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Original Article

Stress Levels and Coping Strategies Among First-Year and Final-Year Medical Students in Public and Private Medical Colleges: A Comparative Cross-Sectional Study

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Abstract

Background: Medical education is highly demanding and exposes students to considerable psychological stress. First-year students often struggle with academic adjustment, whereas final-year students face clinical responsibilities, career uncertainty, and professional pressures.

Objective: To compare stress levels and coping strategies between first-year and final-year medical students enrolled in public and private medical colleges in District Swat, Khyber Pakhtunkhwa, Pakistan.

Methodology: A comparative cross-sectional study was conducted among 248 MBBS students from Saidu Medical College (public sector) and Swat Medical College (private sector). Participants were recruited using a non-probability convenience sampling technique. Data were collected using a structured 38-item questionnaire assessing demographic characteristics, perceived stress, stress-related factors, and coping strategies. Stress scores were categorized into predefined levels ranging from low to extreme stress. Coping mechanisms were classified as problem-focused, non-problem-focused, and maladaptive.

Results: Overall stress levels were higher among final-year students, particularly those enrolled in the private medical college, who demonstrated the highest mean stress score (46.7; 62.3%). Academic stressors constituted the most prominent source of stress (68%), followed by family-related (65%), personal (60.4%), and social stressors (60.2%). Major stressors included curriculum management, excessive academic workload, prolonged class duration, perceived poor educational quality, parental expectations, financial concerns, and uncertainty regarding future career opportunities. Problem-focused coping strategies were the most frequently adopted approaches (71.2%), with studying from the beginning of the academic year, effective schedule management, and seeking guidance from teachers or senior students being the most common adaptive behaviors. Religious activities and physical exercise were also frequently reported, whereas maladaptive coping strategies were comparatively less common.

Conclusion: Medical students experience substantial stress, with final-year students carrying a greater burden. Medical colleges should strengthen academic support, counseling, stress-management programs, and healthy coping practices.

Keywords: Coping Strategies, Medical Students, Psychological Stress, Stress, Undergraduate Medical Education.

Introduction

Mental health has become a major global public health priority, particularly among university students who are exposed to demanding academic environments. According to the World Health Organization, mental health is an integral component of overall health and well-being and is fundamental to individuals' ability to realize their potential, cope with everyday stresses, and contribute productively to society [1]. Undergraduate medical students represent one of the most vulnerable student populations because of the unique academic, psychological, and professional challenges associated with medical education.

Medical training is widely recognized as one of the most academically intensive educational programs. Students are expected to acquire extensive theoretical knowledge, develop clinical competence, master procedural skills, and demonstrate professional behavior while simultaneously adapting to continuous examinations, long study hours, and increasing clinical responsibilities. These cumulative demands often result in persistent psychological stress, emotional exhaustion, anxiety, and burnout, all of which may negatively affect students' academic performance, physical health, interpersonal relationships, and future professional practice [2,3].

Stress represents a complex psychophysiological response that occurs when individuals perceive environmental demands to exceed their available coping resources. Although moderate levels of stress may enhance motivation and learning, persistent or excessive stress has been associated with impaired cognitive function, depression, anxiety disorders, sleep disturbances, substance misuse, reduced academic achievement, and professional burnout [3]. Recent systematic reviews consistently demonstrate that medical students experience substantially higher rates of psychological distress than their age-matched peers in the general population [4–7]. These findings emphasize the urgent need to better understand the factors contributing to stress within medical education.

The nature of stress experienced by medical students often changes throughout their educational journey. First-year students commonly face challenges related to adapting to a new academic environment, increased educational workload, unfamiliar teaching methods, social adjustment, and separation from family. During the COVID-19 pandemic, these challenges were further intensified, with many first-year students reporting increased levels of anxiety and psychological distress [8]. Conversely, final-year medical students encounter additional stressors associated with clinical rotations, patient care responsibilities, examinations, graduation requirements, residency applications, and uncertainty regarding future employment. These academic and professional demands frequently influence both psychological well-being and academic achievement [9].

Students employ a variety of coping strategies to manage stress, ranging from adaptive approaches such as time management, physical exercise, social support, religious practices, and extracurricular activities to maladaptive behaviors including social withdrawal, avoidance, and substance use [10–13]. Effective coping strategies have been shown to reduce stress, improve resilience, and enhance academic performance, whereas inadequate coping mechanisms increase the likelihood of chronic stress, burnout, emotional exhaustion, and mental health disorders [12,13]. Understanding the coping behaviors adopted by medical students is therefore essential for designing institutional interventions that promote psychological resilience and student well-being.

