Original Article

Mind the Grades: Investigating the Relationship Between Academic Performance and Mental Distress Among Medical Students

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Abstract

Background: Mental distress and psychological issues are among the prevalent issues that medical students face and it significantly impacts their academic performance. The aim of this study was to investigate the correlation that exists between academic performance and degree of depression, anxiety, and stress levels among undergraduates in medicine.

Methods: This cross-sectional study was a descriptive research done at Isra University, Hyderabad between a period of August to December 2023. The participants of the study were first-, second-, and third-year undergraduate medical students of basic sciences of any gender who were willing to participate. The mental health of the participants was determined by the Depression, Anxiety, and Stress Scale-21 (DASS-21) and the latest examination findings were recorded to determine academic performance.

Results: Among 463 respondents, 71.27 percent were females and 28.72 percent were males. The incidences of depression, anxiety and stress were established to be 69.97, 71.05 and 36.93, respectively. There were significant differences ($p<0.05$) in prevalence of these conditions of mental health across age groups, gender, residence, and academic year. Age, gender, residence, and type of accommodation were significantly related ($p<0.05$) with academic performance. Moreover, academic scores were found to have a strong negative correlation with the levels of depression ($r= -0.894, p<0.001$), anxiety ($r= -0.922, p<0.001$), and stress ($r= -0.916, p<0.001$).

Conclusions: The study concludes that academic performance and DAS scores have significant negative correlation. It means that the higher the level of the DAS symptoms, the lower the academic score among the undergraduate medical students.

How to cite: Meghji KA, Nadeem F, Memon TF, Rehman A, Rehman M. Mind the Grades: Investigating the Relationship Between Academic Performance and Mental Distress Among Medical Students. Ann King Edw Med Univ.2025;31i4:427-433

Introduction

Mental health which is a significant source of satisfaction and quality of life is a good indicator of overall well-being. Bad mental health is a complex psychological challenge that haunts college students in both the developed and developing worlds alike.[1] Medical education specifically, with its challenging curriculum, clinical apprenticeship, peer pressure, and life changes that condition students to become good doctors or surgeons, is one of the primary reasons of mental disorders around the world.[2]

Medical students face a variety of stressors during their academic careers, such as exposure to suffering patients and deaths, sleep deprivation, isolated social life, and financial constraints, all of which take a significant toll on their mental health affecting their general performance. If left untreated, poor mental health can cause adverse effects including, but not limited to, poor academic performance, compromised academic integrity, subdued empathetic behavior, alcohol and drug abuse, low self-esteem, and suicidal ideation.[2,3]

According to the American Psychological Association (APA), depression is characterized by continuous sorrow, despair, and a loss of interest or pleasure in previously enjoyed activities. Anxiety is defined as excessive worry, apprehension, and fearfulness about future events or situations. Stress refers to the body's physiological and psychological response to external pressures or demands. All three are considered important indicators of mental health.[4] Although depression, anxiety, and stress are separate psychological principles, they commonly interact and overlap, and are some of the most common mental health issues found in medical students significantly affecting academic experience.[5]

The existing literature on the topic shows that the MaOIs showed inconsistent prevalence rates of depression, anxiety, and stress among medical students, with prevalence being over 50 percent in such countries as Pakistan and China.[6,7]

Good mental health among students is critical towards development of cognitive capabilities and intellectual abilities. These qualities are prerequisites to the development of quality medical graduates that have a wide knowledge of medical concepts. This enables such graduates to be better prepared to handle those tasks that involve critical thinking, and capable of navigating complex healthcare situations with an empathetic and precise approach to academic activities that can result in poor academic performance worsening mental distress further, complicating matters even more.[8]

Depression, anxiety, and stress in medical students are mental distresses that are becoming a worrying issue worldwide, and the highest levels have been reported in South Asian groups.[9] This can also lead to a domino effect in which poor mental health such as increased levels of depression, stress, and anxiety among students can lead to worsening academic performance which in turn can cause amplified levels of mental distress.[10]

Also, the impact of sociodemographic factors on academic performance including gender, type of accommodation, and residence (urban vs. rural) in the background of mental health is under-researched. These gaps are crucial to medical institutions aiming to improve system support to students and enhance their well-being and academic accomplishments. Consequently,

Therefore, this study aims to investigate the relationship between mental distress and academic performance among Pakistani medical students, while also assessing the role of key demographic variables.

