JOURNAL OF BASHIR INSTITUTE OF HEALTH SCIENCES

RESEARCH ARTICLE

OPEN ACCESS

ARTICLE INFO
Date Received:
January 17, 2025
Date Revised:
March 07, 2025
Date Published Online
June 30, 2025

Prevalence of Anxiety, Depression, Sleep Quality and Suicide Ideation among Medical Students in Islamabad, Pakistan

[a]Maira Manzoor Kiani, [b]Sundus Khan, [c]Shabnum Khursheed, [d]Atif Ishaq Kiani, [e]Aqsa Aftab, [f]Ayesha Rehman

[a&b]*Lecturer Emergency and Clinical Medicine at Department of Allied Health Sciences, Bashir Institute of Health Sciences, Islamabad, Pakistan*

[c]*Department of Healthcare Management, Riphah International University, Islamabad, Pakistan*

[d]*Lecturer Medical Laboratory Technology at Department of Life Sciences, Abbasyn University, Islamabad, Pakistan*

[e] *Department of Healthcare Management, Riphah International University, Islamabad, Pakistan*

[f]*Lecturer Vision Sciences at Department of Allied Health Sciences, Bashir Institute of Health Sciences, Islamabad, Pakistan*

*CORRESPONDENCE
Maira Manzoor Kiani
Lecturer Emergency and Clinical Medicine at Department of Allied Health Sciences, Bashir Institute of Health Sciences, Islamabad, Pakistan
E-mail:
sunduskhan00@hotmail.com
Phone: +92 316 1976035

ABSTRACT

Background: Medical education is stressful and challenging, as it usually exposes students to multiple academic pressure, working long hours, and emotional stressors. The medical students are prone to developing mental health problems that may have a severe effect on their general well-being and academic performance. The purpose of the research study is to examine the prevalence of anxiety, depression, sleep quality, and suicide ideation among medical students. **Methods:** The research study was cross-sectional, and the data were collected among medical students studying in different medical colleges and universities in Islamabad, Pakistan. The stratified random sampling was employed to represent various years of study and institutions. Data were collected using validated self-report questionnaires, such as the Hospital Anxiety and Depression Scale (HADS), Pittsburgh Sleep Quality Index (PSQI), and Beck Scale for Suicide Ideation. The administration of the data collection was based on a structured online survey, which guaranteed the confidentiality and anonymity of the participants. The data was analyzed using statistical analysis such as descriptive statistics, chi-square tests, t-tests, and multivariate analysis. **Results:** The data of 200 people were analyzed, and the proportion of males and females was equal. A significant number of people recognized the presence of stressors, with 39% of men and 27% of women reporting the existence of stressors. The use of benzodiazepines in sleep was on the lower side [12% in males and 8% in females]. A few participants (a small percentage) indicated that they had substance abuse. Most of them practiced exercise, although regular exercise was less common. The level of anxiety was different, and mild anxiety was the most frequent. The degree of depression was not very high, and the participants described different levels of sleep disturbances. A minor proportion was administered the Beck Scale of Suicide Ideation, and some of them had positive outcomes. **Conclusion:** This study provides insights into the prevalence of

anxiety, depression, sleep quality, and suicide ideation among medical students in Pakistan. The findings suggest that medical students face significant mental health challenges, including high rates of anxiety, depression, and sleep disturbances. These results emphasize the importance of addressing the mental well-being of medical students and implementing targeted interventions and support systems to promote their resilience and overall well-being.

Keywords: Anxiety, Depression, Medical Students, Prevalence, Sleep Problems, Suicidal Ideation

INTRODUCTION

Medical education has been described as stressful and demanding, and it usually exposes students to a lot of academic pressure, long working hours, and emotional stressors. The students of medicine are vulnerable to developing mental health problems that may have a severe effect on their general health and performance [1]. The proposed research study is intended to explore the rates of anxiety, depression, sleep quality, and suicide ideation in medical students. The two mental health conditions that are frequently reported in medical students are anxiety and depression [2]. These psychological problems may be developed due to the strict curriculum, heavy workload, and exposure to human suffering [3]. Anxiety and depression may harm cognitive functioning, interpersonal relationships, and the capacity to deal with the stresses of medical training [4]. Several global studies in research have repeatedly pointed out that the prevalence rates of anxiety and depression are high in medical students. According to a study carried out in the United States, it was discovered that about 27 percent of medical students have symptoms of depression, whereas about 35 percent of them have symptoms of anxiety [5]. Equally, a survey in China showed 46 and 39 percent prevalence of anxiety and depression, respectively, among medical students [6].