Although several international studies have investigated stress and coping strategies among medical students, considerable variation exists across educational systems, cultural settings, and institutional environments [12–15]. In Pakistan, limited comparative evidence is available regarding differences between first-year and final-year students studying in public and private medical colleges, particularly in Khyber Pakhtunkhwa. Furthermore, few recent studies have simultaneously examined both stressors and coping strategies within these distinct academic groups.

Therefore, the present study was undertaken to compare stress levels and coping strategies between first-year and final-year MBBS students enrolled at a public-sector and a private-sector medical college in District Swat, Pakistan. By identifying the predominant sources of stress and the coping mechanisms employed by students, this study aims to provide evidence that may assist educators, institutional administrators, and policymakers in developing targeted interventions to improve student mental health, strengthen academic support systems, and foster healthier learning environments throughout undergraduate medical education.

Methodology

Study Design

A comparative cross-sectional study was conducted to evaluate and compare the levels of stress and coping strategies among first-year and final-year MBBS students enrolled in public- and private-sector medical colleges. A cross-sectional design was selected because it allows the simultaneous assessment of stress levels and coping mechanisms within a defined population at a single point

in time, facilitating comparison between academic years and institutional settings. The study was conducted over one month, from 10 September to 10 October 2024, at Saidu Medical College (public sector) and Swat Medical College (private sector), located in District Swat, Khyber Pakhtunkhwa, Pakistan.

Ethics

Ethical approval for the study was obtained from the Ethical Review Board of Saidu Medical College (Approval No. 185-ERB/024) before commencement of data collection. Participation in the study was entirely voluntary. All eligible students were informed about the objectives, significance, procedures, expected duration, confidentiality measures, and their right to withdraw from the study at any stage without academic consequences. Written informed consent was obtained electronically before participants accessed the questionnaire. No personally identifiable information was collected, and all responses were anonymized prior to analysis. The collected data were stored securely and were accessible only to the research investigators.

Setting

The study was carried out in two undergraduate medical colleges representing both sectors of medical education in District Swat, Khyber Pakhtunkhwa, Pakistan. Saidu Medical College represented the public sector, whereas Swat Medical College represented the private sector. These institutions offer the five-year Bachelor of Medicine and Bachelor of Surgery (MBBS) curriculum regulated by the Pakistan Medical and Dental Council. The study specifically focused on first-year students, who are adapting to the academic and social transition into medical education, and final-year students, who are exposed to clinical training, professional responsibilities, and career-related pressures. Data collection was performed online using Google Forms to ensure easy accessibility and uniform administration of the questionnaire across both institutions.

Participants

The study population comprised first-year and final-year MBBS students enrolled at the participating medical colleges during the study period. Sample size was calculated using the WHO Sample Size Calculator based on the estimated study population and desired precision. Participants were recruited using a non-probability convenience sampling technique, whereby students available during the study period and willing to participate were invited to complete the online questionnaire.

The inclusion criteria consisted of all first-year and final-year MBBS students studying at Saidu Medical College or Swat Medical College who provided informed consent. Students enrolled in second-, third-, and fourth-year MBBS programs, those absent during the study period, students declining participation, or questionnaires with incomplete responses were excluded from the analysis. Ultimately, 248 students fulfilled the eligibility criteria and completed the questionnaire.

Variables

The primary outcome variable was the overall stress level among medical students. Stress was categorized into five predefined levels according to the total stress score obtained from the questionnaire: low stress (0–30), moderate stress (31–43), high stress (44–54), very high stress (55–62), and extreme stress (63–75). Secondary outcome variables included the different domains of stress and coping strategies. Stress-related variables were classified into academic stressors, social stressors, family-related stressors, personal stressors, and year-specific stressors. Coping mechanisms were categorized into problem-focused coping, non-problem-focused coping, and maladaptive coping. Demographic variables included age, gender, marital status, type of medical college (public/private), and academic year (first/final year).

Data sources/measurement

Data were collected using a structured self-administered questionnaire consisting of 38 items. The questionnaire included demographic information, a stress assessment scale, and questions regarding coping strategies.

