

Psychological Distress and its Effect on Academic Performance and Attendance of Undergraduate Medical Entrants: A Longitudinal Study

SHIKHA JAIN¹, PREETI JAIN², AMIT GOEL³

ABSTRACT

Introduction: Globally, the prevalence of psychological distress is alarmingly high and increasing among medical students at different phases of their training. Signs and symptoms of mental distress have also been observed in first-year entrants. Psychological distress can significantly hinder students' ability to retain and apply knowledge.

Aim: To assess changes in stress levels and academic performance among undergraduate medical students after the first term of medical education, compared with their levels at entry into the medical course.

Materials and Methods: A longitudinal, observational study was conducted from July 2015 to February 2016 at the Department of Physiology, Maulana Azad Medical College, New Delhi, India. A total of 168 newly admitted students (97 male, 71 female) participated voluntarily. Data were collected using self-reported questionnaires, including a sociodemographic profile and the General Health Questionnaire (GHQ-12), in two sessions: the baseline session (at the end of the first week in medical college) and the follow-up session (at the end of the first-term exams). Academic performance was assessed at baseline by the percentage of marks secured in the best four subjects in the Class 12 examination, and at follow-up by the percentage of marks secured in combined Physiology theory and practical. Attendance was calculated as the percentage of theory and practical classes attended in Physiology. Data were analysed using Statistical Package for the Social Sciences

(SPSS) version 20.0; Student's t-test, Pearson's correlation and Multivariate Analysis of Variance (MANOVA) were employed. For all analyses, $p < 0.05$ was considered significant.

Results: The mean age of students was 18.51 ± 0.90 years. There was a significant increase ($p < 0.001$) in GHQ-12 scores at follow-up compared with baseline. The prevalence of stress was 14.3% at baseline and 64.3% at follow-up. Stress levels increased significantly at follow-up compared with baseline ($p < 0.001$). Academic performance decreased significantly at follow-up compared with baseline ($p < 0.001$), where the baseline measure was the percentage secured in Class 12. The mean attendance at the end of the first-term examination was $86.12 \pm 5.44\%$. There was a significant correlation between attendance and academic performance at both baseline ($r = 0.236$; $p < 0.01$) and follow-up ($r = 0.444$; $p < 0.001$). MANOVA revealed an overall significant effect of gender ($p < 0.01$) and exercise ($p < 0.05$) on the combined dependent variables. There was a significant main effect of gender on the percentage of marks secured in both Class 12 ($p < 0.001$) and the first-term exam ($p < 0.05$).

Conclusion: There was an overall deterioration in general psychological well-being, as indicated by a significant increase in mean GHQ-12 scores at follow-up. The prevalence of psychological distress and stress levels increased significantly, whereas academic performance declined significantly at follow-up. Continuous counselling is required to identify stressors and promote coping strategies to help students manage stress more effectively.

Keywords: General health questionnaire, Mental health, Stress, University students

INTRODUCTION

Psychological distress refers to a state of emotional discomfort that can result from various stressors, challenges, or life events. It includes feelings of anxiety, depression, frustration, or overwhelming pressure that impact an individual's mental well-being. This distress can affect a person's thoughts, behaviour and ability to function effectively in daily life [1].

In the last two decades, an increase in the prevalence of psychological morbidity among medical students has been reported by various studies across the world. A recent meta-analysis shows that 30.3% of medical students self-reported experiencing a range of psychological and behavioural problems [2]. Symptoms of anxiety [3], depression [4], burnout [5] and even suicidal ideation [6] have been observed among medical students at different phases of their training [7]. Moreover, the mental health of these students tends to deteriorate over the course of their medical training [8,9]. Several factors, such as academic pressure, workload, social challenges and personal issues, have been implicated in causing

psychological distress in medical students [10]. Furthermore, signs and symptoms of mental distress have been observed early, even among psychologically healthy students, during their initial years of medical school [11].

Academic performance is a key indicator of success in educational programmes, primarily measured through exams. While exam results may not always reflect students' true knowledge, they remain the most feasible way to assess cognitive abilities, especially in tertiary institutions where tests are conducted regularly, culminating in a final examination. In medical education, where large volumes of information must be processed, psychological distress can significantly hinder students' ability to retain and apply knowledge. In a recent study by Kim HN, a negative correlation between stress and academic performance was observed among postgraduate medical students [12]. Chunhong H et al., reported that the academic performance of medical undergraduates decreased significantly with increasing depressive symptoms and perceived stress. In the same study, they also demonstrated that the psychological health of postgraduate

students tends to deteriorate as the semester progresses [13]. However, a few studies have shown that, at mild levels, stress may be associated with better working memory [14], which, in turn, can enhance learning ability and cognitive performance [15].

Another growing area of concern in higher education is absenteeism from university teaching sessions, which has significant negative impacts on students, peers and teaching staff [16]. Students experiencing psychological distress may feel physically and emotionally drained, which can lead to increased absenteeism from classes, lectures and clinical placements. This absenteeism, particularly in clinical education, can have a compounding negative effect on academic outcomes, as students miss important learning experiences and fall behind in coursework [17]. Surprisingly, limited research has explored the relationship between psychological distress and attendance in medical education.

