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Original Research Article

Patterns of learning styles and study habits among undergraduate medical students of Green Life Medical College, Dhaka, Bangladesh

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ABSTRACT

Background: Learning styles and study habits are key determinants of medical students' academic success, yet little is known about these factors among students in private medical colleges of Bangladesh.
Methods: A descriptive cross-sectional study was conducted among 237 MBBS students from July to September 2023 using a semi-structured, self-administered questionnaire. Data on sociodemographic factors, VARK learning styles, and study habits were analyzed using descriptive and inferential statistics.
Results: Visual learning style was predominant (56.5%), followed by auditory (39.7%) and kinesthetic (10.5%). Most students studied 3–5 hours daily and followed routine schedules mainly during examinations. Visual learners achieved significantly higher GPAs (4.72±0.31; p=0.021) than auditory or kinesthetic learners. Study environment and sleep quality also influenced performance ($p<0.05$). Students who studied in quiet settings, maintained adequate sleep, and used smartphones for academic purposes demonstrated better results. Logistic regression identified visual learning style (OR=1.84), ≥5 hours of daily study (OR=1.68), adequate sleep (OR=2.20), and academic phone use (OR=1.78) as significant predictors of high GPA.
Conclusions: Visual learning preference, structured study habits, sufficient sleep, and purposeful technology use contribute positively to academic performance. Incorporating multimodal teaching approaches and promoting healthy study routines may enhance learning outcomes and overall student well-being.

Keywords: Learning styles, Study habits, Medical students, Academic performance, Bangladesh

INTRODUCTION

Medical education is a thorough and cognitively demanding discipline that requires learners to acclimatize and apply tremendous amounts of information effectively. The academic performance of medical students depends not only on intellectual capability and provocation but also on their literacy styles and study habits- two crucial determinants that impact how scholars perceive, process, and retain new information. Understanding this factor is pivotal for optimizing tutoring strategies, perfecting pupil engagement, and enhancing academic issues. Learning style refers to an individual's favoured way of acquiring and recycling information.[1] The conception gained eminence in the 1970s and has since evolved through multiple theoretical fabrics. Among these, Fleming's VARK model — Visual, Auditory, Read/ Write, and Kinaesthetic is extensively applied in medical education to identify sensitive preferences that guide learning actions.[2] Studies indicate that medical students frequently flaunt multimodal literacy tendencies, suggesting that flexible and varied teaching approaches can enhance

appreciation and retention.[3] A study by Kumar (2025) found that medical students who preferred kinaesthetic literacy and engaged in active recall and modification ways had advanced GPAs. specially, students who constantly recalled recently memorized information demonstrated a significant correlation with academic achievement (p=0.05).[4]

Conversely, study habits include the routines, behaviours, and time-management techniques students use to grasp academic content.[5] These include techniques like taking notes, reviewing frequently, testing oneself, concentration management, and sticking to a study regimen. While bad study habits frequently lead to underachievement and stress among medical students, effective study habits have been positively connected with higher academic performance.[5] Effective study practices, like time management, taking notes, and frequent review, are among the most important indicators of academic success, according to a study by Aljaffer (2024).[6] Students who consistently engage in these practices tend to achieve high grades (1.6 times; OR=1.6, p=0.08) compared to those who did not attend regularly.[6] Global and regional research indicates that medical students' study habits and preferences for sensory learning are diverse and often less than ideal for long-term, self-regulated learning.

Large surveys in the region report only modest study-habit scores (e.g., textbook-reading mean=3.54±1.14; time-management mean=3.40±1.18 on a 5-point scale), suggesting room for improvement in routine learning behaviours.[5] In Bangladesh, Karim et al (2019) reported that 64.2% of 1,004 students demonstrated multimodal learning styles, and only 35.8% preferred a single mode, predominantly auditory and kinesthetic.[3] About half of students do not reserve daily time for study (49.9% had regular daily study time in a large Turkish sample), underscoring irregular study scheduling as a common problem.[2] Simultaneously, VARK-based and related investigations show that (many studies report >50%, and some report ~70% multimodal/trimodal), while other cohorts have very high visual preferences — evidence that learners commonly use more than one sensory mode and that visual materials are particularly influential in some settings.[2-7] The near-ubiquitous ownership and academic use of smartphones (≈98% ownership; ≈88% use for study in a multi-country sample) creates an opportunity to support these preferences with digital, visual and multimodal resources — although smartphone overuse is also a concern (e.g., ~21.7% screening positive for problematic use), which can negatively affect sleep and study quality (Izquierdo-Condoy et al, 2024; Nikolic et al, 2023).[8,9]