Stress was assessed using a composite scoring system incorporating 5-point Likert-scale items together with selected 3-point and binary (Yes/No) questions. The maximum attainable stress score was 75, with higher scores indicating greater perceived stress. Individual stressors were grouped into predefined domains, including academic, social, family-related, personal, and year-specific stressors.

Coping strategies were evaluated using questions that assessed participants' preferred methods of managing stress. These coping methods were subsequently classified into three major categories: problem-focused coping, non-problem-focused coping, and maladaptive coping. An additional checklist section allowed participants to select commonly practiced coping behaviors.

Prior to the main study, the questionnaire underwent pilot testing among 15 randomly selected medical students to evaluate clarity, comprehensibility, and feasibility. Based on participant feedback, minor modifications were made to improve the wording and organization of the questionnaire before its final administration. Data collection was performed electronically through Google Forms, and the questionnaire link was distributed to

eligible students via institutional communication channels.

Bias

Several measures were implemented to reduce potential sources of bias during the study. A standardized questionnaire and uniform online data collection procedure were used for all participants to minimize interviewer and measurement bias. Pilot testing improved clarity and reduced ambiguity in questionnaire items. Nevertheless, several limitations remain.

The use of convenience sampling may have introduced selection bias, limiting the representativeness of the study population. Because data were self-reported, recall bias and social desirability bias cannot be excluded, particularly for sensitive questions regarding stress and maladaptive coping behaviors. Furthermore, the cross-sectional nature of the study precludes establishing temporal or causal relationships between stressors and coping strategies.

Study size

The required sample size was estimated using the WHO Sample Size Calculator before commencement of the study based on the target study population and desired level of precision. A total of 248 medical students participated in the final analysis, with equal representation of first-year and final-year students from both participating medical colleges. This sample provided sufficient observations to allow descriptive comparisons of stress levels and coping strategies between academic years and institutional sectors.

Quantitative variables

Continuous variables, including stress scores, were summarized using means and standard deviations. Categorical variables such as gender, age groups, medical college, academic year, stress categories, stressors, and coping strategies were summarized using frequencies and percentages. Stress scores were categorized according to predetermined cutoff values to facilitate interpretation and comparison across participant groups.

Statistical methods

The collected data were entered into a computerized database, checked for completeness and consistency, and subsequently analyzed using appropriate statistical software. Descriptive statistical analysis was performed throughout the study. Continuous variables were reported as means with standard deviations, whereas categorical variables were presented as frequencies and percentages.

Stress levels and coping strategies were summarized separately for first-year and final-year students from both public- and private-sector medical colleges. Comparative analyses were descriptive in nature, and no multivariable or inferential statistical modeling was performed. The results are therefore presented primarily as descriptive comparisons between the study groups.

Results

Participants

A total of 248 undergraduate medical students participated in this comparative cross-sectional study. Participants were recruited equally from two medical colleges in District Swat, namely Saidu Medical College (public sector) and Swat Medical College (private sector). Equal representation was maintained across academic years, with first-year and final-year MBBS students contributing equally from each institution.

The study population comprised 54.03% males and 45.94% females. Regarding age distribution, 32.66% of students were aged 18–20 years, 28.63% were between 21 and 23 years, and 38.70% were between 24 and 26 years. Equal numbers of participants were enrolled from the public and private medical colleges, allowing direct comparison between institutional sectors and academic years (Table 1).

Descriptive data

Overall stress scores demonstrated noticeable variation across academic years and institutions. Based on the predefined stress categories, the majority of students were classified as having either moderate or high levels of stress, while no participant fell into the extreme stress category.

Final-year students of Swat Medical College demonstrated the greatest proportion of high stress, whereas first-year students from both institutions were more frequently categorized as having moderate stress levels (Table 1). The mean overall stress score across all participants was 43.9 ± 7.67, corresponding to approximately 57.3% of the maximum attainable stress score. Among the different participant groups, final-year students of Swat Medical College recorded the highest mean stress score (46.7 ± 7.67; 62.3%), indicating a greater overall stress burden compared with students in the remaining groups (Table 2).

When stressors were categorized according to their domains, academic-related stressors demonstrated the highest average burden with an overall mean score of 14.95 (68%), followed by family-related stressors (10.3; 65%), personal stressors (10.22; 60%), and social stressors (5.4; 60.2%). Year-specific stressors affecting first-year students also contributed substantially to overall stress levels (Table 2).