The present study is grounded in the transactional model of stress and coping, which posits that stress arises from an imbalance between perceived demands and available resources [18]. Stress occurs when students perceive academic demands as overwhelming and feel they lack the resources to cope. This triggers emotional and physiological responses that negatively impact both academic performance and attendance. Effective coping strategies, such as time management and relaxation techniques, play a crucial role in managing stress. Students with better coping skills tend to perform better academically and maintain better attendance. Prolonged exposure to academic stress without adequate coping resources may lead to chronic stress, which in turn may negatively affect long-term academic performance and attendance. Studying psychological distress, academic performance and attendance together may provide a better understanding of how these factors interact in the unique context of medical education and help prevent long-term academic and psychological consequences in budding doctors.

Hence, the present study was conducted with the objective of assessing changes in stress levels and academic performance of undergraduate medical students after the first term of medical education, compared with their levels at the time of entry into the medical course. The second objective was to evaluate the interrelationship between stress scores, academic performance and attendance percentage in these medical students.

H_0 : There is no significant difference in the stress levels and academic performance of undergraduate medical entrants at entry and after the first term of medical education.

H_1 : There is a significant difference in the stress levels and academic performance of undergraduate medical entrants at entry and after the first term.

MATERIALS AND METHODS

The present longitudinal, observational study conducted from July 2015 to February 2016 in the Department of Physiology, Maulana Azad Medical College, New Delhi, India. Approval from the Institutional Ethics Committee was obtained prior to the commencement of the study (F.No./11/IEC/MAMC/2011/147). The purpose of the study was fully explained to the participants and written informed consent was obtained.

Sample size calculation: In a recent meta-analysis, the prevalence of stress in medical students was reported to be 30.3% [2]. At a 95% confidence level and taking the prevalence of stress as 30%, with a 10% relative error, the minimum estimated sample size was 81, using the formula:

$$n = Z\alpha^2 p \times q / L^2$$

where n =sample size; $Z\alpha$ =1.96 (the standard normal variate corresponding to a 5% significance level); p =prevalence of stress=30% (0.30); q =1 – p (0.70); and L =relative error (10%=0.10). Considering a 25% attrition rate in prospective studies, the final sample size was estimated at 101.

Inclusion and Exclusion criteria: Newly admitted first-year undergraduate medical students who had just begun attending classes at the institute and who volunteered and provided written informed consent were included in the study. Both male and female students were eligible. Students who had attended classes for more than one week at the institute were not included. Students who returned forms with unanswered questions or did not report for the follow-up session were excluded. Students with a history of any chronic medical ailment or medication, sleep disorders, a psychiatric history, previous drug abuse, or the use of antipsychotic drugs were also excluded from the study.

Participants: Of the 250 newly admitted first-year undergraduate medical students, 217 volunteered to participate. A total of 21 students returned forms with unanswered questions and 28 did not report for the follow-up session; these were excluded from the study. The final number of participants included was 168 (male=97, female=71). Anonymity was maintained by assigning each student a random identification number and strict confidentiality was ensured.

Study Procedure

Data collection: Data were collected using self-reported questionnaires (in English) in two sessions: (i) baseline—at the end of the first week of medical college; and (ii) follow-up—at the end of the first-term examinations (approximately four months after the commencement of classes). Paper-based questionnaires were distributed to students during breaks in their teaching schedules. Completing the questionnaire took about 15 minutes and the completed questionnaires were collected on the same day. Participation was voluntary and did not affect progression in the medical course. At baseline, participants completed two questionnaires: a case study form and the GHQ-12 [19]. At the follow-up session, only the GHQ-12 was administered.

Case study form: The case study form was developed based on a review of the relevant literature. To ensure content validity, it was examined by an expert in sociology. A pilot study was conducted on a small sample of 10 second-year students. The goal of the pilot study was to test the clarity and feasibility of the questionnaire, not to measure the actual outcome; hence, second-year students served as an appropriate proxy group. The form consisted of two parts: the first part collected data on the participant's sociodemographic profile, including gender, age, mother tongue, place of residence after admission to college and whether they engaged in regular exercise (at least 150 minutes per week of moderate exercise). The second part comprised questions on the medium of instruction and the percentage of marks obtained in the best four subjects in the higher secondary examination.

General Health Questionnaire (GHQ-12): The 12-item GHQ-12 is one of the most widely used tools to measure stress levels in the general population. It was chosen because of its well-established validity among student groups and the information it provides about general mental health problems [20]. The GHQ-12 is designed to assess general psychological well-being, focusing on overall psychological distress, emotional problems and social dysfunction. Its broad applicability allows it to capture a wide range of psychological states, encompassing stress, anxiety, depression and other emotional issues that students may experience during their academic life. Academic stress often manifests through emotional, cognitive and social strains (such as anxiety about exams, relationship problems with peers, or feeling overwhelmed by assignments), which can be captured by the GHQ-12 due to its focus on overall psychological distress.

