

Prevalence and Factors Associated with Depression among Medical Students at Makerere University, Uganda

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Background: Depression affects about a third of medical students worldwide. There is paucity of data on depression among medical students in Uganda. The purpose of this study was to establish the prevalence and factors associated with depression among medical students at Makerere University College of Health Science (MakCHS), Uganda.

Methods: A cross-sectional study was conducted among students pursuing a Bachelor of Medicine and Surgery at MakCHS in May and July 2019. Students were enrolled by consecutive sampling, both online using Google Forms and in person for those unable to access internet. The self-reported Patient Health Questionnaire 9 (PHQ9) was administered to assess depression, defined as a PHQ9 score ≥ 10 . Microsoft Excel 2016 and Stata 16 were used for data analysis.

Results: Overall, 331 valid responses (mean age 23.1 ± 3.3 years) were submitted (response rate 93.8%). In a majority of participants, the prevalence of depression was 21.5% ($n=71$) of which 64.1% had moderate depression ($n=50$). On bivariate analysis, year of study, worrying about academic performance, and lectures were significantly associated with depression. On multivariate analysis, worrying about academic performance (aOR 2.52, 95% CI 1.50–4.22; $P<0.001$) and lectures (aOR 1.89, 95% CI 1.11–3.22; $P=0.018$) were significantly associated with depression.

Conclusion: Depression affects a significant number of medical students at MakCHS. About one in five medical students have depression. Year of study and academic performance were significantly associated with depression. Efforts aimed at identification and evaluation of students at risk, administering appropriate interventions, and follow-up of affected students are vital. Analytical studies aimed at establishing the causative factors and the effects of depression on medical students are recommended.

Keywords: depression, medical students, risk factors, PHQ9, Uganda

Introduction

Globally, 4.4% of the population is living with depression.¹ Depression is the single largest contributor to global disability and among the leading causes of years lived with disability.² Depression, also known as major depressive disorder, is a mental disorder characterised by low mood for at least 2 weeks.³ It is often accompanied by low self-esteem, loss of interest in normally enjoyable activities, low energy, decrease or increase in appetite, insomnia or hypersomnia, psychomotor agitation or retardation, and diminished concentration or indecisiveness.⁴

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Depression among medical students has increasingly become a concern for medical educators globally.⁵ In a recent systematic review and meta-analysis, up to 27.2% of medical students had depression globally.⁵ Puthran et al also found out that depression affects about a third of medical students worldwide.⁶ Studies have documented a higher prevalence of depression among medical students than in the general population and age-matched peers.^{7–9} Depression has profound negative academic and professional impact, which includes poor academic performance, substance abuse, and suicidal ideation.¹⁰

Studies from sub-Saharan Africa have also documented a high prevalence of depression among medical students.^{11–14} Aniebue et al reported a prevalence of 23.3% among Nigerian undergraduate medical students.¹⁵ Depression among medical students has been associated with female sex.^{11,16} In East Africa, a high prevalence of depression among university students has been reported.^{17,18} Othieno et al found that 41.3% of general undergraduate students at the University of Nairobi, Kenya were depressed.¹⁷ Medical students, however, did not have a high prevalence of depression in this study (13.3%).¹⁷

There are limited data on depression among medical students in Uganda. An earlier study investigating depression among fresh undergraduate students joining Makerere University between 2001 and 2002 found a higher prevalence of depressed mood among the general population of new students than those in the Faculty of Medicine.¹⁹ To our knowledge, there are no current data specifically describing depression among medical students in Uganda. A recent study at Makerere University highlighted high levels of stress among medical students.²⁰ Stress prevalence was found to be as high as 57.4%, and stressors included academic curriculum, frustration with lectures, long walk to school, lack of free time for leisure activities, academic performance, parental expectations, and lack of mentorship.²⁰ High stress levels can result in deteriorating performance, depression, and other stress-induced disorders like suicidal ideation.²¹ In this study, we aimed to establish the prevalence and factors associated with depression among medical students at Makerere University College of Health Sciences (MakCHS).

Methods

Study Design

A descriptive cross-sectional study using quantitative techniques was conducted between May and July, 2019.

Study Setting

The study was conducted at MakCHS. Makerere University is the largest public institution of higher learning in Uganda. MakCHS is located on Mulago Hill with Mulago National Referral and Teaching Hospital, 5 km by road northeast of Kampala, Uganda's capital and largest city. As of August 2018, the college has four schools: Medicine, Biomedical Sciences, Health Sciences, and Public Health.