Outcome data

Detailed analysis of individual stressors revealed that academic factors were the predominant contributors to stress among medical students (Table 3). Curriculum management represented one of the highest-rated stressors with an overall score of 79.3%, while college administrative regulations were reported by 81% of students. Similarly, prolonged class duration and perceived poor quality of education contributed substantially to stress, with an overall score of 73%. The transition from higher secondary education to medical school produced greater stress among first-year students than the transition from preclinical to clinical training experienced by final-year students.

Among social stressors, excessive use of mobile phones and social media emerged as the most commonly reported issue, affecting approximately 83.5% of participants. Distance between home and hostel represented another frequent stressor, whereas hostel-related problems were comparatively less prominent (Table 3).

Within the family-related domain, parental empathy and concern for students' well-being constituted the highest-rated stressor (88.7%), followed by high family expectations (70%). Financial concerns were also frequently reported, particularly among students enrolled in the private medical college (Table 3).

Regarding personal stressors, uncertainty regarding future career prospects and emotional attachment were the most common concerns among participants, particularly final-year students. Stress associated with patient deaths, classroom criticism, and unwillingness to pursue medical education contributed moderately to the overall personal stress burden (Table 3).

Evaluation of coping mechanisms demonstrated that problem-focused coping strategies were the most frequently utilized adaptive approaches (Table 4). Beginning academic preparation early in the academic year achieved the highest score (86%), followed by seeking advice from senior students and faculty members and returning home during episodes of homesickness. Among non-problem-focused strategies, religious activities (72%), watching movies (62%), and participation in physical activities (56.6%) were commonly practiced. Maladaptive coping strategies were comparatively less frequent, although social isolation remained relatively common (69.4%), whereas illicit substance use demonstrated the lowest frequency (46.3%) (Table 4).

When coping strategies were grouped into broader categories, problem-focused coping demonstrated the highest overall utilization (71.2%), followed by non-problem-focused coping (62.4%), while maladaptive coping was the least commonly employed strategy (48.5%) (Table 5).

The checklist responses further supported these findings (Table 6). The most frequently selected problem-focused behaviors included studying selected topics strategically, maintaining study schedules, avoiding negative social interactions, establishing daily academic goals, and seeking guidance from teachers or senior students. Among non-problem-focused strategies, religious practices, physical exercise, positive use of mobile phones, watching movies, and celebrating academic achievements were the most commonly reported coping behaviors.

Main results

This study demonstrated that medical students experienced considerable levels of psychological stress, with academic stressors representing the predominant source of distress. Final-year students enrolled in the private medical college exhibited the highest overall stress scores compared with students from other academic groups (Tables 1 and 2).

Academic challenges, including curriculum management, administrative requirements, prolonged teaching hours, and perceived educational quality, constituted the principal contributors to stress, while family expectations and parental concern further increased the psychological burden (Table 3).

Students generally adopted adaptive coping mechanisms to manage stress. Problem-focused coping strategies, particularly early academic preparation, effective schedule management, and seeking academic guidance, were more commonly practiced than maladaptive coping behaviors (Tables 4–6). Religious activities, physical exercise, and social support also represented important coping approaches among participants. Although maladaptive strategies such as social isolation were reported by a substantial proportion of students, illicit substance use remained relatively uncommon in this study population (Tables 4–6).

Table 1: Distribution of stress levels among first-year and final-year medical students (N = 248)

Stress Level	Stress Score Range	Final Year (SMC) n (%)	First Year (SMC) n (%)	Final Year (STMC) n (%)	First Year (STMC) n (%)
Extreme stress	63–75	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Very high stress	55–62	6 (9.7)	8 (12.9)	2 (3.2)	3 (4.8)
High stress	44–54	19 (30.6)	24 (38.7)	34 (54.8)	22 (35.5)
Moderate stress	31–43	34 (54.8)	25 (40.3)	26 (41.9)	36 (58.1)
Low stress	0–30	3 (4.8)	5 (8.1)	0 (0.0)	1 (1.6)

Abbreviations: SMC, Saidu Medical College (public sector); STMC, Swat Medical College (private sector).