The 12-items on the GHQ-12 represent 12 manifestations of stress. The scale consists of six positively worded items and six negatively worded items. The six positive items used a 4-point Likert scale with response options: 0=better than usual, 1=same as usual, 2=less

than usual and 3=much less than usual. The six negative items also used a 4-point Likert scale: 0=not at all, 1=no more than usual, 2=more than usual and 3=much more than usual. Total scores range from 0 to 36. Mean scores were calculated using the Likert method [21], which provides a more nuanced, continuous measure of distress severity.

Prevalence estimates were calculated using the standard binary scoring of 0-0-1-1 for each item (minimum score 0, maximum score 12). A GHQ-12 cutoff score of 4 has high sensitivity and specificity [19,22]. Therefore, participants with a GHQ-12 score of 4 or higher were considered to have significant stress in this study. Stress was graded as follows: mild, 4-6; moderate, 7-9; and severe, 10-12. Cronbach's alpha coefficient for the GHQ-12 in this sample was 0.77. The binary scoring method was used to identify cases (presence/absence) of psychological distress.

By applying a dual approach using both scoring methods, the study classified participants based on the prevalence of distress while also capturing variations in symptom intensity. This enhanced both the clinical and statistical interpretability of the results. No scores from the two methods were mathematically combined. Rather, each method was analysed separately and findings were interpreted in parallel.

Academic performance: Academic performance at baseline was assessed by the percentage of marks secured in the best four subjects in the higher secondary (Class 12) examination; a language paper was compulsorily included among these four subjects. At the follow-up session, academic performance was assessed by the percentage of marks secured in the first-term physiology examination. Marks obtained in the written theory paper and the practical examination (maximum 100 each) were added. A single percentage was calculated by dividing the total marks obtained (theory + practical) by the maximum possible marks (200) and multiplying by 100. This facilitated comparability with the percentage of marks from the higher secondary examination.

Attendance: Attendance in both theory and practical physiology classes was recorded from the beginning of the term to the first-term examination. Combined attendance percentage was calculated as total classes attended divided by total classes held across theory and practical classes.

STATISTICAL ANALYSIS

The data was analysed using Statistical Package for Social Sciences (SPSS) version 20.0 for Windows (SPSS, Inc., Chicago, Illinois, USA). All data collection forms were given serial numbers. Data were entered, checked for errors in data entry, explored and cleaned. A reliability analysis of GHQ-12 for the present study was conducted by calculating Cronbach's alpha internal consistency coefficients using the data from all participants. Descriptive statistics in the form of mean±Standard Deviation (SD) was calculated for the continuous data. Categorical data was expressed as frequency and percent and statistical difference was calculated using Chi-square (χ^2) test. Baseline and follow-up values were compared by using student's paired t-test. Correlations between variables were calculated using Pearson's correlation test. Multivariate Analysis of Variance (ANOVA) was done with sociodemographic characteristics as independent variables and GHQ-12, academic performance and attendance as dependent variables. A p-value of <0.05 was considered significant for all analyses.

RESULTS

Sociodemographic characteristics of the participants: The mean age of participants was 18.51±0.90 years (range: 17-22 years). A total of 97 students were male (58.8%) and 71 were female (42.2%). The mother tongue of the majority was Hindi (91.6%) and the medium of instruction in school was English (97.1%). Only 18% of the participants were hostellers, while the rest were day scholars.

More than 85% of the participants were not doing any form of regular physical exercise [Table/Fig-1].

Characteristics		n (%)
Age (in years) (Mean±SD)		18.51±0.90 years
Gender	Male	97 (58.8)
	Female	71 (42.2)
Mother tongue	Hindi	154 (91.6)
	English	2 (1.19)
	Others	12 (7.14)
Medium of education	Hindi	5 (2.9)
	English	163 (97.1)
Stay	Day scholar	121 (72)
	Hostler	47 (18)
Exercise	Yes	25 (14.8)
	No	143 (85.2)

[Table/Fig-1]: Sociodemographic characteristics of all the study participants (N=168).

General Health Questionnaire (GHQ-12): There was a statistically significant increase in the GHQ-12 total score, as well as all individual item scores, at the follow-up session compared with the baseline session [Table/Fig-2]. Among 168 subjects, the prevalence of stress at baseline was 14.3%, meaning that 24 subjects had a GHQ-12 score ≥ 4 by the binary method, while 144 (85.7%) had GHQ-12 scores of 0-3 and were considered normal. In contrast, at follow-up, the prevalence of stress was 64.3%, with 108 subjects having a GHQ-12 score ≥ 4 by the binary method, while 60 (35.7%) had scores of 0-3 and were considered normal. A Chi-square test showed a significant increase in stress levels at follow-up compared with baseline ($\chi^2=130.64$, $p<0.001$) [Table/Fig-3].