Study Population

Undergraduate students pursuing a Bachelor of Medicine and Bachelor of Surgery (MBChB) at the School of Medicine constituted the study population. The 5-year MBChB curriculum consists of 2 years of preclinical training in basic biomedical sciences and 3 years of clinical rotations. In the academic year 2018–2019, there were about 2,000 students at MakCHS, with approximately 900 pursuing MBChB. The study was conducted during the recess term.

Selection Criteria

All undergraduate students aged 18 years or older pursuing MBChB at MakCHS were included in the study after informed consent. Students who were absent during data collection were excluded.

Sample-Size Estimation

Sample size was calculated using a modified Kish–Leslie formula with a 95% CI (1.960) and 5% precision:²²

$$N = \frac{Z^2 p(1-p)}{d^2}$$

where N is sample size, Z SD at 95% CI (1.960), p expected prevalence of depression among medical students, and d precision of the estimate (5%). The prevalence of depression was taken as 53.4% from a study in a similar setting among medical students in Sudan.²³

$$N = \frac{1.960^2 \times 0.534(1 - 0.534)}{0.05^2}$$

We used the modified Kish and Leslie equation to calculate available sample size:

$$n = \frac{N}{1 + \frac{(N-1)}{K}}$$

where K is the estimated overall population of the study population (approximately 2,000 students).

$$n = \frac{382.38}{1 + \frac{(382.38-1)}{2000}}$$

$$n = 321.14$$

$$n = 321$$

To cater for noncorrespondents, 10% of the sample size was added to the calculated sample size. Therefore, the actual total sample size was 353 medical students.

Data-Collection Tools and Procedure

A self-administered tool was used to enrol participants in the study. Both hard-copy and web-based questionnaires designed using Google Forms were used to collect data. Study representatives in each class consecutively distributed paper-based questionnaires to prospective participants. The Google Form link to the questionnaire was also shared via the MakCHS mailing list and WhatsApp groups to reduce nonresponse as a result of stigma associated with some of the contents of the questionnaire, eg, suicidal ideation. The questionnaire consisted of three parts: sociodemographics, the Patient Health Questionnaire 9 (PHQ9) and factors associated with depression were used. The PHQ9 is a validated tool used for screening, diagnosing, and measuring the severity of depression among university students.²⁴ It consists of nine questions based on the DSM-V arranged as Likert items graded from 0 to 3 (not at all, several days, more than half the days, and nearly every day, respectively), with a total possible score of 27.

Study Variables

The dependent variable was depressive symptomatology. Independent variables were:

- (i) sociodemographic factors (age, sex, religion, marital status), students' academic details (year of study and type of tuition funding), and
- (ii) factors associated with depression. A closed-ended question was used to ask participants what they were worried about in the 2 weeks prior to the study (tuition, personal financial problems, relationships, lectures, ward rounds, lack of free time, walking long distances, traumatic patient events at the hospital, academic

performance, chronic illness, major life event). Participants responded by ticking either yes or no.

Measurements

A diagnosis of depressive symptomatology was made after a participant fulfilled the following conditions.

1. Item 1 and item 2 of the PHQ9 scoring a sum of ≥ 3 .
2. A total score of ≥ 10 was used as the cutoff for a diagnosis of depression.

A PHQ9 score ≥ 10 has a specificity and sensitivity of 88% for major depressive disorder.²⁵ Total PHQ9 scores determined severity: 5–9 mild, 10–19 moderate, and 20–27 severe.

Data Management and Analysis

Hard-copy data were entered into Epi Info 7.2.2.6 statistical software (Centers for Disease Control and Prevention, Atlanta, GA, USA) and exported to Microsoft Excel 2016 for cleaning and coding. Online data submissions from Google Forms were also exported to Microsoft Excel 2016 for cleaning and coding. Formal analysis was performed using Stata 16 (StataCorp, College Station, TX, USA). Descriptive analyses were derived by exploring the frequencies and percentages for each of the categorical variables. Results for the continuous variable (age) are presented as median and ranges. To assess associations between the depression and predictor variables, χ^2 tests and logistic regressions were performed. P -values < 0.05 were considered statistically significant.

Ethical and Regulatory Approval

Ethical approval from Mulago Hospital Research Ethics Committee (protocol MHREC 1634) and administrative approval from the principal of MakCHS were obtained prior to the study. The study was conducted in accordance with the Declaration of Helsinki.

