and stress among females is higher than among males. The result of the present study is consistent with the study done among medical students in Shiraz, Islamic Republic of Iran showed that women are more anxious than male . Additionally, a study conducted among university students in the Kurdistan region of Iraq during the COVID-19 pandemic also supports these findings ([Mohammed & Memmedova, 2023](#)). This may be due to the fact that women articulate depression, anxiety, and stress symptoms, even minor ones, more easily and are more passionate about their families.

In the present study, the prevalence of mild to extremely severe depression, anxiety, and stress is 62.9%, 61.9%, and 45.4% respectively. Our findings were similar to several studies, which documented a high rate of symptoms of depression, anxiety, and stress ([Fawzy & Hamed, 2017](#); [Sani et al., 2012](#)). Conversely, a study carried out among undergraduate students in Malaysian universities showed lower rates of symptoms, anxiety, and stress whereby the percentages are 30.7%, 55.5%, and 16.6% for depression, anxiety, and stress([Teh et al., 2015](#)). Besides, some studies also showed lower rates of symptoms of depression, anxiety, and stress . The study performed among medical students in Egyptian public university revealed a prevalence of depression at 63.6% corresponding with our result was 62.9%, while the prevalence of anxiety and stress was 78.4% and 57.8%, respectively which was higher than our student's anxiety was 61.9% and stress 45.5% ([Abdallah & Gabr, 2014](#)). The difference is probably due to the nature of the participants. In our study, participants were only undergraduate students in their freshman and sophomore years. Another reason commencing university is associated with leaving home for the first time and increased independence, pressure, and responsibility. On the other hand, they may be unsatisfied with the study system, pressure to succeed, cope with study, and exam anxiety, and have difficulties achieving work/life balance.

The female gender was highly correlated with levels of depression, anxiety, and stress compared with those found in males. These findings are similar to the findings of a Sociodemographic factors study performed in Egypt([Salem et al., 2016](#)). Furthermore, studies done in Turkey and Hong Kong showed high levels of anxiety and stress among female respondents also . This may be because females are first time separated from their families and the local environment and they start a new lifestyle compared to males. In our study, the reason may be that females more participated in the study compared to males. On the other hand, some studies showed no significant difference according to gender ([Shamsuddin et al., 2013](#); [Singh et al., 2017](#)). The study found statistically significantly different associations between the rate of depression prevalence and the sex of study participants. We noticed those female students are 2.1 times more likely to develop depression than male students. This was in line with other studies done in Africa and Ethiopia that report an association between depression and female sex . The second stage is at risk for developing depressive symptoms (AOR 3.13), anxiety symptoms (AOR 2.57), and stress symptoms (AOR 2.43) when compared to the first stage. This finding has been also demonstrated

by a previous study done by China University ([Liu et al., 2019](#)). This may show the significant role that usually sets general courses in the first year and introduces more specialized courses from the second year; a second-year college may be confronted with intense pressure from study compared to the previous semesters. This may consequently lead to higher stress and even depression. Whereas the study was carried out among Haramaya University students in Ethiopia was demonstrated that first to third-year students were more likely to develop psychological disorders ([Said et al., 2013](#)). There was no statistically significant association of the symptoms of depression, anxiety, and stress with these factors as age, study department, and place of residence which is similar to the study conducted among medical students at Jizan University of Saudi Arabia ([Sani et al., 2012](#)).

Strengths and Limitations

The study's strength was that it was the first to be conducted on university students in Sulaimani City following the release of COVID-19. The study was not out of limitation; first, the sample size was small, second, the selection bias in which the students of the third and fourth stages did not participate in the study. Third, we acknowledge that the cross-sectional design of this study does not allow inferences to be made about any possible outcome of the severity of the mental disorder.

Conclusions

The study concluded that depression, anxiety, and stress are highly prevalent among medical students of Polytechnic University after the lifting of COVID-19 lockdown restrictions. Second-year students were more affected by symptoms of depression, anxiety, and stress compared to first-year students due to increased knowledge about COVID-19. Female students showed heightened fear of COVID-19 and exhibited a higher rate of symptoms of depression, anxiety, and stress. It is very necessary to put a strategy for the prevention and management of depression, anxiety, and stress is highly recommended to minimize the impact of these psychological disorders during any outbreak and should be a part of the curriculum for university students. Counseling and preventive mental health services should be an essential part of the routine investigation of medical students. Actions should be taken to encourage the students to seek help when they feel mental disorders. Further studies should be done to identify different sources and

causes of stress especially related to infectious disease, and the effect of different intervention measures to avoid or cope with the psychological effect of the life tension.