Parameters	Baseline	Follow-up	t value	p-value
GHQ-12	11.83±4.74	15.86±6.43	-11.36	<0.001
Q1 Been able to concentrate on what you are doing	0.64±0.48	0.93±0.55	-6.17	<0.001
Q2 Lost much sleep over worry	1.48±0.65	1.83±0.47	-7.69	<0.001
Q3 Felt that you are playing a useful part in things	0.74±0.50	1.03±0.49	-6.38	<0.001
Q4 Felt capable of making decisions about things	0.81±0.50	1.18±0.66	-7.78	<0.001
Q5 Felt constantly under strain	1.23±0.51	1.67±0.63	-9.30	<0.001
Q6 Felt you could not overcome your difficulties	1.24±0.54	1.47±0.83	-3.84	<0.001
Q7 Been able to enjoy your normal day to day activities	0.74±0.58	0.96±0.83	-3.88	<0.001
Q8 Been able to face your problems	0.96±0.47	1.76±0.84	-13.85	<0.001
Q9 Been feeling unhappy or depressed	1.38±0.72	1.70±0.68	-5.37	<0.001
Q10 Been losing confidence in yourself	1.10±0.56	1.43±0.95	-5.11	<0.001
Q11 Been thinking of yourself as a worthless person	0.86±0.53	0.98±0.65	-2.32	0.021
Q12 Been feeling reasonably happy, all things considered	0.63±0.62	0.87±0.59	-5.31	<0.001

[Table/Fig-2]: A 12-item General Health Questionnaire (GHQ-12) scores in both study sessions (N=168).

Value presented as mean±SD; Mean±SD: paired sample t-test; Test applied: t-test, Statistically significant: $p<0.001$

The mean GHQ-12 total scores for both males and females increased significantly ($p<0.001$) at follow-up compared with baseline. Female subjects scored significantly higher than male subjects at follow-up [Table/Fig-4]. Among 97 male subjects, the

GHQ severity	Baseline n (%)	Follow-up n (%)	Chi-square	p-value
Normal (0-3)	144 (85.7%)	60 (35.7%)	130.64	<0.001
Mild (4-6)	10 (6%)	69 (41.1%)		
Moderate (7-9)	10 (6%)	34 (20.2%)		
Severe (10-12)	4 (2.3%)	5 (3%)		

[Table/Fig-3]: Severity of stress based on GHQ-12 scores (given in brackets) by binary method in both study sessions.
Values are frequency (percent); Chi-square test; Test applied- Chi-square test statistically significant - $p < 0.001$

Subjects	Baseline	Follow-up	p-value
Male (n=97)	11.68±4.29	14.66±5.78	<0.001
Female (n=71)	12.03±5.31	17.51±6.92	<0.001
p-value	0.640	0.004	

[Table/Fig-4]: Gender-wise scores of 12-item General Health Questionnaire (GHQ-12) in both study sessions (N=168).
p-Mean±SD: Paired sample t-test; P- Mean±SD: Independent sample t-test between male and female subjects

baseline prevalence of stress was 10.3% (10 had a GHQ-12 score ≥ 4 by the binary method). Among 71 female subjects, the baseline prevalence of stress was 19.7% by the same criteria. At follow-up, the prevalence of stress in male and female subjects was 58.8% and 71.7%, respectively [Table/Fig-5].

Session	Gender	GHQ severity				Chi-square	p-value
		Normal	Mild	Moderate	Severe		
Baseline	Male n (%)	87 (89.7)	7 (7.2)	2 (2.1)	1 (1.0)	8.63	0.035
	Female n (%)	57 (80.3)	3 (4.2)	8 (11.3)	3 (4.2)		
Follow-up	Male n (%)	40 (41.2)	39 (40.2)	16 (16.5)	2 (2.1)	0.24	0.237
	Female n (%)	20 (28.1)	30 (42.2)	18 (25.3)	3 (4.2)		

[Table/Fig-5]: Gender-wise distribution of severity of stress based on GHQ-12 scores by binary method in both study sessions.
Chi-square test

Academic performance: The mean percentage of marks secured in the first-term examination decreased significantly ($p < 0.001$) compared with the mean percentage secured in the best four subjects in the higher secondary (Class 12) examination (baseline session). Male subjects achieved a significantly higher mean percentage of marks in both Class 12 and the first-term examination compared with female subjects [Table/Fig-6].

Subjects	Baseline (% in 12 th)	Follow-up (% in 1 st Term)	p-value
Overall (N=168)	87.17±9.03	49.13±11.35	<0.001
Male (n=97)	88.68±9.12	51.02±9.78	<0.001
Female (n=71)	84.84±9.16	47.77±10.36	<0.001
p-value	0.008	0.040	

[Table/Fig-6]: Academic performance of the study subjects at two study intervals.
P-Mean±SD: Paired sample t-test; P- Mean±SD: Independent sample t-test between male and female subjects

The participants who scored $< 50\%$ at baseline were only 0.6%, compared with 51.8% at the follow-up session. A significant difference was observed in academic performance between baseline and follow-up sessions ($\chi^2 = 45.03$, $p < 0.001$) [Table/Fig-7].