Results

Demographics

A total of 331 participants with a median age of 22 (18–40) years responded to the study (response rate 36.7%). Students from all the classes (years 1–5) participated in the study. The majority of the participants were male (59%), aged 18–25 years (86%), single (78%), and on government sponsorship (57%). Table 1 summarizes the demographic characteristics of the participants.

Table 1 Sociodemographic Characteristics of the Participants (n=331)

	n	%
Age (median, range)	22	18–40
18–25 years	285	86
26–35 years	43	13
>36 years	3	1
Sex		
Female	133	40
Male	196	59
Prefer not to say	2	1
Year of study		
First	82	25
Second	68	21
Third	73	22
Fourth	55	17
Fifth	53	16
Religion		
Anglican	90	27
Atheist/none	11	3
Buddhist	1	0
Christian	3	1
Muslim	32	10
Pentecostal	59	18
Presbyterian	1	0
Roman Catholic	116	35
Seventh Day Adventist	16	5
Traditional	2	1
Tuition funding		
Government	189	57
Nongovernmental organisation	2	1
Private	116	35
Self	24	7
Marital status		
Divorced	4	1
Married	16	5
Relationship	54	16
Single	257	78

Prevalence of Depression

Table 2 summarizes the prevalence of depression among medical students at Makerere University. Overall, 21.5% of medical students had depression. Of those with depression, a majority were males, aged 18–25 years, government-funded, and not in any intimate relationship. Up to 62%, 57.7%, and 52.1% were worried about examinations, academic performance, and personal financial problems, respectively. Some 49.3% of the students with depression

were worried about lack of free time. A majority of those with depression had moderate form (41%, n=29; Figure 1).

Factors Associated with Depression

On bivariate analysis, year of study, academic performance, and worrying about lectures were significantly associated with depression (Table 2). We performed multivariate analysis with aORs to reduce the effect of confounders (Table 3). Students aged 26–35 years and those in their second year were 1.7 and 1.6 times more likely to have depression, respectively. However, this relationship was not statistically significant. Students worried about lectures (aOR 2.2, 95% CI 1.1–4.4; $P=0.028$) and academic performance (aOR 2.5, 95% CI 1.3–5.0; $P<0.001$) were significantly more likely to have depression. There was no significant association of depression in medical students with sex, age, religion, or marital status.

Discussion

Depression among medical students has far-reaching effects on the students and society at large. In this study, we sought to determine prevalence and factors associated with depression and suicidal ideation among medical students at Makerere University, and found prevalence of 21.5%, in line with previous studies on medical students in Nigeria (23.3%) and Peru (23.3%),^{15,26,27} but higher than among medical students in developed countries with student-wellness programs, ie, 3.8% and 2.6% among US and German medical students, respectively.^{28,29} Our finding is lower than global estimates reported by a recent systematic review and meta-analysis, which revealed prevalence of 27.2%.⁵ In the developing countries of Cameroon and Sudan, more than half the medical students (50% vs 65.2%, respectively) had depression.^{11,23} These differences may be attributed to the different curricula used in different countries, teaching methods, mental-wellness programs, and diagnostic tools used to diagnose depression.⁵

Our study also found that the majority of medical students with depression were in their second and third years of study. Other papers have shown higher prevalence in first-year,^{30,31} third-year,^{32–34} and final-year students.³⁵ The high prevalence in the second year of study can be attributed to the bulk of work required, since the greatest part of the biomedical syllabus, ie, microbiology, pharmacology, pathology, immunology, and some aspects of anatomy and physiology, are covered in this academic year. In the third year, medical students

Table 2 Prevalence of Depression Among Medical Students at Makerere University (n=331)