Methods

The research took place in Isra University, Hyderabad in August 2023 to December 2023 after receiving the approval of the university Ethical Review Board (ERB letter no: IU/RR-10-IRC-23/N/2023/227).

The sample size was estimated to be 323 (OpenEpi, Based on an expected prevalence of 70%).[2]

In order to implement the possibility of attrition into the study, variability, erroneous filler of the forms, and low response rates, 507 questionnaires were administered to the students who are present during the day of the data collection. A total of 463 participants, each of which had finished the questionnaire, were included in the final sample, which has a response rate of 91.3.

The sampling was done on a convenience basis. Informed consent was given by MBBS students of either sex who studied basic sciences (first, second, and third year). The exclusion criteria were students of the clinical sciences (fourth and final year), students with pre-existing mental health conditions, or those undergoing treatment of mental health, and students who refused to participate.

The participants were informed of the study objectives and procedures and anonymity was guaranteed. A self-structured questionnaire was used to gather the demographic data such as age, gender, residence, and type of accommodation. Mental health was evaluated on the basis of the validated Depression, Anxiety, and Stress Scale-21 (DASS-21),[11] which offered not only overall numerical values of the given subscales but also the categorical values (presence or absence of symptoms). The academic achievement was measured based on the most recent scores of the summative examination of the participants (annual university examination percentages), which were further broken down into two groups, <70% and ≥ 70% to reflect a popular academic standard of adequate academic performance.

The analysis of the data was conducted by means of the samples of SPSS version 28. The descriptive statistics were provided in means and standard deviations of continuous variables and frequencies with proportions

of categorical variables. A Shapiro-Wilk test was used to determine the status of the continuous variables in terms of normality. As part of inferential statistics, chi-square tests were used to test the relationship between the categorical variables which included academic performance grouping and demographics. The level of correlation between academic scores (percentage) and continuous DASS-21 subscale scores was assessed with the help of Pearson correlation. A p-value less than the 0.05 was regarded as statistically significant.

Results

Out of the 463 students, 71.27 percent were females and 28.72 percent were males. The age of the respondents was between 18-23 years with a mean age of 20.38± 2.49 years. Figure 1 presents the gender distribution of age (based on gender) of the study participants.
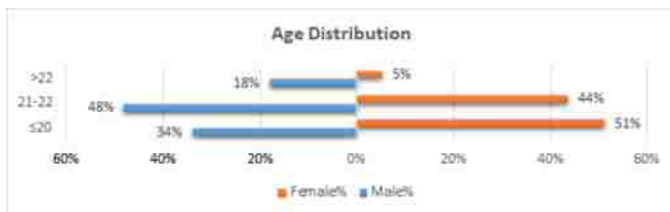
Figure 1. *Gender-Based Age Distribution: Population pyramid of study participants.*

The prevalence of depression, anxiety, and stress stood at 69.97%, 71.05%, and 36.93% with the mean scores of 15.25±11.03, 13.35±11.93, and 11.12±9.33 on depression, anxiety, and stress respectively. Table 2 provides the relationships between depression, anxiety, and stress symptoms and a number of demographic variables.

Table 1: *Demographic variables of the study population (n=463)*

Variables	n	%
Age		
≤20	214	46.22
21-22	208	44.92
>22	41	8.85
Gender		
Male	133	28.72
Female	330	71.27
Residence		
Urban	153	33.04
Rural	310	66.95
Accommodation		
Off-campus	315	68.03
On-campus	148	31.96
Year of Study		
First Year	161	34.77
Second year	154	33.26
Third Year	148	31.96

Significant differences in age group (p<0.05) were observed with higher rates of frequencies in the participants belonging to the age group of ≤20 years and then

Table 2: *Association of demographic variables with Depression, Anxiety, and Stress (n=463)*