The heightened vulnerability of medical students to anxiety and depression is caused by various risk factors. One of the most notable factors is academic stress, such as the heavy curriculum, workload, and fear of failure [7]. Also, the emotional burden of observing the suffering of patients, working long hours, and a lack of social support may be factors that lead to mental health issues. The risk is also aggravated by poor coping skills, absence of a work-life balance, and access to mental health services [7]. The literature on the topic has indicated multifactorial causes of anxiety and depression in medical students. Medical education is highly competitive and demanding, and this can bring a lot of pressure and self-doubt [8]. The move between a pre-medical and medical school, as well as the necessity to perform in a clinical setting, may be overwhelming as well. The heavy workload, which consists of many hours of study and clinical rotations, does not always allow time to take care of themselves and relax [9]. The combination of these factors and the emotional burden of taking care of patients and the never-ending search for perfection leads to the development of anxiety and depression among medical students [10]. Besides anxiety and depression, another important factor that impacts mental health is the quality of sleep. Medical students are frequently exposed to abnormal sleeping schedules, long hours of study, and shift work, which may interfere with their sleep-wake schedule. The low quality of sleep has been linked to poor concentration, memory issues, and susceptibility to mental illnesses [11].

Several studies have established different forms of sleeping issues among medical students. A common sleep complaint is insomnia or the inability to fall asleep, remain asleep, or have restorative sleep. A study carried out in Pakistan revealed that about 64 percent of medical students had symptoms of insomnia. A study conducted in India found that 49 percent of medical students had sleep problems [12]. Another sleep disorder that is common in medical students is the delayed sleep phase syndrome (DSPS). It is described by a shift in the timing of sleep and wakefulness, and it is difficult to synchronize sleep patterns with academic and clinical demands among students [13]. Research in Turkey found that 33 percent of medical students fulfilled the criteria of DSPS [14]. Moreover, excessive daytime sleepiness (EDS) is a major issue with medical students. In a study conducted in Malaysia, 36 percent of medical students were found to have excessive daytime sleepiness that may cause impaired concentration, decrease cognitive ability, and predispose them to errors in clinical practice [15]. Sleep deprivation is a common problem among medical students as education and clinical rotations are demanding. A study carried out in the United States established that medical students had an average of 6.77 hours of sleep per night, which is less than the recommended sleep time [16]. In another study conducted in Brazil, it was found that 88.8 percent of medical students slept insufficiently, with the mean hours of sleep being less than 6 hours a night [17].

Moreover, suicide ideation is increasingly becoming an issue among medical students [18]. The stressors that are unique to medical education, including academic pressure, emotional strain, and exposure to the suffering of patients, can lead to hopelessness and despair [18]. It is essential to know the rate of suicide ideation to create effective preventive strategies and offer mental health assistance to students in time. This research study will help illuminate the mental health issues of this vulnerable group in Pakistan by focusing on the prevalence of anxiety, depression, sleep quality, and suicide ideation among medical students. The results of this research not only increase the knowledge of the scope of these problems but also offer helpful knowledge in the creation of specific interventions and support systems to facilitate the well-being and resilience of medical students.

MATERIALS AND METHODS

In this study, a cross-sectional study design was used to examine the prevalence of anxiety, depression, sleep quality, and suicidal ideation among medical students attending different government and private medical colleges in the capital territory of Islamabad, Pakistan. A stratified random sampling method was used to provide proportional representation by academic years and institutions, and a pre-determined sample size of 200 students was calculated based on a statistical power analysis. Data collection was performed with the help of validated self-report measures: the Hospital Anxiety and Depression Scale (HADS) was used to measure the levels of anxiety and depression, the Pittsburgh Sleep Quality Index (PSQI) was used to measure the quality of sleep, and the Beck Scale for Suicide Ideation was used to measure the presence and severity of suicidal thoughts.

DATA COLLECTION PROCEDURE

The data were obtained through a structured online survey that was sent to the participants using a secure link. All the respondents signed informed consent before completing the questionnaire. The study was very strict in maintaining confidentiality and anonymity. The Institutional Review Board (IRB) of collaborating institutions granted ethical approval, and the protocols had strict policies in terms of the privacy of the participants and data security.