	Depression		P-value
	Yes (%)	No (%)	
All participants	71 (21.5)	260 (78.5)	
Age, years			0.527
18–25	60 (84.5)	225 (86.5)	
26– 35	11 (15.5)	32 (12.3)	
>36	0	3 (1.2)	
Sex			0.713
Female	30 (42.3)	103 (39.6)	
Male	41 (57.7)	155 (59.6)	
Prefer not to say	0	2 (0.8)	
Year of study			0.043
First	15 (21.1)	67 (25.8)	
Second	21 (29.6)	47 (18.1)	
Third	20 (28.2)	53 (20.4)	
Fourth	6 (8.5)	49 (18.8)	
Fifth	9 (12.7)	44 (16.9)	
Religion			0.886
Anglican	16 (22.5)	74 (28.5)	
Atheist/none	2 (2.8)	9 (3.5)	
Buddhist	0	1 (0.4)	
Christian	0	3 (1.2)	
Muslim	9 (12.7)	23 (8.8)	
Pentecostal	12 (16.9)	47 (18.1)	
Presbyterian	0	1 (0.4)	
Roman Catholic	27 (38)	89 (34.2)	
Seventh Day Adventist	4 (5.6)	12 (4.6)	
Traditional	1 (1.4)	1 (0.4)	
Tuition funding			0.456
Government	37 (52.1)	152 (58.5)	
NGO	0	2 (0.8)	
Private	30 (42.3)	86 (33.1)	
Self	4 (5.6)	20 (7.7)	
Marital status			0.384
Divorced	2 (2.8)	2 (0.8)	
Married	2 (2.8)	14 (5.4)	
Relationship	10 (14.1)	44 (16.9)	
Single	57 (80.3)	200 (76.9)	
Students worried in the past 2 weeks about			
Tuition	13 (18.3)	31 (11.9)	0.160
Personal financial problems	37 (52.1)	130 (50)	0.752
Relationships	27 (38)	70 (26.9)	0.068
Lectures	32 (45.1)	68 (26.2)	0.002
Ward rounds	19 (26.8)	48 (18.5)	0.123
Examinations	44 (62)	161 (61.9)	0.994
Lacking free time	35 (49.3)	112 (43.1)	0.350

(Continued)

Table 2 (Continued).

	Depression		P-value
	Yes (%)	No (%)	
Long distance to school	19 (26.8)	64 (24.6)	0.712
Traumatic patient events at hospital	13 (18.3)	31 (11.9)	0.160
Academic performance	41 (57.7)	85 (32.7)	<0.001
Chronic illness	5 (7)	8 (3.1)	0.127
Major life event	7 (9.9)	21 (8.1)	0.632

begin clinical rotations, which is usually a new environment accompanied by increased academic demands, including night calls. Other traumatic incidents like losing a patient may also contribute to depression in third-year students at MakCHS.

Our results showed that worrying about lectures and academic performance was significantly associated with depression. This is in line with Waqas et al and Sousa et al, who established that increased academic expectations were associated with depression among medical students.^{36,37} Medical students with depression also have poorer academic performance than their peers.³⁶ These studies continue to reaffirm the impact of increased academic expectations on the mental health of medical students, highlighted by a recent study at Makerere University, where 38% of students admitted that the academic curriculum was a top stressor.²⁰ Clearly, academic demands on medical students seem to be a major source of stress. Some of the reasons for this may include the high expectations placed on the student by their family, who see the student as the solution to the family's socioeconomic problems and prestige.³⁸ Some personal factors, such as

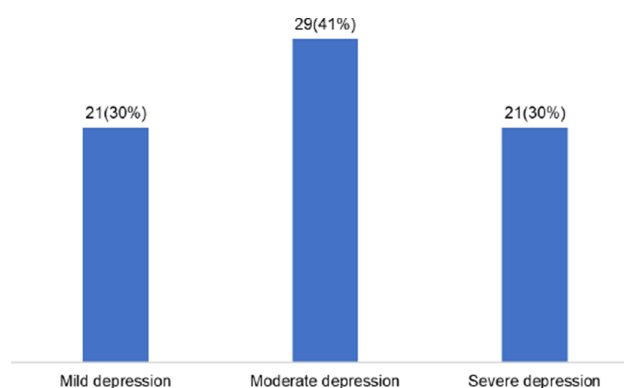
**Figure 1** Severity of depression among medical students with depressive symptomatology at Makerere University.