Variables	Depression			Anxiety			Stress		
	Absent n (%)	Present n (%)	χ^2 test p-value	Absent n (%)	Present n (%)	χ^2 test p-value	Absent n (%)	Present n (%)	χ^2 test p-value
Age group									
≤20 years	42 (30.21)	172 (53.08)	**21.742**	45 (33.58)	169 (51.36)	**12.374**	116 (39.72)	98 (57.30)	**16.523**
21-22 years	78 (56.11)	130 (40.12)	**0.000***	73 (54.47)	135 (41.03)	**0.002***	152 (52.05)	56 (32.74)	**0.000***
>22 years	19 (13.66)	22 (6.79)		16 (11.94)	25 (7.59)		24 (8.21)	17 (9.94)	
Gender									
Male	55 (39.56)	78 (24.07)	**5.821**	53 (39.55)	80 (24.31)	**10.796**	105 (49.3)	35 (25.5)	**7.512**
Female	98 (70.50)	232 (71.60)	**0.015***	81 (60.44)	249 (75.68)	**0.001***	108 (50.7)	102 (74.5)	**0.006***
Residence									
Urban	60 (43.16)	93 (28.70)	**9.194**	59 (44.02)	94 (28.57)	**1.028**	111 (38.01)	42 (24.56)	**8.820**
Rural	79 (56.83)	231 (71.29)	**0.002***	75 (55.97)	235 (71.42)	**0.001***	181 (61.98)	129 (75.43)	**0.002***
Study year									
1st year	32 (23.02)	129 (39.81)	**23.696**	18 (13.43)	143 (43.46)	**47.378**	73 (25.00)	88 (51.46)	**34.063**
2nd year	41 (29.49)	113 (34.87)	**0.000***	47 (35.07)	107 (32.52)	**0.000***	108 (36.98)	46 (28.65)	**0.000***
3rd year	66 (47.48)	82 (25.30)		69 (51.49)	79 (24.01)		111 (38.01)	37 (21.63)	
Accommodation									
On-campus	29 (20.86)	119 (36.72)	**11.257**	25 (18.65)	123 (37.96)	**15.358**	41 (14.04)	107 (62.57)	**116.800**
Off-campus	110 (79.13)	205 (63.27)	**0.000***	109 (81.34)	206 (63.58)	**0.000***	251 (85.95)	64 (37.42)	**0.000***

* Statistically significant (p-value <0.05) using Chi-square test.

21-22 years. The difference in gender was also significant (p<0.05), as females had higher rates of frequency in all the three conditions. The residence of the participants was also found to have a significant relationship, and participants in rural were found to have higher frequency rates of depression, anxiety, and stress than their urban counterparts (p<0.05). Additionally, statistically significant associations were found between the academic year of study and all three mental health conditions (p<0.05), with the highest frequency rates in the first year, followed by the second and third years, respectively (Table 2).

Of the 463 participants included in the study, 314 (67.81%) had an academic score of ≥70%. Academic score was significantly associated with age group (p<0.05), with higher scores observed in participants aged ≤20 years followed by participants in the 21-22 years age group. Gender differences were also statistically significant (p<0.05), with females exhibiting higher academic scores compared to their male counterparts (p<0.05). Similarly, a statistically significant association of academic score was observed with residence (p<0.05) and accommodation (p<0.05), with higher academic scores observed in students hailing from urban areas and having off-campus accommodation. The association of academic scores with demographic variables is shown in Table 3.
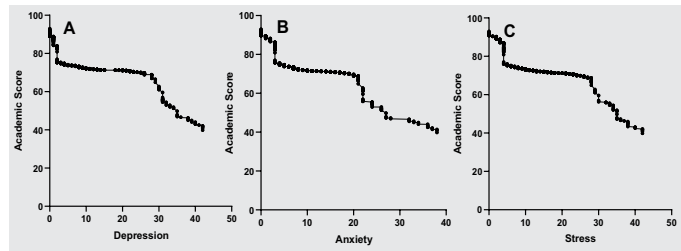
Table 3: *Association of academic score with demographic variables (n=463)*

Variables	Academic Performance		
	<70%	≥70%	χ² test
	n (%)	n (%)	p-value
Age			
≤20	41 (27.51)	173 (55.09)	**44.884**
21-22	80 (53.69)	128 (40.76)	**0.001***
>22	28 (18.79)	13 (4.14)	
Gender			
Male	61 (40.93)	72 (22.92)	**16.008**
Female	88 (59.06)	242 (77.07)	**0.001***
Residence			
Urban	39 (26.17)	114 (36.30)	**4.687**
Rural	110 (73.82)	200 (63.69)	**0.030***
Accommodation			
On-campus	57 (38.25)	91 (28.98)	**3.996**
Off-campus	92 (61.74)	223 (71.01)	**0.045***

* Statistically significant (p-value <0.05) using Chi-square test.