STATISTICAL ANALYSIS

The collected data was analysed using appropriate statistical methods. Descriptive statistics were used to determine the prevalence rates of anxiety, depression, sleep quality, and suicide ideation among medical students. Chi-square tests or t-tests were conducted to examine associations between variables, and multivariate analysis was employed to control confounding factors.

RESULTS

Table 1 provides a frequency distribution of demographic variables among male and female participants in the study. The table shows that the sample consists of 100 male participants, accounting for 50% of the total sample, and 100 female participants, also accounting for 50% of the total sample, indicating a balanced representation of gender in the study. The table presents the distribution of participants across different age groups. Among male participants, 48 (48%) fall in the 19-21 years age group, while 52 (52%) belong to the 22-24 years age group. Similarly, among female participants, 44 (44%) are in the 19-21 years age group, and 56 (56%) are in the 22-24 years age group. Additionally, the table provides information on the distribution of participants across professional years. Among male participants, there are no participants in the 1st year, 13 (13%) in the 2nd year, 43 (43%) in the 3rd year, 43 (43%) in the 4th year, and 1 (1%) in the Final year. Among female participants, there is 1 (1%) participant in the 1st year, 19 (19%) in the 2nd year, 38 (38%) in the 3rd year, 41 (41%) in the 4th year, and 1 (1%) in the Final year. Furthermore, the table presents data on participants' academic interests. Among male participants, 89 (89%) have an academic interest, while 11 (11%) do not. Among female participants, 96 (96%) have an academic interest, while only 4 (4%) do not.

Table 1: Frequency Distribution of Demographic Variables [N=200]

		Male	Female
Variables	Sub-Categories	F (%)	F (%)

Gender		100	100
Age	19-21 Years	48 (48%)	44 (44%)
	22- 24 Years	52 (52%)	56 (56%)
	1st Year	00 (00%)	01 (01%)
Professional Year	2nd Year	13 (13%)	19 (19%)
	3rd Year	43 (43%)	38 (38%)
	4th Year	43 (43%)	41 (41%)
	Final Year	01 (01%)	01 (01%)
Academic Interest	Yes	89 (89%)	96 (96%)
	No	11 (11%)	04 (04%)

Table 2 provides the prevalence of psychiatric disorders among a population categorized by different variables. The table specifically focuses on the comparison between males and females. Let's dive into the narrative explanation of the data presented. In terms of any known physical or psychiatric illness, the data reveal that none of the males or females included in the study reported having such an illness. This indicates a 0% prevalence rate for both genders, suggesting that the population under investigation does not have a significant history of pre-existing health conditions in this regard. Moving on to family psychiatric history, the numbers shift slightly. Among males, 3% reported having a family history of psychiatric disorders, while 97% did not have such a history. On the other hand, among females, 8% had a family psychiatric history, and 92% did not. These results indicate that a small portion of the population, both males and females, have a familial predisposition to psychiatric disorders, but the majority do not. Regarding stressors in life, the data show that a relatively higher percentage of males and females experience stressors. Among males, 39% reported having stressors, while among females, 27% reported the same. This suggests that stress is more prevalent among males compared to females in this population. However, it is worth noting that most of both genders, 61% of males and 73% of females, did not report experiencing significant stressors. Lastly, the use of benzodiazepines for sleep was examined. The data reveal that 12% of males reported using benzodiazepines for sleep, while only 8% of females reported the same. This indicates that a slightly higher proportion of males rely on benzodiazepines for sleep compared to females. However, most of both males and females, 88% of males and 92% of females, do not use benzodiazepines for sleep.

Table 2: Prevalence of Psychiatric Disorders among the Population [N=200]

Variables		Male		Female	
		F	%	F	%
Any known Physical/Psychiatric Illness?	Yes	00	0%	00	0%
	No	100	100%	100	100%
Family Psychiatric History	Yes	03	3%	08	8%
	No	97	97%	92	92%
Stressors in life	Yes	39	39%	27	27%
	No	61	61%	73	73%
Use of Benzodiazepines for sleep?	Yes	12	12%	08	8%
	No	88	88%	92	92%

Table 3 presents the level of physical activity among males and females. It includes information on two variables: "Any abuse of drugs?" and "Do you exercise?" In the first variable, which pertains to drug abuse (such as cannabis, cigarettes, alcohol, etc.), 6% of males answered "Yes," indicating that they engage in drug abuse. For females, only 2% responded positively. Most of both males (94%) and females (98%) answered "No," indicating that they do not abuse drugs. Moving on to the second variable, "Do you exercise?" Among males, 71% stated that they exercise, while 29% do not. Among females, 62% reported exercising, while

38% do not engage in regular exercise. Lastly, the third variable, "Do you exercise regularly?" shows that 24% of males exercise regularly, while 76% do not. For females, 8% exercise regularly, while the majority (82%) do not maintain a regular exercise routine.

