Original Article

Study Habits, Learning Approaches, and Academic Performance among Medical Students: A Cross-Sectional Study

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[1,2,3,4,5] *Conception of Study*

[1,2,3,4,5] *Experimentation/Study Conduction*

[1] *Analysis/Interpretation/Discussion*

[1,2,3,4,5,] *Manuscript Writing*

[1] *Critical Review*

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Article Processing

Received: 15/09/2025

Accepted: 20/12/2025

Cite this Article: ***Janjua MI, Malaika, Niazi MA, Farooq M, Fatima M. Study habits, learning approaches, and academic performance among medical students: a cross-sectional study. SJRMC. 2025;29(2).***

Conflict of Interest: *Nil*

Funding Source: *Nil*

Access Online:

Abstract

Background: Learning involves applying different learning methods and strategies to acquire values, knowledge, and abilities. Throughout their preclinical and clinical years, medical students' study habits change, and they employ various teaching strategies, including lectures, lab work, small-group discussions, case-based learning, and bedside teaching. Comprehending learning styles and study habits can help customize instructional strategies to enhance academic achievement.

Objectives: The objectives of this study were to explore different study habits among medical students, their prevalence, and the effect on academic performance.

Materials and Methods: A questionnaire-based cross-sectional study was conducted among 129 medical students on the different study habits and their effects on the academic performance of the 2nd year medical students of the Rawalpindi Medical University for a time frame of six months.

Results: Most students with satisfactory performance studied more than 6 hours daily and revised weekly; none who studied <1 hour or revised inconsistently showed good performance. 88.4% preferred solo study, while strategic and surface approaches were equally common among both poor and satisfactory performers.

Conclusion: Effective study habits and learning strategies play a critical role in enhancing academic outcomes. Thus, understanding students' learning preferences and adapting teaching methods accordingly can be fruitful. This study offers valuable insights for policymakers and educators to develop targeted strategies that promote academic excellence.

Keywords: Medical Students, Learning, Academic Performance, Study Habits, Medical Education, Cross-Sectional Studies

Introduction

Education is the process of acquiring knowledge, skills, values, beliefs, and habits. Learning style refers to the ways individuals perceive, process, and retain information, encompassing preferred strategies, techniques, and instructional stimuli.[1] In medical education, students are exposed to diverse teaching strategies such as lectures, lab work, small group discussions, case-based learning, bedside teaching, etc.[2] As students progress from the preclinical to clinical years, their study methods evolve accordingly.[3] Understanding learning styles helps educators make learning more effective, as no one teaching strategy can fulfill the needs of all students. [4] Appropriate learning strategies contribute significantly to academic success.

Various studies worldwide have explored different learning preferences.[5,6] A study from Pakistan showed that small-group discussions, problem-based learning, and model-based presentation were the most preferred approaches.[3] In the past two years, medical education has also rapidly shifted to online formats, though most students traditionally rely on textbooks.[7,8]

Study habits represent the practical application of learning styles and play a crucial role in academic success. In medical institutions, a curriculum along with related assessments helps promote various study habits among students, improving their ability to interpret facts in clinical practice.[9] Effective study habits include studying in a quiet place, studying daily, turning off devices that interrupt studies, taking notes of important content, having regular rests and breaks, studying based on one's own learning style, and prioritizing the difficult content.[10] In contrast, poor study habits involve procrastination, evading study, studying in an unsuitable environment, and multitasking with media.[11]

Academic performance remains a central focus of medical education research. Numerous studies have identified study habits, learning attitudes, and the selection of appropriate resources as key predictors of academic performance.[12,13] However, despite international and national studies exploring learning preferences and study habits, there is limited local evidence linking study habits to academic performance. Notably, no similar assessment has been conducted at Rawalpindi Medical University. This study aims to address this gap and provide evidence to inform educational strategies and policy decisions, improving academic outcomes.

Materials and Methods

A cross-sectional observational Study was conducted at Rawalpindi Medical University from March to June 2024. Participants included second-year MBBS students, recruited through non-random convenience sampling due to ease of access and feasibility within the study timeframe. To minimize selection bias, invitations were sent to all students in class chat groups, and participation was voluntary. This

approach was considered appropriate for exploring study habits and their association with academic performance in a defined academic cohort. However, it may introduce selection bias and limit the generalizability of the findings beyond the study population.

Inclusion criteria were second-year MBBS students enrolled at Rawalpindi Medical University during the study period who provided informed consent and completed the questionnaire. Exclusion criteria included students who declined to participate, submitted incomplete questionnaires, were repeating the academic year, or were absent during the data collection period.

The sample size was 115, calculated using the OpenEpi sample size calculator at a 95% confidence interval, a 5% margin of error, using a prevalence rate of 12.5% derived from a reference study.[14] It was raised by 10% to account for incomplete responses. So, the sample was finally raised to 127.