Conflict of interest

The authors declared that there is no conflict of interest in this study.

Funding source

This study has not received any grant or fund from any national or international company, University, or organization and is entirely self-funded.

Acknowledgment

We would like to express thanks to the Polytechnic University College of Health and all students for their help in completing this study.

Ethical consideration

The scientific and ethics committees of the College of Health and Medicine at the Sulaimani Polytechnic University in Sulaymaniyah, Iraq, approved this study (No. 93 - SPU in December 2022). All procedures used in this study comply with the Declaration of Helsinki. On the other hand, after explaining the purpose of the study, consent forms were obtained from students, and students were assured that they were free to participate in the study.

References

- Abdallah, A. R., & Gabr, H. M. (2014). Depression, anxiety and stress among first year medical students in an Egyptian public university. (Ed.), ^ (Eds.).
- Ali Moloud, E., Pargal, M. F., Qadir Rashid, A., Osmani, H., Dalvand, P., Mehrnezhadi, S., & Baghi, V. (2022). The relationship between COVID-19 fear and anxiety with the quality of life of students in Sulaymaniyah, Iraq. *Novelty in Clinical Medicine*, 1(4), 173-177.
- Arcand, M., Bilodeau-Houle, A., Juster, R. P., & Marin, M. F. (2023). Sex and gender role differences on stress, depression, and anxiety symptoms in response to the COVID-19 pandemic over time. *Front Psychol*, 14, 1166154.
<https://doi.org/10.3389/fpsyg.2023.1166154>
- Asif, S., Mudassar, A., Shahzad, T. Z., Raouf, M., & Pervaiz, T. (2020). Frequency of depression, anxiety and stress among university students. *Pakistan journal of medical sciences*, 36(5), 971.
- Beiter, R., Nash, R., McCrady, M., Rhoades, D., Linscomb, M., Clarahan, M., & Sammut, S. (2015). The prevalence and correlates of depression, anxiety, and stress in a sample of college students. *J Affect Disord*, 173, 90-96. <https://doi.org/10.1016/j.jad.2014.10.054>
- Bovero, A., Tosi, C., Miniotti, M., Torta, R., & Leombruni, P. (2018). Medical Students Reflections Toward End-of-Life: a Hospice Experience. *J Cancer Educ*, 33(3), 634-639.
<https://doi.org/10.1007/s13187-017-1171-1>
- Brenneisen Mayer, F., Souza Santos, I., Silveira, P. S., Itaquí Lopes, M. H., de Souza, A. R., Campos, E. P., de Abreu, B. A., Hoffman Ii, I., Magalhães, C. R., Lima, M. C., Almeida, R., Spinardi, M., & Tempiski, P. (2016). Factors associated to depression and anxiety in medical students: a multicenter study. *BMC Med Educ*, 16(1), 282.
<https://doi.org/10.1186/s12909-016-0791-1>
- Campbell, F., Blank, L., Cantrell, A., Baxter, S., Blackmore, C., Dixon, J., & Goyder, E. (2022). Factors that influence mental health of university and college students in the UK: a systematic review. *BMC Public Health*, 22(1), 1778.
- Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J., & Zheng, J. (2020). The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Res*, 287, 112934. <https://doi.org/10.1016/j.psychres.2020.112934>