Table 3: Level of Physical Activity among Medical Students in Islamabad, Pakistan [N=200]

Variables		Male		Female	
		F	%	F	%
Any abuse of a drug? (Cannabis,	Yes	06	06%	02	02%
Cigarettes, alcohol, etc.)	No	94	94%	98	98%
Do you exercise?	Yes	71	71%	62	62%
	No	29	29%	38	38%
Do you exercise regularly?	Yes	24	24%	8	18%
	No	76	76%	82	82%

Table 4 presents the prevalence rates of anxiety and depression among males and females. The table is divided into two variables: anxiety and depression. Analyzing the data for anxiety, we can observe that among males, 39% reported having no anxiety. On the other hand, 41% experienced mild anxiety, 18% had moderate anxiety, and only 2% had severe anxiety. Looking at the female data, 18% reported having no anxiety. A higher percentage of females experienced mild anxiety (46%) compared to males, while 30% had moderate anxiety. The proportion of females reporting severe anxiety was 6%, which was higher than that of males. Moving on to the analysis of depression, among males, the majority (52%) reported no depression. For females, the percentage of no depression was also high at 64%. Among males, 25% experienced mild depression, while 23% had moderate depression. No males reported severe depression. Among females, 10% experienced mild depression, while 20% had moderate depression. The percentage of females reporting severe depression was 6%. Based on the data, it can be concluded that females generally have a higher level of both anxiety and depression compared to males. This is evident from the higher percentages of females reporting mild, moderate, and severe anxiety, as well as moderate and severe depression.

Table 4: Prevalence Rate of Anxiety and Depression [N=200]

Variables		Male		Female	
		F	%	F	%
	No Anxiety	39	39%	18	18%
	Mild	41	41%	46	46%
Anxiety	Moderate	18	18%	30	30%
	Severe	02	2%	06	6%
	No Depression	52	52%	64	64%
Depression	Mild	25	25%	10	10%
	Moderate	23	23%	20	20%
	Severe	00	00%	06	06%

Table 5 illustrates the prevalence rates of sleep disorders and suicidal ideation in males and females. The table includes two variables: sleep quality and the Beck Scale for Suicide Ideation. Examining the data concerning sleep quality, among males, 25% reported having a normal sleep pattern. A larger proportion of males experienced mild sleep disturbance (43%), followed by moderate sleep disturbance (27%), and a small percentage (5%) reported severe sleep disturbance. Turning to the female data, 14% reported having a normal sleep pattern. Similarly to males, a higher percentage of females experienced mild sleep disturbance (24%), followed by moderate sleep disturbance (32%). Notably, a significant proportion of females (30%) reported

severe sleep disturbance, surpassing the prevalence observed in males. Regarding the overall assessment of poor sleep quality, 75% of males and 86% of females reported experiencing suboptimal sleep quality. Shifting the focus to suicidal ideation, among males, 12% completed the Beck Scale for Suicide Ideation form. Of those who filled out the form, 4% tested positive for suicidal ideation. Among females, 20% completed the Beck Scale for Suicide Ideation form, and among them, 10% tested positive for suicidal ideation. Based on the data, it can be concluded that both males and females encounter sleep disorders, but females exhibit a higher prevalence of severe sleep disturbance. Concerning suicidal ideation, females also exhibit a higher prevalence compared to males, with a greater percentage testing positive for suicidal ideation.