Students were given an overview of the research and were included only after they provided informed consent. After removing missing and incomplete ones, 129 responses were recorded for analysis.

The questionnaire comprised four main parts. Demographic data were collected using a self-made questionnaire. Study habits were assessed using items adapted from previous studies, and the ASSIST (Approaches and Study Skills Inventory for Students) questionnaire, previously validated as having acceptable internal consistency (e.g., Cronbach's α of 0.65 for Deep, 0.70 for Strategic, and 0.75 for Surface approaches), was used to evaluate study skills and learning approaches.[15,16] Academic performance was assessed using self-reported scores from the most recent examination, categorized as poor (<50%), average (50–80%), or satisfactory (>80%). While official exam records were not accessible, self-reported data were anonymized to reduce reporting bias.

Data were coded and anonymized before entry to ensure confidentiality, and only the research team had access to the dataset. Data were stored securely on a password-protected computer. Data cleaning procedures included checking for missing values, inconsistencies, and outliers before analysis. All analyses were performed using SPSS version 27. Descriptive statistics were used to summarize study habits, including preferred study methods and revision frequency. Inferential statistical tests (chi-square test of independence and Kruskal -Wallis test) were applied to examine the association between learning approaches and academic performance. For other variables, no inferential analysis was conducted; results are presented descriptively.

Results

Of the 129 participants, 25.6% (n = 33) were female, and 74.4% (n = 96) were male. The majority were day scholars (77.5%, n = 100), while 22.5% (n = 29) were hostellers. The mean age was 19.95 ± 0.90 years. Based on academic

performance, 23.3% (n = 30) were categorized as poor, 70.5% (n = 91) as average, and 6.2% (n = 8) as satisfactory performers.

Among female students (n = 33), 3 (9.1%) achieved satisfactory performance, 25 (75.8%) average, and 5 (15.2%) poor. Among male students (n = 96), 5 (5.2%) achieved satisfactory performance, 66 (68.8%) average, and 25 (26%) poor.

The distribution of study habits is presented descriptively, as no inferential statistical tests were conducted for these variables. The median daily study duration was 3 hours (Q1=2 hours, Q2=4 hours, IQR: 2 hours). None of the students studying for less than one hour a day were classified as satisfactory performers. Higher frequencies of satisfactory performance were observed among students reporting study durations of more than six hours per day (Table 1).

Table 1: *Study Hours and Academic Performance*

Study Hours	Poor Performance	Average Performance	Satisfactory Performance	Total
<1 hr/ day	1(20.0)	4(80)	0(0)	5(3.9)
1-3 hrs/ day	20(24.1)	61(73.5)	2(2.4)	83(63.4)
4-6 hrs/day	8(27.6)	20(69)	1(3.4)	29(22.5)
>6 hrs	1(8.3)	6(50)	5(41.7)	12(9.3)
Total	30(23.3%)	91(70.5%)	8(6.2%)	129(100)

Note. Data has been presented as frequencies and percentages.

Revision habits were also analyzed descriptively (Table 2). No students who reported daily revision were classified as poor performers. Weekly revision was most common among satisfactory performers, while inconsistent revision or last-minute study was mostly reported by average performers.

Table 2: *Concept Revision and Academic Performance*

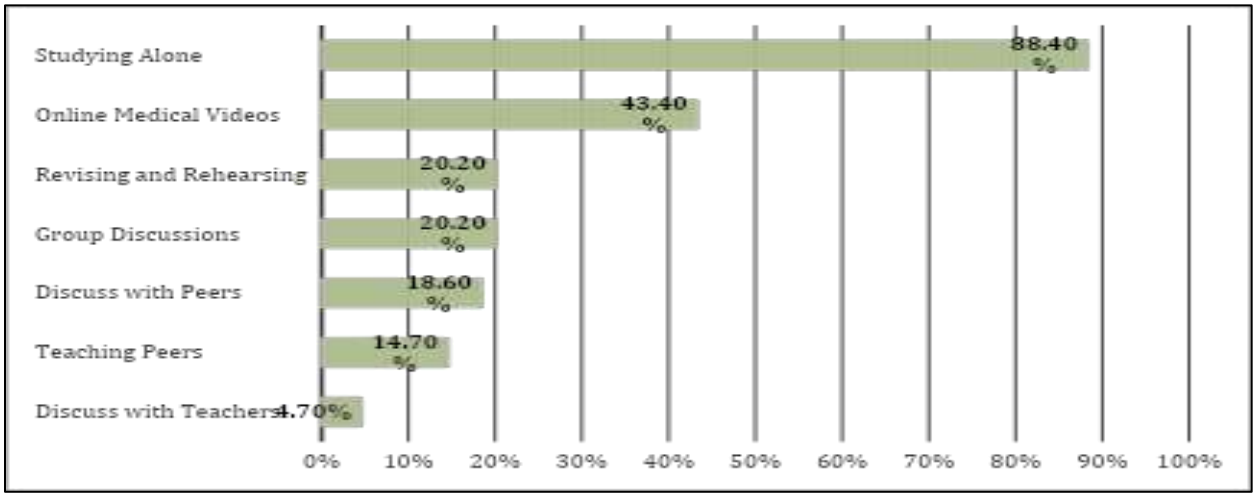
Revision	Poor Performance	Average Performance	Satisfactory Performance	Total
Daily	0(0.0)	2(66.7)	1(33.3)	3(2.3)
Weekly	2(9.1)	15(68.2)	5(22.7)	22(17.1)
Biweekly	3(20.0)	11(73.3)	1(6.7)	15(11.6)
Near Exams	10(23.3)	32(74.4)	1(2.3)	43(33.3)
Inconsistent	15(32.6)	31(67.4)	0(0.0)	46(35.7)
Total	30(23.3)	91(70.5)	8(6.2)	129(100)