Table 2: Mean overall stress scores and stressor domain scores among first-year and final-year medical students

Stress Domain	First Year (SMC) Mean (%)	Final Year (SMC) Mean (%)	First Year (STMC) Mean (%)	Final Year (STMC) Mean (%)	Overall Mean (%)	SD	Maximum Score
Overall stress level	43.0 (57.3)	42.6 (56.8)	43.4 (57.6)	46.7 (62.3)	43.9 (57.3)	7.67	75
Academic stressors	15.2 (69.0)	13.5 (61.0)	15.3 (69.5)	15.5 (70.6)	15.0 (68.0)	0.91	22
Social stressors	5.4 (60.0)	5.6 (62.8)	4.9 (55.0)	5.6 (62.5)	5.4 (60.2)	0.84	9
Family-related stressors	10.0 (62.3)	9.5 (60.0)	10.5 (65.6)	11.1 (69.3)	10.3 (65.0)	1.13	16
Personal stressors	9.7 (57.2)	10.9 (64.0)	9.5 (55.6)	10.8 (63.6)	10.2 (60.0)	0.93	17
First-year-specific stressors*	3.6 (60.5)	—	3.6 (60.5)	—	3.6 (60.5)	—	6

Abbreviations: SMC, Saidu Medical College (public sector); STMC, Swat Medical College (private sector); SD, standard deviation.

Table 3: Mean scores of individual stressors among first-year and final-year medical students

Stressor	First Year (SMC) Mean (%)	Final Year (SMC) Mean (%)	First Year (STMC) Mean (%)	Final Year (STMC) Mean (%)	Overall Mean (%)	SD	Maximum Score
Academic stressors							
Curriculum management	2.48 (82.7)	2.10 (70.0)	2.24 (74.7)	2.69 (90.0)	2.38 (79.3)	0.81	3
Competition with peers	1.82 (60.7)	1.65 (55.0)	1.73 (57.5)	1.92 (64.0)	1.78 (59.3)	0.87	3
College administration and institutional regulations	2.21 (73.7)	2.38 (79.3)	2.43 (81.0)	2.68 (89.0)	2.43 (81.0)	0.78	3
Transition from preclinical to clinical training*	—	1.56 (52.0)	—	1.91 (63.7)	1.74 (58.0)	0.91	3
Transition from higher secondary school to medical college†	2.18 (73.7)	—	2.02 (67.0)	—	2.10 (70.0)	0.83	3
Modular integrated curriculum	2.60 (52.0)	2.64 (52.8)	3.01 (60.3)	2.71 (54.2)	2.74 (54.8)	1.03	5
Long class duration and poor teaching quality	3.92 (78.4)	3.19 (63.8)	3.87 (77.4)	3.63 (72.6)	3.65 (73.0)	1.14	5
Social stressors							
Mobile phone and social media use	2.39 (79.7)	2.48 (82.7)	2.52 (84.0)	2.63 (87.7)	2.51 (83.5)	0.72	3
Distance between home and hostel	1.81 (60.3)	2.02 (67.3)	1.61 (53.5)	1.95 (65.0)	1.85 (61.6)	0.88	3
Hostel-related issues	1.20 (40.0)	1.16 (38.7)	0.80 (26.7)	1.04 (34.7)	1.04 (34.7)	1.02	3
Bullying during entry into medical college†	2.20 (73.3)	—	2.03 (67.7)	—	2.00 (66.7)	0.76	3
Family-related stressors							
Family expectations	2.05 (68.3)	1.90 (63.3)	2.32 (77.3)	2.13 (71.0)	2.10 (70.0)	0.90	3
Parental empathy	2.59 (86.3)	2.58 (86.0)	2.84 (94.7)	2.63 (87.7)	2.66 (88.7)	0.65	3
Concerns regarding the future of the medical profession	2.69 (54.0)	2.98 (59.6)	2.51 (50.2)	3.37 (67.4)	2.89 (57.8)	1.66	5
Financial concerns	2.66 (53.2)	2.08 (41.6)	2.84 (56.8)	2.97 (59.4)	2.63 (52.6)	1.33	5
Personal stressors							
Emotional attachment	1.85 (61.7)	2.21 (73.7)	2.00 (66.7)	2.16 (72.0)	2.06 (68.7)	0.89	3
Difficulty adjusting as a new medical student†	1.43 (47.7)	—	1.60 (53.3)	—	1.52 (50.5)	—	3
Lack of interest in studying medicine	1.64 (54.7)	1.45 (48.3)	1.43 (47.7)	1.56 (52.0)	1.52 (50.7)	0.80	3
Emotional impact of patient death	2.69 (53.8)	2.97 (59.4)	2.85 (57.0)	2.74 (54.8)	2.81 (56.2)	1.26	5
Being criticized in class	1.68 (56.0)	2.24 (74.7)	1.49 (50.0)	1.99 (66.7)	1.85 (61.7)	0.83	3
Uncertainty regarding career and future	1.87 (62.3)	2.00 (66.7)	1.68 (56.0)	2.37 (79.0)	1.98 (66.0)	0.89	3