Table 5: Prevalence of Sleep Disorders and Suicidal Ideation [N=200]

Variables		Male		Female	
		F	%	F	%
Pittsburgh Sleep Quality Index (PSQI):	Normal Sleep pattern	25	25%	14	14%
	Mild Sleep Disturbance	43	43%	24	24%
	Moderate Sleep Disturbance	27	27%	32	32%
	Severe Sleep Disturbance	05	05%	30	30%
Overall, bad sleep Quality		75	75%	86	86%
Beck Scale for Suicide Ideation	Filled form	12	12%	20	20%
	Positive for suicidal ideation	04	4%	10	10%

DISCUSSION

The current research on 200 Pakistani medical students demonstrates the essential tendencies in sleep disturbances, mental health, and suicidality, and significant gender differences. Females reported much higher rates of severe sleep disturbance (30% vs. 5% males), anxiety (46% mild, 30% moderate, 6% severe), and suicidal ideation (10% vs. 4% males), although fewer stressors were reported (27% vs. 39%). One of the possible protective factors was physical activity, and 24% of males were physically active compared to 8% of females. The results overlap with several recent investigations of the sleep-psychopathology-suicidality pathway, and finding both similarities and inconsistencies, which are worth critical analysis. The strong gender difference in sleep disturbances and suicidality corresponds with neurobiological and psychosocial studies. The increased rate of severe sleep disturbances (PSQI) in females is associated with increased anxiety and depressive symptoms, which is also found in the Austrian young adults, where poor sleep quality was a predictor of suicidality mainly via anxiety/depression pathways [19]. This cross-cultural consistency indicates that sleep architecture disturbances might be disproportionately impacted by females because of hormonal effects on circadian rhythms and emotional hyper-reactivity. However, paradoxes arise when men are exposed to stress in the present research, males reported more stressors (39% vs. 27%), but females demonstrated poor mental results. This paradox indicates that it is not the exposure to stress but stress appraisal that might be the driver of gender differences, which can be mediated by rumination, which is supported by the physiological stress theory [20].

Furthermore, this fact highlights reported poor sleep compared to 75% of males further highlights the importance of sleep as a key intervention point of this population. The preventive effect of physical activity (24% males versus 8% females) offers a critical intervention understanding. This is highly consistent with the study conducted in the Guangdong Province, where physical exercise mediated the relationship between sleep and depression by alleviating depressive symptoms even among poor sleepers [20, 21]. The neurobiological processes could include normalization of HPA axis dysfunction and cortisol lowering induced by exercise [20, 21], which could reverse the inflammatory activation (e.g., IL-6 increase) that has been implicated in both sleep disturbances and suicidality [22]. Importantly, low regular exercise rates (especially in females) in the current study identify a potentially modifiable factor that may interfere with the sleep-suicidality pathway. This is compared to research that only examines pharmacotherapy (e.g., benzodiazepine use in this case: 8-12%), indicating that non-pharmacological interventions can provide better risk mitigation due to acting upstream [23].

The fact that females had higher proportions of moderate/severe sleep disturbances (62% combined) and suicidality is consistent with studies that have highlighted daytime impairment as a key mediator. In a clinical study of depressed youth, daytime

dysfunction, rather than nocturnal symptoms alone, was the sleep domain most strongly linked to suicidal ideation when controlling depression severity [24]. This implies that functional outcomes (e.g., fatigue, cognitive impairment) that occur 24 hours after exposure (e.g., suicidality) may be more proximal than sleep disruption itself. This paradigm is supported by the PSQI data of the current study, which measures daytime dysfunction, which revealed that females with severe sleep disturbances (30%) reported twice the suicidality of males. This aligns with longitudinal data that daytime sleepiness mediates the effects of social media on suicidal ideation in college students, forming a consistent model in which sleep disruption, impairment during the day, emotional dysregulation and suicidality [25].

Although meta-analytic research has found a strong association between insomnia and suicidality (OR=2.10), this study found comparatively low suicidality rates (4-10%) despite high rates of sleep disturbance (75-86%), a disparity that may be partially attributed to methodological weaknesses (e.g., short suicidality screening), the protective cultural influence of collectivist family structure in Pakistan, and the so-called weak risk factor paradox whereby sleep disturbances have statistically significant but clinically modest impacts [26, 27]. The lack of reported depression diagnoses (0%) also defies known depression-suicidality links, perhaps reflecting underdiagnosis, stigma, or actual subclinical conditions, and implying that sleep interventions might be especially useful early [28]. Although gender differences (e.g., 30% severe sleep disturbance in females vs. 5% in males) are consistent with the broader literature, cultural and contextual factors require gender-specific interventions that are multi-component and that focus on daytime dysfunction, exercise barriers, and gender-specific stressors via culturally adapted frameworks such as academic-integrated support instead of clinical referrals.