Note. Data has been presented as frequencies and percentages.

Most students preferred studying alone (88.4%, n = 114). Watching online medical videos was reported by 43.4% (n = 56), while group discussions and revision/rehearsal were each reported by 20.2% (n = 26). The least

commonly reported habit was discussing topics with teachers (n = 6)

Figure 1: *Different Study Habits among Medical Students*



Note. Participants were allowed to select more than one option; therefore, percentages do not sum to 100%

A contingency table was constructed to examine the distribution of performance outcomes (Poor, Average, Good) across different learning approaches (Surface, Deep, Strategic, Mixed). Among Average performers, Deep learners accounted for the largest proportion (39, 42.9%), followed by Mixed (21, 23.1%), Surface (19, 20.9%), and Strategic learners (12, 13.2%). For Satisfactory performers, Deep and Strategic learners each contributed 3 participants (37.5%), with Mixed contributing 2 (25%) and Surface none. Among poor performers, Deep learners again contributed the most (11, 36.7%), followed by Mixed (8, 26.7%), Surface (7, 23.3%), and Strategic learners (4, 13.3%).

An independent chi-square test was conducted to assess whether the learning approach was associated with performance outcomes. The results indicated no statistically significant association, χ^2 (6, N = 129) = 5.15, p = 0.525. The calculated Cramér's V was 0.141, indicating a weak association between learning approach and performance. These findings suggest that, in this sample, differences in performance outcomes across learning approaches could reasonably arise by chance, and the learning approach alone is not a strong predictor of academic performance.

Table 3 *Academic Progress among Different Study Approaches*

Approach	Poor Performance	Average Performance	Satisfactory Performance	χ^2(df)	*P*-value
Surface	7(26.9)	19(73.1)	0(0.0)		
Deep	11(21.6)	39(76.5)	3(5.9)		
Strategic	4(21.1)	12(63.2)	3(15.8)		

Mixed	8(25.8)	21(67.7)	2(6.5)		
Total	30(23.3)	91(70.5)	8(6.2)	5.15(6)	0.525

Note. Academic Progress among Study Approaches presented as frequencies and percentages.

The median exam score was 72% (Q1= 70%, Q3=75%, IQR: 5%). A Kruskal-Wallis test was conducted to examine differences in exam scores across four learning approaches (Surface, Deep, Strategic, Mixed). The distributions of scores were not normally distributed, justifying the use of this non-parametric test. The results indicated no statistically significant difference in median scores among the groups, $H(3) = 4.18$, $p = 0.243$, with a small effect size ($\varepsilon^2 = 0.033$), suggesting that the learning approach had minimal influence on exam performance. Descriptively, strategic learners had slightly higher median scores than surface learners, while deep and mixed learners had similar medians, but these differences were not statistically significant. Overall, the learning approach alone does not appear to be a strong predictor of academic performance in this sample.

Approach	**Median Exam Score(%)**	**Q1(%)**	**Q3(%)**	**IQR(%)**	**n**
Surface	71	69	74	5	26
Deep	72	70	75	5	53
Strategic	73	71	76	5	19
Mixed	72	70	75	5	31
Overall	72	70	75	5	129

Note. Kruskal–Wallis $H(3) = 4.18$, $p = 0.243$, $\varepsilon^2 = 0.033$

Discussion

The current study explores the relationship between study habits, learning strategies, and academic performance. Female students in our sample showed slightly higher performance than male students, consistent with previous literature. [16] While the sample size is small and differences were not statistically tested, these trends may be influenced by factors such as study habits, motivation, or societal expectations. However, further research is needed to explore these variables in depth.