Table 3 Multivariate Regression Showing Factors Associated with Depression Among Medical Students at Makerere University

	aOR (95% CI)	P-value
Age, years		
18–25	1.0	
26–35	1.7 (0.5–5.4)	0.701
Sex		
Female	1.0	
Male	0.9 (0.5–1.7)	0.358
Year of study		
First	1.0	
Second	1.6 (0.7–3.8)	0.297
Third	1.3 (0.5–3.6)	0.560
Fourth	0.4 (0.1–1.2)	0.096
Fifth	0.7 (0.2–2.0)	0.455
Religion		
Roman Catholic	1.0	
Anglican	0.6 (0.3–1.3)	0.216
Atheist/none	0.2 (0.0–3.1)	0.278
Muslim	1.0 (0.4–2.8)	0.953
Pentecostal	0.7 (0.3–1.6)	0.380
Seventh Day Adventist	2.5 (0.6–10.1)	0.198
Tuition funding		
Government	1.0	
Private	1.6 (0.8–3.1)	0.204
Self	0.3 (0.1–1.8)	0.206
Marital status		
Single	1.0	
Divorced	8.5 (0.5–145.4)	0.139
Married	0.5 (0.1–3.9)	0.527
Relationship	0.6 (0.2–1.4)	0.193
Students worried in the previous 2 weeks about		
Tuition	1.1 (0.4–3.2)	0.792
Personal financial problems	0.8 (0.4–1.5)	0.488
Relationships	1.7 (0.9–3.3)	0.122
Lectures	2.2 (1.1–4.4)	0.028
Ward rounds	1.3 (0.5–3.5)	0.560
Lacking free time	0.6 (0.3–1.3)	0.212
Long distances to school	0.7 (0.3–1.5)	0.316
Traumatic patient events at hospital	1.4 (0.5–3.8)	0.517
Academic performance	2.5 (1.3–5.0)	0.009
Chronic illness	1.1 (0.2–4.7)	0.940
Major life event	0.6 (0.2–1.9)	0.369

problem-solving skills, access to basic needs, self-esteem, self-awareness, self-efficacy, and interpersonal skills, have been advanced as potential reasons for depression and burnout for people working in the health services.³⁹

Moreover, the academic environment itself can be a source of stress, eg, through hectic academic schedules, multiple concurrent tasks, and little supervision, support, or mentorship.⁴⁰

We found no significant difference in depression prevalence between males and females, which correlates with a global systematic review and meta-analysis⁵ and previous studies on first-year students at Makerere University.¹⁹ A number of studies have demonstrated a higher prevalence of depression in female medical students than their male counterparts.^{7,11,16,34,41,42} Male students, however, formed a greater percentage of depressed students in our study. This is problematic, since male sex has been associated with poor disclosure and health-seeking, which predisposes them to finding solace in drugs and substances of abuse like alcohol and marijuana.⁴³ Marital status was not a significant predictor of depression in this study, but single students had higher prevalence than their married and dating counterparts, owing to the social support a partner offers.

Our study fills a crucial gap in the literature on the current status of mental health among medical students in Uganda. The large sample increases the generalizability of the findings. However, there are some limitations. Firstly, the PHQ9 questionnaire that was used is a screening questionnaire that picks out probable depression. Clinical diagnosis of major depressive disorder through either psychiatric interviews or using the Mini-Neuropsychiatric Interview — depression module should have been used to determine actual major depressive disorder among the students. Secondly, recall bias as a result of self-administration of the PHQ9 tool is to be expected. Also, other risk factors for depression among medical students like burnout were not assessed in the present study. Lastly, the cross-sectional nature of the study provides only associative factors and not a causal relationship between depression and independent variables.

Conclusion

Depression affects a significant number of medical students at Makerere University. About one in five had depression. Year of study and academic performance were significantly associated with depression. Potential barriers to seeking care for depression may include stigma, cultural beliefs, cost, and limited availability of mental health services. Efforts aimed at identification and evaluation of students at risk, administering appropriate

interventions, and follow-up of affected students are vital. Nakimuli-Mpungu et al (Uganda) demonstrated that peer group-support psychotherapy can be a low-cost, culturally sensitive intervention for managing depression among adults.⁴⁴ We recommend further exploration of the use of peer group-support psychotherapy among medical students with depressive symptoms. Further studies employing analytical designs to establish direct and indirect causes of depression among medical students in Uganda are recommended.

Data-Sharing Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Author Contributions

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data, took part in drafting the article or revising it critically for important intellectual content, agreed to submit to the current journal, gave final approval to the version to be published, and agree to be accountable for all aspects of the work.

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The authors declare no conflict of interest.