- Cook, A. F., Arora, V. M., Rasinski, K. A., Curlin, F. A., & Yoon, J. D. (2014). The prevalence of medical student mistreatment and its association with burnout. *Acad Med*, 89(5), 749-754. <https://doi.org/10.1097/acm.0000000000000204>
- Fauzi, M., Anuar, T., Teh, L., Lim, W. F., James, R., Ahmad, R., Mohamed, M., Bakar, S., Zuraina, M. Y., & Salleh, M. Z. (2021). Stress, Anxiety and Depression among a Cohort of Health Sciences Undergraduate Students: The Prevalence and Risk Factors. *Int J Environ Res Public Health*, 18, 3269. <https://doi.org/10.3390/ijerph18063269>
- Fawzy, M., & Hamed, S. A. (2017). Prevalence of psychological stress, depression and anxiety among medical students in Egypt. *Psychiatry Res*, 255, 186-194. <https://doi.org/10.1016/j.psychres.2017.05.027>
- Fuad, M. D. F., Lye, M. S., Ibrahim, N., binti Ismail, S. I. F., & Kar, P. C. (2015). Prevalence and risk factors of stress, anxiety and depression among preclinical medical students in Universiti Putra Malaysia in 2014. *International Journal of Collaborative Research on Internal Medicine & Public Health*, 7(1), 0-0.
- Gao, W., Ping, S., & Liu, X. (2020). Gender differences in depression, anxiety, and stress among college students: a longitudinal study from China. *Journal of affective disorders*, 263, 292-300.
- Garlow, S. J., Rosenberg, J., Moore, J. D., Haas, A. P., Koestner, B., Hendin, H., & Nemeroff, C. B. (2008). Depression, desperation, and suicidal ideation in college students: results from the American Foundation for Suicide Prevention College Screening Project at Emory University. *Depress Anxiety*, 25(6), 482-488. <https://doi.org/10.1002/da.20321>
- Harvey, S. B., Glozier, N., Henderson, M., Allaway, S., Litchfield, P., Holland-Elliott, K., & Hotopf, M. (2011). Depression and work performance: an ecological study using web-based screening. *Occup Med (Lond)*, 61(3), 209-211. <https://doi.org/10.1093/occmed/kqr020>
- Hope, V., & Henderson, M. (2014). Medical student depression, anxiety and distress outside North America: a systematic review. *Med Educ*, 48(10), 963-979. <https://doi.org/10.1111/medu.12512>
- Hussein, N. R., Naqid, I. A., Saleem, Z. S. M., Almizori, L. A., Musa, D. H., & Ibrahim, N. (2020). A sharp increase in the number of COVID-19 cases and case fatality rates after

- lifting the lockdown in Kurdistan region of Iraq. *Ann Med Surg (Lond)*, 57, 140-142.
<https://doi.org/10.1016/j.amsu.2020.07.030>
- Ibrahim, A. K., Kelly, S. J., Adams, C. E., & Glazebrook, C. (2013). A systematic review of studies of depression prevalence in university students. *J Psychiatr Res*, 47(3), 391-400.
<https://doi.org/10.1016/j.jpsychires.2012.11.015>
- Ihm, L., Zhang, H., Van Vijfeijken, A., & Waugh, M. G. (2021). Impacts of the Covid-19 pandemic on the health of university students. *The International Journal of Health Planning and Management*, 36(3), 618-627.
- Ip, E. J., Nguyen, K., Shah, B. M., Doroudgar, S., & Bidwal, M. K. (2016). Motivations and Predictors of Cheating in Pharmacy School. *Am J Pharm Educ*, 80(8), 133.
<https://doi.org/10.5688/ajpe808133>
- January, J., Madhombiro, M., Chipamaunga, S., Ray, S., Chingono, A., & Abas, M. (2018). Prevalence of depression and anxiety among undergraduate university students in low- and middle-income countries: a systematic review protocol. *Systematic reviews*, 7, 1-5.
- Jiang, X. L., Zheng, X. Y., Yang, J., Ye, C. P., Chen, Y. Y., Zhang, Z. G., & Xiao, Z. J. (2015). A systematic review of studies on the prevalence of insomnia in university students. *Public Health*, 129(12), 1579-1584. <https://doi.org/10.1016/j.puhe.2015.07.030>
- Leahy, C. M., Peterson, R. F., Wilson, I. G., Newbury, J. W., Tonkin, A. L., & Turnbull, D. (2010). Distress levels and self-reported treatment rates for medicine, law, psychology and mechanical engineering tertiary students: cross-sectional study. *Australian & New Zealand Journal of Psychiatry*, 44(7), 608-615.
- Liu, X., Ping, S., & Gao, W. (2019). Changes in Undergraduate Students' Psychological Well-Being as They Experience University Life. *Int J Environ Res Public Health*, 16(16).
<https://doi.org/10.3390/ijerph16162864>
- Lovibond, S. H., & Lovibond, P. F. . ((1995)). *Manual for the Depression Anxiety Stress Scales* (2nd ed.). Sydney: Psychology Foundation of Australia.
- McLean, C. P., Asnaani, A., Litz, B. T., & Hofmann, S. G. (2011). Gender differences in anxiety disorders: prevalence, course of illness, comorbidity and burden of illness. *J Psychiatr Res*, 45(8), 1027-1035. <https://doi.org/10.1016/j.jpsychires.2011.03.006>