Abbreviations: SMC, Saidu Medical College (public sector); STMC, Swat Medical College (private sector); SD, standard deviation.

Table 4: Mean scores of coping mechanisms among first-year and final-year medical students

Coping Strategy	First Year (SMC) Mean (%)	Final Year (SMC) Mean (%)	First Year (STMC) Mean (%)	Final Year (STMC) Mean (%)	Overall Mean (%)	SD	Maximum Score
Problem-focused coping							
Sought guidance from senior students when facing academic difficulties	1.90 (63.3)	1.77 (59.0)	1.94 (65.0)	2.00 (66.7)	1.90 (63.3)	0.91	3
Sought support from friends, family members, or teachers	1.60 (53.6)	1.60 (53.6)	1.87 (62.3)	1.87 (62.3)	1.74 (58.0)	1.31	3
Returned home when feeling homesick	1.87 (62.3)	2.22 (74.0)	1.81 (60.5)	1.87 (62.3)	1.95 (65.0)	1.00	3
Studied consistently from the beginning of the academic year	2.66 (88.6)	2.40 (80.0)	2.70 (90.0)	2.56 (85.3)	2.57 (86.0)	0.71	3
Non-problem-focused coping							
Engaged in physical activities	2.82 (56.4)	2.85 (57.0)	2.93 (58.6)	2.73 (54.6)	2.83 (56.6)	1.06	5
Participated in religious activities	3.44 (68.8)	3.65 (73.0)	3.76 (75.2)	3.53 (70.6)	3.60 (72.0)	1.08	5
Watched movies for relaxation	2.89 (58.0)	3.11 (62.2)	3.24 (65.0)	2.90 (58.0)	3.10 (62.0)	1.10	5
Maladaptive coping							
Isolated oneself from social interactions and activities	3.44 (68.8)	3.39 (68.0)	3.47 (69.5)	3.64 (73.0)	3.47 (69.4)	1.10	5
Used illicit substances	1.08 (36.0)	1.45 (48.3)	1.35 (45.0)	1.66 (55.3)	1.39 (46.3)	0.84	3

Abbreviations: SMC, Saidu Medical College (public sector); STMC, Swat Medical College (private sector); SD, standard deviation.

Table 5: Comparison of overall coping strategy domains among first-year and final-year medical students

Coping Domain	First Year (SMC) Mean (%)	Final Year (SMC) Mean (%)	First Year (STMC) Mean (%)	Final Year (STMC) Mean (%)	Overall Mean (%)	SD	Maximum Score
Problem-focused coping	6.42 (71.3)	6.60 (73.3)	6.42 (71.3)	6.04 (67.1)	6.41 (71.2)	0.87	9
Non-problem-focused coping	11.90 (60.0)	12.40 (62.0)	13.15 (65.8)	12.35 (61.8)	12.47 (62.4)	1.03	20
Maladaptive coping	4.52 (45.2)	4.79 (48.0)	4.82 (48.2)	5.30 (53.0)	4.85 (48.5)	0.97	10

Abbreviations: SMC, Saidu Medical College (public sector); STMC, Swat Medical College (private sector); SD, standard deviation.

Table 6: Frequency of problem-focused and non-problem-focused coping strategies

A. Problem-focused coping strategies

Coping Strategy	First Year (SMC)	Final Year (SMC)	First Year (STMC)	Final Year (STMC)	Total Responses (n)
Avoided interactions with negative individuals	21	24	36	38	119
Studied consistently from the beginning of the academic year	17	11	20	30	78
Sought guidance from teachers or senior students	11	7	16	9	43
Managed study schedules effectively	26	24	28	33	111
Discussed academic concerns with colleagues	16	18	18	24	76
Focused on selective ("smart") study topics	23	27	34	39	123
Skipped classes ("bunking")	3	8	12	16	39
Set daily academic goals	15	20	20	25	80