Attendance: The mean attendance percentage at the end of the first-term examination (follow-up session) was 86.12 ± 5.44 . Only one participant attended $< 60\%$ of classes, while 95.8% had attendance in the $> 75\%$ category [Table/Fig-8].

There was a significant correlation ($p < 0.001$) between GHQ-12 scores at baseline and at follow-up. There were no significant correlations ($p > 0.05$) between GHQ-12 scores and academic performance or attendance. There was a significant correlation ($p < 0.001$) between attendance and academic performance at both baseline and follow-up [Table/Fig-9].

Multivariate analysis: A two-way MANOVA was conducted with sociodemographic characteristics as the independent variables and GHQ-12 score, academic performance and attendance as the dependent variables. The observed covariance matrices of the dependent variables were equal across groups (Box's $M = 112.45$; $p = 0.073$). The MANOVA revealed an overall significant effect of gender ($p = 0.001$) and exercise ($p = 0.038$) on the combined dependent variables [Table/Fig-10].

Although only Class 12 percentage and exercise were statistically significant in the univariate analyses ($p < 0.05$), other variables—mother tongue and medium of education—were retained in the multivariate model regardless of their univariate significance. This was done because these variables have known theoretical or empirical relevance to academic performance and psychological stress. Therefore, the multivariate model was developed to adjust for possible confounding effects and to better understand the independent contribution of each predictor.

There was a significant main effect of gender on the percentage of marks secured in both Class 12 ($p < 0.001$) and the first-term examination ($p = 0.036$). However, exercise had a significant main effect only on the percentage of marks secured in Class 12 ($p = 0.002$). No significant main or interaction effects ($p > 0.05$) of the other independent variables were observed on any of the dependent variables [Table/Fig-11].

% of marks	Baseline n (%)	Follow-up n (%)	Chi-square	p-value
<50%	1 (0.6%)	87 (51.8%)	45.03	<0.001
50-75%	15 (8.92%)	81 (48.21%)		
76-90%	66 (39.28%)	Nil		
>90%	86 (51.19%)	Nil		

[Table/Fig-7]: Academic performance of subjects based on their mean percentage of marks at two study intervals (N=168).
Chi-square test, Statistically significant: $p < 0.001$

% attendance in MBBS class	n (%)
<60%	1 (0.6%)
60-75%	6 (3.6%)
>75%	161 (95.8%)

[Table/Fig-8]: Attendance of all participants at follow-up session (N=168).

Variables		GHQ Follow-up	Academic performance		Attendance follow-up
			Baseline	Follow-up	
GHQ baseline	r	0.424	0.014	-0.004	0.085
	p	<0.001	0.861	0.957	0.271
GHQ follow-up	r		-0.061	-0.063	0.034
	p		0.433	0.420	0.665
Academic performance baseline	r			0.529	0.236
	p			<0.001	0.002
Academic performance follow-up	r				0.444
	p				<0.001

[Table/Fig-9]: Correlation of GHQ-12, academic performance and attendance at study intervals session (N=168).
Pearson's correlation test; r-Pearson's correlation coefficient; Statistically significant - $p < 0.001$

Independent variables	F	Wilk's Lambda	Partial eta squared	p-value
Gender	4.552	0.870	0.130	0.001
Stay	1.253	0.960	0.040	0.287
Exercise	2.428	0.926	0.074	0.038
Mother tongue	0.516	0.967	0.170	0.879
Medium of education	0.922	0.971	0.029	0.469

[Table/Fig-10]: Multivariate analysis with sociodemographic characteristics as independent variables and GHQ-12, academic performance and attendance as dependent variables (N=168): MANOVA.

Test applied - MANOVA, Statistically significant: $p < 0.001$

Independent variables	Dependent variables	F (df1, df2)	Partial eta squared	p-value
Gender	GHQ baseline	F (1, 11)=0.73	0.005	0.39
	GHQ follow-up	F (1, 11)=0.36	0.002	0.55
	% in 12 th	F (1, 11)=17.63	0.102	<0.001
	% in 1 st term	F (1, 11)=4.45	0.028	0.036
	Attendance	F (1, 11)=1.57	0.010	0.21
Stay	GHQ baseline	F (1, 11)=0.53	0.003	0.47
	GHQ follow-up	F (1, 11)=0.49	0.000	0.83
	% in 12 th	F (1, 11)=3.66	0.023	0.06
	% in 1 st term	F (1, 11)=2.87	0.018	0.09
	Attendance	F (1, 11)=4.24	0.003	0.52
Exercise	GHQ baseline	F (1, 11)=0.46	0.003	0.50
	GHQ follow-up	F (1, 11)=0.76	0.005	0.38
	% in 12 th	F (1, 11)=9.63	0.058	0.002
	% in 1 st term	F (1, 11)=0.47	0.003	0.49
	Attendance	F (1, 11)=0.96	0.006	0.33
Mother tongue	GHQ baseline	F (2, 11)=0.45	0.006	0.64
	GHQ follow-up	F (2, 11)=0.48	0.006	0.62
	% in 12 th	F (2, 11)=0.11	0.001	0.90
	% in 1 st term	F (2, 11)=0.25	0.003	0.78
	Attendance	F (2, 11)=1.13	0.014	0.33
Medium of education	GHQ baseline	F (1, 11)=0.50	0.003	0.48
	GHQ follow-up	F (1, 11)=0.00	0.000	0.95
	% in 12 th	F (1, 11)=2.68	0.017	0.10
	% in 1 st term	F (1, 11)=1.25	0.008	0.27
	Attendance	F (1, 11)=1.10	0.007	0.30