LIMITATIONS AND RECOMMENDATIONS

The limitations of this research work are that it is a single institutional sampling in Islamabad that restricts the generalization of the study to Pakistan, and the use of self-reported data, which is susceptible to recall bias and social desirability bias. The cross-sectional design does not allow causal inference, and the possible underrepresentation of students with severe effects and unmeasured confounders further limits the results. Future studies are needed to use multi-centre longitudinal designs in different regions of Pakistan, objective measures (e.g., actigraphy to measure sleep), and control of key confounders (e.g., academic load, socioeconomic factors), and mixed methods approaches to gain a deeper understanding of risk mechanisms and resilience factors in this population.

CONCLUSION

In conclusion, this research study examined demographic variables, psychiatric disorders, physical activity levels, and prevalence rates of anxiety, depression, sleep disorders, and suicidal ideation among males and females. The sample consisted of 100 male and 100 female participants, representing a balanced gender distribution across different age groups and professional years. The study found a low prevalence of known physical or psychiatric illnesses among both genders, indicating a lack of significant pre-existing health conditions. However, a small proportion of participants reported a family history of psychiatric disorders, suggesting a familial predisposition in some cases. Stressors were more prevalent among males, but most of both genders did not report significant stressors. A slightly higher percentage of males used benzodiazepines for sleep compared to females, although most participants in both groups did not rely on them. In terms of physical activity, more males reported exercising, while a larger proportion of females did not maintain a regular exercise routine. Females exhibited higher rates of anxiety and depression compared to males, with higher percentages of mild, moderate, and severe anxiety, as well as moderate and severe depression. Both males and females reported sleep disturbances, with females showing a higher prevalence of severe sleep disturbance. Most participants in both groups reported suboptimal sleep quality. Females also had a higher prevalence of suicidal ideation compared to males. Therefore, the study suggests that females may be more susceptible to psychiatric disorders, anxiety, depression, sleep disturbances, and suicidal ideation compared to males. These findings contribute to our understanding of gender differences in mental health within the studied population. Further research and targeted interventions addressing these gender-specific mental health concerns could be beneficial.

CONFLICT OF INTEREST

The authors declared no conflict of interest.

AUTHOR CONTRIBUTION

SK designed the study, methodology, supervised data collection, conducted statistical analysis, and wrote the manuscript. MMK oversaw ethics, curated/validated data, gender-disaggregated analysis, and manuscript editing. MIK performed a literature review, interpreted data from psychiatric instruments, designed tables, and critically revised the content. AK created questionnaires, carried out recruitment/consent, data cleaning, and visualized the results. AR was the senior supervisor, funded the study, guaranteed methodological rigor, interpreted clinical implications, and completed the manuscript. The final version was approved by all authors.

ACKNOWLEDGEMENT

We extend our heartfelt gratitude to Hamad Ahmed, Associate Professor Department of Pharmacy, Bashir Institute of Health Sciences, Islamabad for his invaluable support and assistance throughout this study.