B. Non-problem-focused coping strategies

Coping Strategy	First Year (SMC)	Final Year (SMC)	First Year (STMC)	Final Year (STMC)	Total Responses (n)
Watched movies	6	20	21	18	65
Read books unrelated to academics	5	13	14	4	36
Participated in religious activities	16	21	31	34	102
Listened to music	10	8	23	11	52
Practiced meditation	3	11	12	6	32
Used mobile phones positively	11	12	21	16	60
Participated in extracurricular activities	15	15	13	13	56
Engaged in physical exercise	11	13	17	27	68
Celebrated achievements to remain motivated	11	11	12	21	55

Abbreviations: SMC, Saidu Medical College (public sector); STMC, Swat Medical College (private sector).

Discussion

This comparative cross-sectional study evaluated stress levels and coping strategies among first-year and final-year medical students enrolled in public- and private-sector medical colleges in District Swat, Pakistan. Overall, the findings demonstrate that medical students experience considerable psychological stress throughout their undergraduate training, with final-year students, particularly those attending the private medical college, reporting the highest stress levels. Academic demands emerged as the predominant source of stress, while problem-focused coping strategies were the most frequently adopted methods of stress management.

The observation that final-year students experienced greater stress than first-year students suggests that psychological burden accumulates throughout medical training. Final-year students are simultaneously expected to complete demanding clinical rotations, prepare for professional examinations, develop clinical competence, and make important career decisions regarding postgraduate training and future employment. These cumulative responsibilities may explain the higher stress scores observed in this group. Similar findings have been reported in studies demonstrating increased stress among senior medical students because of academic workload, clinical responsibilities, and career uncertainty [9,16]. However, some studies from Malaysia and Nepal reported higher stress among first-year students owing to difficulties adapting to the medical learning environment [14,15]. These contrasting findings may reflect differences in educational systems, curriculum design, institutional support, and cultural contexts across countries.

Academic stressors represented the largest contributor to overall stress in the present study. Curriculum management, prolonged teaching hours, perceived poor educational quality, peer competition, and administrative regulations consistently produced the highest stress scores. These findings are consistent with previous studies conducted in Pakistan and other countries, where academic workload and examination pressure remain the principal determinants of psychological stress among medical students [16-19]. The demanding nature of undergraduate medical education, coupled with continuous assessments and high academic expectations, places students under persistent psychological pressure that may adversely affect both academic performance and mental well-being.

Interestingly, the transition from higher secondary education to medical school appeared to be more stressful for first-year students than the transition from preclinical to clinical training among final-year students. This finding suggests that adaptation to the learning environment and educational expectations during the initial phase of medical education presents a substantial challenge. Similar observations have been reported previously, where early academic adjustment was identified as an important predictor of student stress and psychological distress [14,20]. Strengthening orientation programs, mentorship initiatives, and early academic support may therefore facilitate a smoother transition into medical education.

Family-related stressors also contributed substantially to students' psychological burden. High parental expectations and parental empathy emerged as important sources of stress, reflecting the strong influence of family dynamics within South Asian societies. Financial concerns were particularly common among students attending the private medical college, likely reflecting higher tuition fees and educational expenses. Similar associations between financial stress and psychological distress have been reported among medical students in Pakistan and Malaysia [19,21,22]. These findings highlight the importance of considering socioeconomic and family-related influences when designing student wellness programs.

Among social stressors, excessive use of mobile phones and social media represented the most frequently reported issue. Although digital technology serves important educational and communication functions, excessive use may contribute to distraction, poor sleep quality, reduced academic productivity, and increased psychological distress. Distance from home and hostel-related issues also contributed to stress among many students, particularly those residing away from their families. These findings emphasize that medical student stress extends beyond academic factors and includes broader psychosocial influences.

Personal stressors, including uncertainty regarding future career prospects and emotional attachment, were particularly evident among final-year students. Career uncertainty has become increasingly important because of growing competition for postgraduate training positions and concerns regarding employment opportunities. Similar observations have been reported in previous studies, where fear of future career prospects constituted a major contributor to psychological stress among senior medical students [16,18]. Institutions should therefore integrate structured career counseling and professional development programs into undergraduate curricula to reduce uncertainty during the transition to professional practice.

With respect to stress management, students predominantly employed adaptive coping strategies.