[Table/Fig-11]: Univariate analysis for GHQ-12, academic performance and attendance as dependent variables and sociodemographic characteristics as independent variables N=168: Univariate ANOVA.

Test applied - MANOVA, Statistically significant: $p < 0.001$

DISCUSSION

The present longitudinal study aimed to evaluate changes in stress levels and their impact on academic performance and attendance among undergraduate medical entrants over the first semester. A key finding was an overall deterioration in the general psychological well-being of students during the initial months of medical education. This was indicated by a significant increase in the GHQ-12 total mean score at follow-up, as well as increases in the mean scores of all 12 GHQ items. Although increases were evident across all items, relatively higher mean scores were observed for three negatively worded items—"lost sleep over worry," "been feeling unhappy or depressed," and "felt constantly under strain"—and for one positively worded item—"been able to face problems." These results are consonant with a prior study that also reported sleep loss and a constant feeling of strain linked to stress [22].

When the change in the prevalence of psychological distress was examined, a significant increase was observed in the

proportion of students scoring above the cut-off point (≥ 4) during the follow-up session compared with their baseline values. A total of 65% of students had GHQ-12 scores at or above the threshold at follow-up, indicating significant psychological distress. In contrast, a significantly smaller percentage (15%) of students scored above the cut-off point at baseline. These results are in conformity with similar longitudinal studies in the literature that highlight the high-stress environment of medical education and its detrimental effects on students' emotional and psychological well-being [4,5,7]. The majority of students experienced mild to moderate levels of stress. Although fewer than 3% fell into the severe category of psychological distress, this nevertheless corroborates the alarming rise in the global prevalence of psychological morbidity consistently reported among budding doctors [2-7].

In the current study, no significant difference in the overall GHQ-12 score was found between genders at baseline. However, there was a significant difference between genders at follow-up. This is in concurrence with previous studies, in which female participants scored significantly higher than male participants on the GHQ-12 scale [22-25], indicating that, while both genders experienced academic stress, females more frequently exhibited symptoms such as sleep disturbances, emotional exhaustion and reduced academic confidence. It is worth noting that, in the present study, a significant difference in the severity of psychological distress was observed between male and female participants both at entry and at the end of the first semester in medical college. At baseline, only 10.3% of males had psychological distress, compared with 19.7% of females. At follow-up, psychological distress was observed in 71.7% of females, compared with 58.8% of males. Together, these findings point to a more nuanced relationship between stress levels and how stress is experienced and expressed by males and females.

The academic performance of undergraduate medical entrants declined significantly at the four-month follow-up compared with baseline values. Additionally, there was a significant positive correlation between academic performance and attendance percentage. These findings are consistent with previous studies that have shown a positive relationship between class attendance and academic success [16,26]. Attending classes regularly critically influences learning, which, in turn, contributes to significantly better academic performance [27]. On the other hand, poor attendance has been identified as a significant barrier in undergraduate medical education [28]. However, in the current study, a significant decline in the percentage of marks scored in the first semester was evident despite the fact that almost all (>95%) students regularly attended classes and had a requisite attendance percentage of >75%. These findings suggest the importance of external pressures in shaping student behaviour, particularly in structured academic environments like medical college, where attendance and performance are closely monitored. Fear of being detained for insufficient attendance may be a substantial motivator for attending classes in medical college. It also indicates the need to provide a settling-in period for newly admitted medical undergraduates so they can adjust to a rigorous curriculum that demands high levels of cognitive ability and poses physical, psychological and social challenges. Indeed, some of these issues have been addressed in the new Competency-Based Medical Curriculum (CBME), which came into force with the 2019 undergraduate batch [29]. It would be interesting to examine outcomes from similar prospective studies with new MBBS batches and compare them with studies like ours that were conducted before CBME was implemented.

Correlational analysis did not reveal any significant association between psychological stress and attendance or academic performance at either baseline or follow-up. This suggests that

psychological distress, though prevalent among students, may not have a direct or linear relationship with objective academic outcomes or classroom attendance, at least in the early phases of medical education. However, the multivariate analysis of variance showed significant main effects of gender and exercise on the combined outcome variables (stress, academic performance and attendance). Subsequent univariate analyses revealed that academic performance was the most affected dependent variable. Specifically, gender had a consistent effect on academic performance across both sessions, suggesting that gender-based differences may persist throughout early medical education. These differences could be attributed to varying study habits, cognitive strategies, stress responses, or social expectations across genders, as documented in previous literature [5,9,10,22,23].