FINDING SOURCE

No funding was received for this work

REFERENCES

1. Teixeira, R.J., T. Brandão, and A.R.J.C.P. Dores, *Academic stress, coping, emotion regulation, affect and psychosomatic symptoms in higher education.* 2022. **41**(11): p. 7618-7627.
2. Mirza, A.A., et al., *Depression and anxiety among medical students: a brief overview.* 2021: p. 393-398.
3. Muller, A.E., et al., *The mental health impact of the covid-19 pandemic on healthcare workers, and interventions to help them: A rapid systematic review.* 2020. **293**: p. 113441.
4. Waters, L., et al., *Positive psychology in a pandemic: Buffering, bolstering, and building mental health.* 2022. **17**(3): p. 303-323.
5. Matos Fialho, P.M., et al., *Perceptions of study conditions and depressive symptoms during the COVID-19 pandemic among university students in Germany: Results of the international COVID-19 student well-being study.* 2021. **9**: p. 674665.
6. Bello, U.M., et al., *Prevalence of anxiety and depression among the general population in Africa during the COVID-19 pandemic: a systematic review and meta-analysis.* 2022. **10**.
7. Hassan, S.u.N., et al., *Academic self-perception and course satisfaction among university students taking virtual classes during the COVID-19 pandemic in the Kingdom of Saudi-Arabia (KSA).* 2021. **11**(3): p. 134.
8. Stankov, L.J.L. and I. Differences, *Unforgiving Confucian culture: A breeding ground for high academic achievement, test anxiety and self-doubt?* 2010. **20**(6): p. 555-563.
9. Ross, A., et al., *Factors that influence health-promoting self-care in registered nurses: Barriers and facilitators.* 2019. **42**(4): p. 358.
10. Moreno, C., et al., *How mental health care should change as a consequence of the COVID-19 pandemic.* 2020. **7**(9): p. 813-824.
11. Ju, Y.-E.S., B.P. Lucey, and D.M.J.N.R.N. Holtzman, *Sleep and Alzheimer disease pathology—a bidirectional relationship.* 2014. **10**(2): p. 115-119.
12. Molla, A. and T.J.S.d. Wondie, *Magnitude of poor sleep hygiene practice and associated factors among medical students in Ethiopia: a cross-sectional study.* 2021. **2021**.
13. Moderie, C., S. Van der Maren, and M.J.S.m. Dumont, *Circadian phase, dynamics of subjective sleepiness and sensitivity to blue light in young adults complaining of a delayed sleep schedule.* 2017. **34**: p. 148-155.
14. Ozkara San, E.J.J.o.T.N., *Effect of the diverse standardized patient simulation (DSPS) cultural competence education strategy on nursing students' transcultural self-efficacy perceptions.* 2019. **30**(3): p. 291-302.

15. Hangouche, A.J.E., et al., *Relationship between poor quality sleep, excessive daytime sleepiness and low academic performance in medical students.* 2018: p. 631-638.
16. Haile, Y.G., S.M. Alemu, and T.D.J.B.r.i. Habtewold, *Insomnia and its temporal association with academic performance among university students: a cross-sectional study.* 2017. **2017**.
17. Alqudah, M., et al., *Daytime sleepiness among medical colleges' students in Jordan: Impact on academic performance.* 2022. **2022**.
18. Witt, K., et al., *Effectiveness of universal programmes for the prevention of suicidal ideation, behaviour and mental ill health in medical students: a systematic review and meta-analysis.* 2019. **22**(2): p. 84-90.
19. Slanitz, C., et al., *Anxious and depressive symptoms mediate the influence of sleep quality on suicidality in young adults.* Frontiers in Public Health, 2024. **Volume 12 - 2024**.
20. Liu, Y., et al., *Physical exercise moderates the mediating effect of depressive symptoms between sleep quality and suicidal ideation among college students.* Sci Rep, 2025. **15**(1): p. 21925.
21. Li, Y. and K. Guo, *Research on the relationship between physical activity, sleep quality, psychological resilience, and social adaptation among Chinese college students: A cross-sectional study.* Frontiers in psychology, 2023. **14**: p. 1104897.
22. Fan, X., et al., *Sleep disturbance and suicidal ideation among youth with depression.* Journal of Affective Disorders, 2024. **354**: p. 232-238.
23. Khazaie, H., et al., *Physical Activity Patterns, Circadian Rhythms, and Aggressive and Suicidal Behavior among a Larger Sample of the General Population Aged 15 to 34 Years.* J Clin Med, 2023. **12**(8).
24. Ojha, U.C. *Journal Scan Endothelial repair capacity and apoptosis are inversely related in obstructive sleep apnea. Obstructive sleep apnea and stroke. Development of central sleep apnea after maxillofacial surgery for obstructive sleep apnea*. 2018.
25. Ma, Y.-B., et al., *The effect of social media use on suicidal ideation in college students: Mediation by daytime sleepiness and sleep quality.* Journal of Affective Disorders, 2025. **374**: p. 274-281.
26. McCall, W.V., et al., *Reducing Suicidal Ideation Through Insomnia Treatment (REST-IT): A Randomized Clinical Trial.* Am J Psychiatry, 2019. **176**(11): p. 957-965.
27. Romier, A., et al., *Objective sleep markers of suicidal behaviors in patients with psychiatric disorders: A systematic review and meta-analysis.* Sleep Medicine Reviews, 2023. **68**: p. 101760.
28. Slanitz, C., et al., *Anxious and depressive symptoms mediate the influence of sleep quality on suicidality in young adults.* Front Public Health, 2024. **12**: p. 1322069.