Problem-focused coping mechanisms including early academic preparation, effective schedule management, consultation with senior students and faculty members, and goal setting were more frequently utilized than maladaptive approaches. These findings are encouraging because problem-focused coping has consistently been associated with improved resilience, academic performance, and psychological well-being [23,24]. Religious practices, physical activity, and recreational activities also represented commonly used coping strategies, reflecting the important role of spirituality and healthy lifestyle behaviors in stress management within this cultural context [13,14].

Although maladaptive coping strategies were comparatively uncommon, social isolation was frequently reported. Isolation may reduce opportunities for peer support and may contribute to prolonged psychological distress if not addressed appropriately. In contrast, illicit substance use was reported infrequently compared with studies conducted in Western countries [10,11]. Cultural norms, religious beliefs, and social expectations may partially explain the lower prevalence observed in this population. Nevertheless, because substance use was assessed through self-report, underreporting due to social desirability bias cannot be excluded.

The findings of this study have important implications for medical education. Since academic stress represents the principal contributor to psychological distress, medical colleges should implement comprehensive student wellness initiatives, including structured mentorship programs, accessible psychological counseling services, academic advising, stress-management workshops, resilience training, and regular mental health screening. Improvements in curriculum organization, assessment scheduling, teaching quality, and student support services may substantially reduce unnecessary academic stress while promoting healthier learning environments. Institutional efforts should also address financial and career-related concerns, particularly among senior students approaching graduation.

Limitations

Several limitations should be considered when interpreting the findings of this study. First, the cross-sectional study design limits the ability to establish causal relationships between stressors and coping strategies because exposure and outcomes were measured simultaneously. Longitudinal studies are needed to evaluate how stress evolves throughout medical education and to determine causal pathways. Second, participants were recruited using a non-probability convenience sampling technique from only two medical colleges within a single geographic region. Consequently, selection bias cannot be excluded, and the findings may not be generalizable to all medical students in Pakistan or other educational settings. Third, stress levels and coping strategies were assessed using self-administered questionnaires, making the results susceptible to recall bias, response bias, and social desirability bias, particularly for sensitive behaviors such as maladaptive coping and substance use. Participants may have underreported socially undesirable behaviors or over reported adaptive coping practices. Fourth, although the questionnaire underwent pilot testing before implementation, detailed psychometric evaluation, including internal consistency, construct validity, and test-retest reliability, was not reported. Future studies should employ fully validated and internationally recognized instruments, such as the Perceived Stress Scale (PSS), Medical Student Stressor Questionnaire (MSSQ), or Brief COPE inventory, to improve comparability across studies. Finally, the present study relied primarily on descriptive statistical analyses without multivariable modeling. Potential confounding variables, including socioeconomic status, previous mental health conditions, academic performance, residential status, and family characteristics, were not adjusted for. Future multicenter studies using probability sampling, larger sample sizes, longitudinal designs, and multivariable statistical analyses would provide stronger evidence regarding predictors of stress and effective coping mechanisms among medical students.

Conclusion

Medical students experience substantial psychological stress throughout undergraduate medical education, with final-year students demonstrating greater stress than first-year students. Academic demands including curriculum management, teaching quality, examination pressure, and career uncertainty constitute the primary sources of stress, while family expectations and financial concerns further contribute to students' psychological burden. Despite these challenges, most students employ adaptive problem-focused coping strategies, including effective time management, early academic preparation, seeking academic support, religious practices, and physical activity. These coping behaviors may enhance resilience and reduce the adverse effects of stress; however, the persistently high prevalence of stress underscores the need for institutional intervention.

Authors' Contributions:

All authors meet the ICMJE criteria for authorship.

Author 1: Substantial contribution to conception and design, drafting the manuscript, final approval, agreed to be accountable for all the work.

Author 2: Substantial contribution to conception and design, data acquisition, drafting the manuscript, final approval, agreed to be accountable for all the work.
Author 3: Analysis and interpretation of data, drafting the manuscript, final approval, agreed to be accountable for all the work.
Author 4: Analysis and interpretation of data, critical revision, final approval, agreed to be accountable for all the work.
Author 5&6: Substantial contribution to conception and design, drafting the manuscript, final approval, agreed to be accountable for all the work.
Author 7&8: Substantial contribution to conception and design, data acquisition, drafting the manuscript, final approval, agreed to be accountable for all the work.

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