The role of exercise was significant only with regard to academic performance in higher secondary examinations, indicating that pre-admission academic achievement may be positively influenced by regular physical activity. This finding aligns with prior research showing the cognitive benefits of exercise, including improved concentration, memory and stress management, which may translate into better academic outcomes during school years [28]. However, its lack of a continued influence in the medical college setting may be due to increased academic demands, time constraints, or reduced engagement in physical activity once students enter the demanding medical curriculum.

No significant main or interaction effects were observed for other variables such as mother tongue, place of stay (e.g., hostel vs home), or medium of education. This suggests that, among the medical entrants studied, these demographic variables did not contribute meaningfully to differences in stress levels, academic performance, or attendance. This also reflects the relatively homogeneous academic preparedness and language proficiency of students admitted to medical college, regardless of these background characteristics.

Overall, these findings highlight the complex interplay between individual lifestyle factors (such as exercise), sociodemographic variables (like gender), psychological distress, academic outcomes and attendance. While psychological stress is prevalent, its lack of a direct association with academic performance or attendance suggests that other psychological and environmental factors may influence how students are affected. Recognising and strengthening these protective factors could be key to helping students thrive, even under pressure.

Limitation(s)

The present study was based on self-reported information provided by students. Thus, there is a risk of bias due to students' interpretation of the questions. Another limitation is that the study included academic performance and attendance only in the subject of Physiology. Including marks and attendance from the other two subjects in Phase I MBBS would provide a broader picture of medical students' performance.

CONCLUSION(S)

In conclusion, the present study shows that the psychological health of medical students deteriorates during the first semester, warranting early intervention. Addressing mental health concerns from the outset of medical education is crucial. Medical institutions must acknowledge the unique challenges students face during their transition to the rigorous demands of medical training and proactively implement supportive measures. Initiatives such as stress management programmes, accessible counselling services and structured peer support systems can play a vital role in helping students manage stress effectively and maintain optimal academic performance.