A statistically significant negative correlation (p<0.001) was found between academic scores and the levels of depression (r= -0.894), anxiety (r= -0.922), and stress (r= -0.916, p<0.001). This indicates that as levels of depression, anxiety, and stress increase, academic scores tend to decrease.

Figure 2. *Correlation of Academic Scores with A) Depression, B) Anxiety, and C) Stress*

Discussion

This research was designed to assess the prevalence of depression, anxiety and stress among medical students and the association between these psychological conditions and academic performance. This relationship is long lasting and takes a considerable physical, mental, and emotional toll, requiring resilience and commitment by future medical practitioners to continue with their medical education courses, which then results in adverse outcomes that are undesirable and unavoidable.[12,13] This association is crucial in understanding how to introduce effective mechanisms and strategies that can improve the overall performance of the medical practitioner including the academic performance, the presence of malicious academic behavior, cynicism, and burnout, which are undesirable and cannot be avoided.[14]

The prevalence rates of the depression, anxiety and stress in medical students of the present study were 69.97, 71.05 and 36.93 respectively. A study carried by Azim et al. in Karachi had also reported similar frequency rates of depression (71%), anxiety (72%), and stress (35%) as seen in this study.(15) Similarly, Valladares-Garrido et al., in a study conducted in Peru, observed depression (71.6%), anxiety (71.9%), and stress (62.7%), which is in alignment with the findings of the current study.[3]

Mirza et al., in a study conducted in Kingdom of Saudi Arabia, observed stress levels of 38% among medical students, similar to findings of the present study.[16] The difference observed in the levels of mental distress in the studies mentioned above could be explained by a different study population, screening instrument, methodology applied, the cut-off values defining the amount of depression, and the socio-demographic traits of the study population.

In the current research, the results were found to be statistically significant between depression, anxiety, and stress variables as related to age and year of study with

younger students and medical school students in their first year having higher levels of mental distress. A second study stated that students between the ages of 18-21 years had a 2.42 times higher risk of developing depressions which concurs with the results of this study.[17]

Likewise, research by Adhikari et al. at the Nepalese Army Institute of Health Sciences-College of Medicine in Nepal reported higher levels of depression among first-year students.[18] This heightened mental distress could stem from adjusting to a new environment, separation from family and friends, and the challenges of adapting to a different educational system. Potential factors contributing to this include reduced social interaction, unfamiliar academic routines and exam schedules, and a lack of breaks or vacations.[16]

There was also a higher frequency of depression, anxiety, and stress observed in medical students from rural areas and among those with on-campus accommodation, in the current study. This is consistent with the findings of Rajar et al. reported higher levels of mental distress in students having an on-campus accommodation in hostels.[5] This might have been possibly caused by homesickness, accommodation away, quality of food in the mess/canteen, conditions in the hostel, accommodation with roommates and difficulties with sleep.

Gender was found to have significant association with all factors of mental distress in the study at hand in which females had higher rates of depression, anxiety and stress. This is in line with the study of Khattak et al. who also found that female medical students had 2.56 times higher chances of exhibiting symptoms of depression and anxiety than their male counterparts in a study that was carried out among the various medical colleges in Rawalpindi and Islamabad.[14] In line with this, Al Saadi et al. also found that females are more likely to have signs of depression and anxiety compared to their male counterparts in a in a study conducted in the Faculty of Medicine of Damascus University, Syria.[19] Also, medical education, being a taxing experience, with the possibility of unequal social support and coping mechanisms, may be one of the factors that add to the reported disparities in mental health among medical students, based on their genders.