Our study found that the average study hours for students were 3.22 hours per day (±2.212). Students who studied for more than six hours each day were more likely to show satisfactory performance. In contrast, none of the students who studied for less than one hour per day achieved satisfactory performance. This suggests a potential relation between extended

study hours and better performance, though quality and strategies of study may matter more than raw duration.

Moreover, revision habits played a significant role in academic performance. Students who revised concepts daily did not have poor performance, indicating that consistent engagement with the material reinforces learning and retention. On the other hand, most students with satisfactory performance revised weekly, suggesting that weekly revisions may also be an effective strategy for academic success.

However, inconsistent revision habits and procrastination seemed to hinder performance.[18,19] Nearly a quarter of the students (24.8%) reported leaving tasks to the last minute, and 24% revised inconsistently. These students tended to have average academic performance, indicating that these strategies may not be conducive to achieving higher academic success. Educational interventions should focus on fostering time management skills and promoting consistent study and revision habits among students.

Our results also shed light on the preferred study methods among students. A significant majority (88.4%) of students preferred to study alone, which is similar to results from studies conducted before.[20] This may depict a preference for self-paced learning, although further research is required to understand the reasons behind this.

However, collaborative learning methods were also used by 20.2% of the students. They facilitate a deeper understanding through peer learning and interactive dialogue.[21] Despite its less frequent use, this strategy could benefit students who prefer a more social learning environment.

In addition, 43.4% of students utilized online medical videos to enhance their understanding, indicating the increasing role of digital resources in medical education. Online videos offer flexibility, accessibility, and often simplified explanations of complex topics, making them a popular tool among students. The least favored method was discussing topics with teachers (4.7%), which could indicate that students either felt intimidated or preferred other methods of clarifying concepts.

In our sample, no statistically significant differences in academic performance were observed across learning approaches (Surface, Deep, Strategic, Mixed), as confirmed by both the chi-square and Kruskal-Wallis tests. While Deep and Strategic approaches were common among students with satisfactory performance, the data indicate that learning approach alone is not a strong predictor of academic outcomes. Nevertheless, from an educational perspective, students who rely primarily on surface learning may still be at a disadvantage in demanding contexts, such as medicine, where deeper understanding and critical thinking are required for effective application of knowledge.[22] Therefore, further research is needed to explore

how these approaches interact with study habits and other factors.

These findings suggest that, in this sample, the learning approach alone may not strongly predict academic outcomes. Nevertheless, in demanding fields like medicine, students who rely primarily on surface approaches may face challenges in applying knowledge in clinical settings, where deeper understanding and critical thinking are required.

This research builds upon earlier studies that identified the impact of study habits and learning strategies.[22] The findings from our study underscore the need for targeted educational interventions to promote better study habits and learning strategies. Educational institutions can consider strategies to provide a supportive learning environment that encourages students to adopt more effective study techniques, such as regular revisions, active engagement with the material, and collaborative learning when appropriate.

Interventions should focus on teaching time management, reducing procrastination, and encouraging students to engage with the material consistently over time, rather than cramming before exams. Institutions should also provide resources such as workshops or seminars on study strategies, peer support groups, and mentorship programs that can help students improve their academic performance.

These findings serve as a foundation for holistic measures in nurturing student accomplishment. Students should be encouraged to use a combination of individual and group study methods, as well as digital resources, to enhance their learning experience. Promoting a balanced and personalized approach to learning will help students find the methods that work best for them and enable them to perform optimally.

Several limitations characterize this study, including the lack of a comparative group, such as students from a different field, and a limited sample size, which may restrict generalizability. The non-random sampling may introduce selection bias. Self-reported performance and study habits are subject to recall and social desirability bias, potentially affecting response accuracy. Finally, the study was conducted at a single institution, which may limit external validity.

Future studies could address these limitations by including multiple cohorts and larger samples to improve representativeness and by adopting random or stratified sampling methods to reduce selection bias. Using official academic records and anonymized surveys could minimize recall and social desirability bias. Conducting multi-center studies across different medical schools would enhance external validity and generalizability of the findings.

The authors extend their heartfelt appreciation to all participants who generously contributed to this study. Especially thankful to Dr. Gaiti Ara from the Anatomy Department at

Rawalpindi Medical University for her facilitation throughout the research.

Conclusion

In summary, our results suggest that consistent and sufficient study habits, rather than learning approach, play a major role in academic achievement among medical students. While gender, revision patterns, and learning methods also influence performance, structured study routines appear to have the greatest impact. Educational institutions must focus on creating interventions that support students in developing more effective study strategies and provide a learning environment that fosters both individual and collaborative learning. By doing so, they can help students achieve their full academic potential and prepare them for successful medical careers.

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