Within this context, medical students at Green Life Medical College, Dhaka, represent a diverse cohort influenced by varying cultural, educational, and technological factors. However, there is limited empirical evidence describing how these students learn and study within the specific institutional environment of private medical colleges in Bangladesh. A detailed understanding of their learning styles and study habits could inform curriculum reform, faculty development, and student-support programs tailored to their actual needs. Therefore, this study aims to assess the learning styles and study habits of undergraduate medical students at Green Life Medical College. By identifying their dominant learning preferences, common study behaviours, and related socio-demographic factors, the study seeks to provide data-driven insights for improving instructional design, student learning outcomes, and academic well-being.

METHODS

This research was a descriptive cross-sectional framework to evaluate the learning preferences and study behaviours of undergraduate medical students. This was conducted at Green Life Medical College, a private institution affiliated with the University of Dhaka in Bangladesh, and the study spanned from July 2023 to September 2023. The study focused on students enrolled in the MBBS program at Green Life Medical College during the 2023 academic year. Eligible participants included students from first through fifth year. The inclusion criteria specified that participants must be full-time students who voluntarily consented and were present during the data collection phase. Those who were absent or opted out of participation were excluded.

A convenience sampling method was utilized due to time and logistical limitations. A total of 237 medical students took part in the survey, surpassing the minimum sample size necessary for descriptive research (n≥200 for population-based studies at the institutional level). Data collection employed a semi-structured, self-administered questionnaire that was created after a thorough review of relevant literature.[2,3,5] The questionnaire comprised four sections: Socio-demographic information – including age, gender, academic year, parental education, occupation, and living arrangements. Assessment of learning styles – based on the VARK model (Visual, Auditory, Read/Write, Kinaesthetic), utilizing 24 standardized items adapted from the instrument at the University of California Merced Student Advising and Learning Centre. Each item was scored on a 3-point scale: Often=3, Sometimes=2, and Seldom=1. The dominant learning style of each participant was determined by their highest cumulative score. Study habits assessment – evaluating study hours, preferred study times, utilization of study schedules, break frequency, sleep habits during exams, and ideal study environments. Learning resources section – including the use of textbooks, lecture slides, handouts from teachers and fellow students, guidebooks, and internet resources.

Data were collected during scheduled class hours with prior permission from the principal and head of the Department of Community Medicine. Participants were briefed about the study objectives and assured of

confidentiality and voluntary participation. Each respondent completed the questionnaire in approximately 15–20 minutes under the supervision of the investigators. All completed questionnaires were reviewed manually for completeness and consistency. Data were entered into Microsoft Excel (Microsoft Corporation, Redmond, WA) for cleaning and descriptive analysis. Statistical analyses were performed using SPSS (version 26.0, IBM Corp., Armonk, NY).

Descriptive statistics such as frequencies, percentages, means, and standard deviations were computed. Associations between categorical variables (e.g., gender, learning style, and study habits) were tested using the Chi-square test (χ^2). A p-value <0.05 was considered statistically significant. Ethical approval was obtained from the Departmental Ethics Committee of Green Life Medical College, Dhaka. Written informed consent was secured from all participants prior to inclusion. Confidentiality was maintained throughout the study; no identifiable personal information was collected. Participation was entirely voluntary, and respondents were informed that they could withdraw at any time without any academic consequences.