REFERENCES

- [1] Mirowsky J, Ross CE. Measurement for a human science. *J Health Soc Behav.* 2002;43(2):152-70.
- [2] Jahrami H, Alkaabi J, Trabelsi K, Pandi-Perumal SR, Saif Z, Seeman MV, et al. The worldwide prevalence of self-reported psychological and behavioural symptoms in medical students: An umbrella review and meta-analysis of meta-analyses. *J Psychosom Res.* 2023;173:e111479.
- [3] Quek TT, Tam WW, Tran BX, Zhang M, Zhang Z, Ho CS, et al. The global prevalence of anxiety among medical students: A meta-analysis. *International Int J Environ Res Public Health.* 2019;16(15):2735.
- [4] Akdemir M, Aktekin MR, Şenol YY, Sönmez Y, Baysal ÖD, Mamakli S, et al. Depression and psychological distress in medical students, a prospective study. *Noro Psikiyatr Ars.* 2022;59(2):116-22.
- [5] Yusoff MS, Hadie SN, Yasin MA. The roles of emotional intelligence, neuroticism, and academic stress on the relationship between psychological distress and burnout in medical students. *BMC Med Edu.* 2021;21(1):293. Available from: <https://doi.org/10.1186/s12909-021-02733-5>.
- [6] Tyssen R, Vaglum P, Grønvold NT, Ekeberg O. Suicidal ideation among medical students and young physicians: A nationwide and prospective study of prevalence and predictors. *J Affect Disord.* 2001;64(1):69-79.
- [7] Rotenstein LS, Ramos MA, Torre M, Segal JB, Peluso MJ, Guille C, et al. Prevalence of depression, depressive symptoms, and suicidal ideation among medical students: A systematic review and meta-analysis. *JAMA.* 2016;316:2214-36.
- [8] Aktekin M, Karaman T, Senol YY, Erdem S, Erengin H, Akaydin M. Anxiety, depression and stressful life events among medical students: A prospective study in Antalya, Turkey. *Med Educ.* 2001;35:12-17.
- [9] Moffat KJ, McConnachie A, Ross S, Morrison JM. First year medical student stress and coping in a problem-based learning medical curriculum. *Med Educ.* 2004;38:482-91.
- [10] Hawsawi AA, Nixon N, Nixon E. Navigating the medical journey: Insights into medical students' psychological wellbeing, coping, and personality. *PLoS ONE.* 2025;20(2):e0318399. Available from: <https://doi.org/10.1371/journal.pone.0318399>.
- [11] Mahaur R, Jain P, Jain AK. Emotional Intelligence of Medical students and its association with their psychological health. *South-East Asian J Med Educ.* 2018;12(2):25.
- [12] Kim HN. Stress and its correlation with academic performance and psychological health: An empirical investigation among postgraduate gastroenterology students. *Cuest Fisioter.* 2025;54(1):44-53.
- [13] Chunhong H, Jingjing D, Huan H, Peiyao Z, Xiaona Z, Xiaowen Y, et al. A cross-sectional study of the current status of psychological health and its correlation with academic performance in medical students: Taking medical students in a medical university in China as examples. *Front. Psychiatry.* 2025;16:1496248. Doi: 10.3389/fpsyt.2025.1496248.
- [14] Lewis RS, Nikolova A, Chang DJ, Nicole Y. Weekes. Examination stress and components of working memory. *Stress.* 2008;2:108-14. Doi: 10.1080/10253890701535160.
- [15] Kalpan HI, Sadock BJ. Learning theory. In *Synopsis of Psychiatry; Behavioural Sciences/Clinical Psychiatry.* 8th edition Philadelphia; Williams & Wilkins; 2000. pp: 148-54.
- [16] Moores E, Birdi GK, Higson HE. Determinants of university students' attendance. *Educational Research.* 2019;61(4):371-87.
- [17] Oldfield J, Rodwell J, Curry L, Marks, G. Psychological and demographic predictors of undergraduate non-attendance at university lectures and seminars. *Journal of Further and Higher Education.* 2017;42(4):509-23.
- [18] Biggs A, Brough P, Drummond S. Lazarus and Folkman's psychological stress and coping theory. *The Handbook of Stress and Health: A Guide to Research and Practice.* John Wiley & Sons Ltd.; 2017:349-64.
- [19] Goldberg DP, Gater R, Sartorius N, Ustun TB, Piccinelli M, Gureje O, et al. The validity of two versions of the GHQ in the WHO study of mental illness in general health care. *Psychol Med.* 1997;27(1):191-97.
- [20] Radovanovic Z, Eric L. Validity of the general health questionnaire in a Yugoslav student population. *Psychol Med.* 1983;13:205-07.
- [21] Goldberg D, Williams P. A User's Guide to the General Health Questionnaire Windsor. Windsor: nferNelson; 1988.
- [22] Nikam LH. Study of stress prevalence and its effect on mental health and academic performance based on gender and residence among the first year Indian medical undergraduate students. *J Med Sci Health.* 2020;6(2):31-35.
- [23] Mahaur R, Jain P, Jain AK. Association of mental health to emotional intelligence in medical undergraduate students: Are there gender differences? *Indian J Physiol Pharmacol.* 2017;61(4):383-91.
- [24] Backović DV, Zivojinović JI, Maksimović J, Maksimović M. Gender differences in academic stress and burnout among medical students in final years of education. *Psychiatr Danub.* 2012;24(2):175-81.
- [25] Graves BS, Hall ME, Dias-Karch C, Haischer MH, Apter C. Gender differences in perceived stress and coping among college students. *PLoS One.* 2021;16(8):e0255634. Doi: 10.1371/journal.pone.0255634.
- [26] Nowreen N, Chowdhary S, Hameed R. Impact of class attendance on academic performance in the subject of physiology. *Natl J Physiol Pharm Pharmacol.* 2019;9(6):524-26.
- [27] Ancheta R, Daniel D, Ahmad R. Effect of class attendance on academic performance. *Eur J Educ Stud.* 2021;8(9):115-30. Available from: <http://dx.doi.org/10.46827/ejes.v8i9.3887>.

[28] Latif Khan Y, Khursheed Lodhi S, Bhatti S, Ali W. Does absenteeism affect academic performance among undergraduate medical students? Evidence from "Rashid Latif Medical College (RLMC)". Adv Med Educ Pract. 2019;10:999-1008. Doi: 10.2147/AMEP.S226255. PMID: 31819699; PMCID: PMC68970.

[29] Medical Council of India. Foundation Course for the Undergraduate Medical Education Program. 2019; pp 1-46. Available at <https://www.nmc.org.in/wp-content/uploads/2020/08/FOUNDATION-COURSE-MBBS-17.07.2019.pdf>. (accessed on 18 May 2025).

PARTICULARS OF CONTRIBUTORS:

1. Professor and Head Department of Physiology, ESIC Medical College and Hospital, Noida, Uttar Pradesh, India.

2. Director Professor, Department of Physiology, Maulana Azad Medical College, New Delhi, India.

3. Director and Head, Department of Critical Care Medicine, Sarvodaya Hospital, Greater Noida West, Uttar Pradesh, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Shikha Jain,
A603, Elite Golf Greens, Sector-79, Noida-201306, Uttar Pradesh, India.
E-mail: jshikha234@gmail.com

PLAGIARISM CHECKING METHODS: [\[Jain H et al.\]](#)

- Plagiarism X-checker: Mar 07, 2025
- Manual Googling: Aug 19, 2025
- iThenticate Software: Aug 21, 2025 (11%)

ETYMOLOGY: Author Origin

EMENDATIONS: 8

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: [Mar 04, 2025](#)
Date of Peer Review: [Mar 26, 2025](#)
Date of Acceptance: [Aug 23, 2025](#)
Date of Publishing: [Oct 01, 2025](#)