Consistently, Al Saadi et al. also observed that female medical students were twice as likely to show symptoms of depression and anxiety as compared with their male counterparts, in a study conducted in the Faculty of Medicine of Damascus University, Syria.[19] On the same note, Kebede et al. found out that females had a higher likelihood of anxiety by 2.56 times as compared to males due to the combination of a combination of other factors such as social and cultural expectations, gender specific stressors, hormonal variations, societal strains, and differences in coping mechanisms.[17] Also, the stressful medical education, along with the possible differences in social support and coping mechanisms, could be the cause of the gender differences in mental health outcomes among the medical students.[17]

In the present research 67.81 percent of the respondents scored an academic mark of ≥ 70 percent. There was a significant association between the female gender with increased academic scores. This conclusion is consistent with the studies of Wu et al. who hypothesized that some of the attributes of a woman, including helpfulness and relationship consciousness, can make them successful in their tasks and tests.[20] Such a motivation and attitude towards different assessments may partly justify why the female gender tends to perform better than male students in academic tests.[20]

The present research study also revealed the existence of the strong negative association between academic scores and all the three areas of mental distress. On the same note, Awadalla et al. in a research study in the United Arab Emirates (UAE) reported that an increased amount of symptoms of depression and anxiety is negatively correlated to lower academic scores, which corroborates the current study findings. This conclusion is in line with the findings of the present study.[10] Similarly, in a study conducted at Fujian Medical University in China, Lin et al. found a significant negative correlation between stress levels and academic performance.[21]

Nonetheless, it is necessary to note that not every research proves this relationship. As an example, Shiraly et al. did not find any significant relationships between psychological distress and academic performance in a study of Iranian medical students, even though there were high levels of stress and anxiety, which might be due to adaptive responses.[22] In a similar example, Gilavand et al. similarly found no significant relationships between psychological distress and academic performance in a study of Iranian medical students (during the COVID-19 pandemic) possibly due to revision of policies during the lockdown.[23]

The results of these studies emphasize the inconsistency of the psychological distress influence on academic performance and the importance of contextual and individual-level moderators on this association.

Healthcare training is a stressor and chronic stress has been discovered to be positively associated with dimi-

nished altruistic principles and greater potential of professional misconduct in the case of doctors. Moreover, depression and anxiety may lead to low empathy, course failures, college dropout, and suicidal ideation which is also corroborated by the fact that physicians tend to commit suicide more frequently than people in most other occupations, and the mental and emotional burden of medical education and service is enormous.[24] It is thus essential that education institutions and especially medical school should test the mental health of students on a regular basis, as well as encourage constructivist and social constructivist philosophy in curriculum design and delivery methods to provide students with a setting that encourages wholesome self-directed learning and reflection.[25] Finally, student mentoring programs, time-management workshops may also be improved, which will all help to provide a more supportive and effective learning environment.[26,27]

Along with the strengths, however, there were also some limitations associated with the current study. First, the depression, anxiety, or stress scores of the study participants prior to the medical education were not considered because of the unavailability of the data. Second, the research was done in one institution with a convenience sampling technique, thus it can be exposed to selection bias and it does not give much impact on the generalization of the results to the overall population of students. Finally, there were other potentially confounding variables including sleep quality, daily screen time, physical activity, dietary patterns, household monthly income and imposterism not measured in the current study leaving future studies with the opportunity to factor in these multifarious factors and their potential combinations to make an additional contribution to our knowledge of student mental status. The research in the future ought to take into account using multi-center longitudinal studies with random or stratified methods of sampling and a wider scope of psychological, behavioral, and socioeconomic variables to investigate the factors affecting student mental health and achievement more holistically.

Conclusion

Through the obtained results, the study concludes that academic performance and DAS scores have significant negative correlation. It means that the higher the level of the DAS symptoms, the lower the academic score is likely to drop among the undergraduate medical students.

Ethical Approval: The Ethical Committee of Isra University, Hyderabad approved this study vide letter No. IU/ RR-10-IRB-23/N/2023/ 277.

Authors' Contribution:

KAM: Acquisition of data, conception & design, analysis & interpretation of data, drafting of article, final approval of the version to be published

FN: Drafting of article, critical revisions for important intellectual content, and final approval of the version to be published

TFM: Drafting of article, analysis & interpretation of data, and final approval of the version to be published

AR: Acquisition of data, conception & design

MR: Acquisition of data

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