- Mohammed, M. A., & Memmedova, K. (2023). Prevalence of Mental Health Problems among Iraqi University Students during the COVID-19 Pandemic. *Sustainability*, 15(3), 1746. <https://www.mdpi.com/2071-1050/15/3/1746>
- Oppong Asante, K., & Andoh-Arthur, J. (2015). Prevalence and determinants of depressive symptoms among university students in Ghana. *J Affect Disord*, 171, 161-166. <https://doi.org/10.1016/j.jad.2014.09.025>
- Quek, Y. H., Tam, W. W. S., Zhang, M. W. B., & Ho, R. C. M. (2017). Exploring the association between childhood and adolescent obesity and depression: a meta-analysis. *Obes Rev*, 18(7), 742-754. <https://doi.org/10.1111/obr.12535>
- Ramón-Arbués, E., Gea-Caballero, V., Granada-López, J. M., Juárez-Vela, R., Pellicer-García, B., & Antón-Solanas, I. (2020). The Prevalence of Depression, Anxiety and Stress and Their Associated Factors in College Students. *Int J Environ Res Public Health*, 17(19). <https://doi.org/10.3390/ijerph17197001>
- Said, D., Kypri, K., & Bowman, J. (2013). Risk factors for mental disorder among university students in Australia: findings from a web-based cross-sectional survey. *Soc Psychiatry Psychiatr Epidemiol*, 48(6), 935-944. <https://doi.org/10.1007/s00127-012-0574-x>
- Salem, G. M., Allah, M. B. A., & Said, R. M. (2016). Prevalence and predictors of depression, anxiety and stress among Zagazig University students. *Med J Cairo Univ*, 84(2), 325-334.
- Salzer, M. S. (2012). A comparative study of campus experiences of college students with mental illnesses versus a general college sample. *J Am Coll Health*, 60(1), 1-7. <https://doi.org/10.1080/07448481.2011.552537>
- Sani, M., Mahfouz, M., Bani, I., Alsomily, A., Alagi, D., Alsomily, N., & Asiri, S. (2012). Prevalence of stress among medical students in Jizan University, Kingdom of Saudi Arabia. *Gulf Med J*, 1(1), 19-25.
- Sarokhani, D., Delpisheh, A., Veisani, Y., Sarokhani, M. T., Manesh, R. E., & Sayehmiri, K. (2013). Prevalence of Depression among University Students: A Systematic Review and Meta-Analysis Study. *Depress Res Treat*, 2013, 373857. <https://doi.org/10.1155/2013/373857>
- Shamsuddin, K., Fadzil, F., Ismail, W. S., Shah, S. A., Omar, K., Muhammad, N. A., Jaffar, A., Ismail, A., & Mahadevan, R. (2013). Correlates of depression, anxiety and stress among

- Malaysian university students. *Asian J Psychiatr*, 6(4), 318-323.
<https://doi.org/10.1016/j.ajp.2013.01.014>
- Singh, M., Goel, N. K., Sharma, M. K., & Bakshi, R. K. (2017). Prevalence of depression, anxiety and stress among students of Punjab University, Chandigarh. *Age (in years)*, 86(211), 52-58.
- Storrie, K., Ahern, K., & Tuckett, A. (2010). A systematic review: Students with mental health problems--a growing problem. *Int J Nurs Pract*, 16(1), 1-6.
<https://doi.org/10.1111/j.1440-172X.2009.01813.x>
- Teh, C. K., Ngo, C. W., binti Zulkifli, R. A., Vellasamy, R., & Suresh, K. (2015). Depression, anxiety and stress among undergraduate students: A cross sectional study. *Open Journal of Epidemiology*, 5(04), 260.
- Thurber, C. A., & Walton, E. A. (2012). Homesickness and adjustment in university students. *J Am Coll Health*, 60(5), 415-419. <https://doi.org/10.1080/07448481.2012.673520>
- Wahed, W. Y. A., & Hassan, S. K. (2017). Prevalence and associated factors of stress, anxiety and depression among medical Fayoum University students. *Alexandria Journal of Medicine*, 53(1), 77-84.
- Wege, N., Muth, T., Li, J., & Angerer, P. (2016). Mental health among currently enrolled medical students in Germany. *Public Health*, 132, 92-100.
<https://doi.org/10.1016/j.puhe.2015.12.014>
- Worsley, J. D., Harrison, P., & Corcoran, R. (2021). Bridging the Gap: Exploring the Unique Transition From Home, School or College Into University. *Front Public Health*, 9, 634285. <https://doi.org/10.3389/fpubh.2021.634285>
- Zhu, N., Zhang, D., Wang, W., Li, X., Yang, B., Song, J., Zhao, X., Huang, B., Shi, W., Lu, R., Niu, P., Zhan, F., Ma, X., Wang, D., Xu, W., Wu, G., Gao, G. F., & Tan, W. (2020). A Novel Coronavirus from Patients with Pneumonia in China, 2019. *N Engl J Med*, 382(8), 727-733. <https://doi.org/10.1056/NEJMoa2001017>