References

- World Health Organization. *Depression and Other Common Mental Disorders: Global Health Estimates*. Division of Mental Health; 2017.
- Vos T, Allen C, Arora M, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. *The Lancet*. 2016;388(10053):1545–1602.
- American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorder: DSM-5*. 5th ed. APA; 2013.
- National Institute of Mental Health. *Depression Basics*. Bethesda; 2016.
- Rotenstein LS, Ramos MA, Torre M, et al. Prevalence of depression, depressive symptoms, and suicidal ideation among medical students: a systematic review and meta-analysis. *JAMA*. 2016;316(21):2214–2236. doi:10.1001/jama.2016.17324
- Puthran R, Zhang MW, Tam WW, Ho RC. Prevalence of depression amongst medical students: a meta-analysis. *Med Educ*. 2016;50(4):456–468. doi:10.1111/medu.12962
- Dyrbye LN, Thomas MR, Shanafelt TD. Systematic review of depression, anxiety, and other indicators of psychological distress among U.S. and Canadian medical students. *Acad Med*. 2006;81(4):354–373. doi:10.1097/00001888-200604000-00009
- Hope V, Henderson M. Medical student depression, anxiety and distress outside North America: a systematic review. *Med Educ*. 2014;48(10):963–979. doi:10.1111/medu.12512
- Inam SB. Anxiety and depression among students of a medical college in Saudi Arabia. *Int J Health Sci (Qassim)*. 2007;1(2):295–300.
- Dyrbye LN, Harper W, Durning SJ, et al. Patterns of distress in US medical students. *Med Teach*. 2011;33(10):834–839. doi:10.3109/0142159X.2010.531158
- Ngasa SN, Sama CB, Dzekem BS, et al. Prevalence and factors associated with depression among medical students in Cameroon: a cross-sectional study. *BMC Psychiatry*. 2017;17(1):216. doi:10.1186/s12888-017-1382-3
- Alem A, Araya M, Melaku Z, Wendimagegn D, Abdulahi A. Mental distress in medical students of Addis Ababa University. *Ethiop Med J*. 2005;43(3):159–166.
- van Zyl PM, Joubert G, Bowen E, et al. Depression, anxiety, stress and substance use in medical students in a 5-year curriculum. *Afr J Health Prof Educ*. 2017;9(2):67–72.
- Asante KO, Andoh-Arthur J. Prevalence and determinants of depressive symptoms among university students in Ghana. *J Affect Disord*. 2015;171:161–166. doi:10.1016/j.jad.2014.09.025
- Aniebue PN, Onyema GO. Prevalence of depressive symptoms among Nigerian medical undergraduates. *Trop Doct*. 2008;38(3):157–158. doi:10.1258/td.2007.070202
- Basnet B, Jaiswal M, Adhikari B, Shyangwa PM. Depression among undergraduate medical students. *Kathmandu Univ Med J (KUMJ)*. 2012;10(39):56–59. doi:10.3126/kumj.v10i3.8021
- Othieno CJ, Okoth RO, Peltzer K, Pengpid S, Malla LO. Depression among university students in Kenya: prevalence and sociodemographic correlates. *J Affect Disord*. 2014;165:120–125. doi:10.1016/j.jad.2014.04.070
- Mohamed EAA, Ahmed BGME, Abdelgadir EBA. Prevalence of depression among Medical Students in Sudan International University in May 2017–August 2017. *J Nurs Healthcare*. 2018;3:4.
- Ovuga E, Boardman J, Wasserman D. Undergraduate student mental health at Makerere University, Uganda. *World Psychiatry*. 2006;5(1):51–52.
- Amanya SB, Nakitende J, Ngabirano TD. A cross-sectional study of stress and its sources among health professional students at Makerere University, Uganda. *Nurs Open*. 2018;5(1):70–76. doi:10.1002/nop.2.113
- Kumar SG, Kattimani S, Sarkar S, Kar SS. Prevalence of depression and its relation to stress level among medical students in Puducherry, India. *Ind Psychiatry J*. 2017;26(1):86–90.
- Kish L. *Survey Sampling*. 1965.
- Dafaalla M, Farah A, Bashir S, et al. Depression, anxiety, and stress in Sudanese medical students: a cross sectional study on role of quality of life and social support. *Am J Educ Res*. 2016;26:937–942.
- Adewuya AO, Ola BA, Afolabi OO. Validity of the patient health questionnaire (PHQ-9) as a screening tool for depression amongst Nigerian university students. *J Affect Disord*. 2006;96(1–2):89–93. doi:10.1016/j.jad.2006.05.021

25. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med*. 2001;16(9):606–613.
26. Givens JL, Tjia J. Depressed medical students' use of mental health services and barriers to use. *Acad Med*. 2002;77(9):918–921. doi:10.1097/00001888-200209000-00024
27. Valle R, Sánchez E, Perales A. Depressive symptomatology and alcohol-related problems during the academic training of medical students. *Rev Peru Med Exp Salud Publica*. 2013;30(1):54–57. doi:10.1590/S1726-46342013000100011
28. Voltmer E, Kötter T, Spahn C. Perceived medical school stress and the development of behavior and experience patterns in German medical students. *Med Teach*. 2012;34(10):840–847. doi:10.3109/0142159X.2012.706339
29. Gold JA, Hu X, Huang G, et al. Medical student depression and its correlates across three international medical schools. *World J Psychiatry*. 2019;9(4):65. doi:10.5498/wjp.v9.i4.65
30. Al-Faris EA, Irfan F, Van der Vleuten CP, et al. The prevalence and correlates of depressive symptoms from an Arabian setting: a wake up call. *Med Teach*. 2012;34(Suppl 1):S32–36. doi:10.3109/0142159X.2012.656755
31. Bassols AM, Okabayashi LS, Silva AB, et al. First- and last-year medical students: is there a difference in the prevalence and intensity of anxiety and depressive symptoms? *Braz J Psychiatry*. 2014;36(3):233–240. doi:10.1590/1516-4446-2013-1183
32. Yang F, Meng H, Chen H, et al. Influencing factors of mental health of medical students in China. *J Huazhong Univ Sci Technol Med Sci*. 2014;34(3):443–449. doi:10.1007/s11596-014-1298-9
33. Elkins C, Plante KP, Germain LJ, Morley CP. Burnout and depression in MS1 and MS3 years: a comparison of cohorts at one medical school. *Fam Med*. 2017;49(6):456–459.
34. Brenneisen Mayer F, Souza Santos I, Silveira PS, et al. Factors associated to depression and anxiety in medical students: a multicenter study. *BMC Med Educ*. 2016;16(1):282. doi:10.1186/s12909-016-0791-1
35. Youssef FF. Medical student stress, burnout and depression in Trinidad and Tobago. *Acad Psychiatry*. 2016;40(1):69–75. doi:10.1007/s40596-015-0468-9
36. Waqas A, Rehman A, Malik A, Muhammad U, Khan S, Mahmood N. Association of ego defense mechanisms with academic performance, anxiety and depression in medical students: a mixed methods study. *Cureus*. 2015;7(9):e337.
37. Moreira de Sousa J, Moreira CA, Telles-Correia D. Anxiety, depression and academic performance: a study amongst portuguese medical students versus non-medical students. *Acta Med Port*. 2018;31(9):454–462.
38. Mulyadi S, Rahardjo W, Basuki AMH. The role of parent-child relationship, self-esteem, academic self-efficacy to academic stress. *Proc Soc Behav Sci*. 2016;217:603–608. doi:10.1016/j.sbspro.2016.02.063
39. Pandey J, Singh M. Donning the mask: effects of emotional labour strategies on burnout and job satisfaction in community healthcare. *Health Policy Plan*. 2016;31(5):551–562. doi:10.1093/heapol/czv102
40. Michie F, Glachan M, Bray D. An evaluation of factors influencing the academic self-concept, self-esteem and academic stress for direct and re-entry students in higher education. *Educ Psychol*. 2001;21(4):455–472. doi:10.1080/01443410120090830
41. Pinzon-Amado A, Guerrero S, Moreno K, Landinez C, Pinzon J. [Suicide ideation among medical students: prevalence and associated factors]. *Rev Colomb Psiquiatr*. 2013;43(Suppl 1):47–55.
42. Onyishi M, Talukdar D, Sanchez R, Olaleye AO, Medavarapu S. Prevalence of clinical depression among medical students and medical professionals: a systematic review study. *Arch Med*. 2016;8.
43. McKenzie SK, Collings S, Jenkin G, River J. Masculinity, social connectedness, and mental health: men's diverse patterns of practice. *Am J Mens Health*. 2018;12(5):1247–1261. doi:10.1177/1557988318772732
44. Nakimuli-Mpungu E, Musisi S, Wamala K, et al. Effectiveness and cost-effectiveness of group support psychotherapy delivered by trained lay health workers for depression treatment among people with HIV in Uganda: a cluster-randomised trial. *Lancet Global Health*. 2020;8(3):. doi:10.1016/S2214-109X(19)30548-0

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