RESULTS

Sociodemographic characteristics of respondents

A total of 237 medical students participated in the study, yielding a 100% response rate. Of the respondents, 51% were female and 49% male. The mean age was 21.4±1.2 years, with the majority (66%) between 20–22 years. Most students (64%) were Bangladeshi nationals, followed by Indians (32%), and a small proportion were Nepalese or Others (4%). Regarding their academic level, 32% were in the 2nd year, 29% in 3rd year, 16% in 1st year, 13% in 4th year, and 10% in final year. A large proportion (63%) came from Bangla medium backgrounds, and 72% had achieved GPA 5.0 in HSC/A-Level examinations. About 63% resided in hostels, while 28% lived with family. Half of the respondents' fathers held master's degrees (50%), and 35% of mothers held bachelor's degrees. The most common paternal occupation was business (39%), followed by service (29%), while the most frequent maternal occupation was business (61%).

Study habits of respondents

Most students (40%) reported studying 3–5 hours daily, while 22% studied 5–7 hours and 13% more than 7 hours per day. A large proportion (43%) reported following a routine study schedule only during examinations, whereas only 20% followed a schedule consistently. Regarding study environment, 72% preferred a quiet room at home, 21% preferred the library, and only 4% studied with background distractions (e.g., TV). More than 73% took regular breaks, typically after 1–3 hours of study, and 35% took 15–30-minute breaks. During examination periods, 61% reported insufficient sleep, highlighting potential academic stress and poor rest–work balance. Analysis of VARK learning styles showed that 56.5% of students were visual learners, 33% auditory, and 10.5% tactile/kinaesthetic (multiple preferences possible). This indicates a clear dominance of visual learning preferences, consistent with trends reported among medical students globally.[2]

Table 1: Demographic characteristics of medical students (n=237).

Variable	Category	N (%)
Gender	Male	116 (49)
	Female	121 (51)
Age (years)	17-19	33 (14)
	20-22	156 (66)
	23-25	45 (19)
	26-28	3 (1)
Nationality	Bangladeshi	152 (64)
	Indian	76 (32)
	Nepalese/others	9 (4)
Academic year	1st year	38 (16)
	2nd year	76 (32)
	3rd year	69 (29)
	4th year	30 (13)
	5th year	24 (10)
Medium in HSC	Bangla	150 (63)
	English	51 (22)
	English version	16 (7)
	Other (Gujarati, Hindi)	20 (8)
Accommodation	Hostel	150 (63)
	With family	65 (28)
	Rented house	22 (9)
Father's educational qualification	HSC	36 (15)
	Master's degree	118 (50)
	Bachelor degree	68 (29)
	Doctorate degree	15 (6)
Father's occupation	Doctors	24 (10)
	Business	92 (39)
	Engineer	14 (6)
	Service holder	69 (29)
	Others	38 (16)
Mother's educational qualification	HSC	72 (30)
	Master's degree	77 (33)
	Bachelor degree	82 (35)
	Doctorate degree	6 (2)
Mother's occupation	Doctors	64 (27)
	Business	145 (61)
	Engineer	21 (9)
	Home maker	7 (3)

Learning resource utilization

Textbooks were the most frequently used learning resources 64.1% always used them and 32.5% sometimes used them.

Lecture slides and teachers' handouts were also common, used always by 59% and 53% respectively. Only 34% reported always using the internet for learning, indicating that traditional print and lecture-based resources remain dominant.

Table 2: Study habit characteristics among medical students.

Study habit variable	Category	N (%)
Daily study duration	<1 h	12 (5)
	1–3 h	47 (20)
	3–5 h	95 (40)
	5–7 h	52 (22)
	>7 h	31 (13)
Routine schedule	All the time	47 (20)
	Only during exams	102 (43)
	Sometimes	43 (18)
	None	45 (19)
Preference of study environment	Library	50 (21)
	Quiet room at home	171 (72)
	By turning on tv	9 (4)
	Others	7 (3)
Regular breaks	Yes	174 (73.4)
	No	63 (26.6)
Duration of study before taking break	<1 h	76 (32)
	1-3 h	90 (38)
	3-5 h	45 (19)
	>5 h	26 (11)
Break interval	15–30 min	84 (35.4)
	< 15 min	60 (25.3)
	30–40 min	37 (15.6)
	> 40 min	10 (4.2)
Learning style	Visual preference	134 (56.5)
	Auditory preference	78 (33)
	Tactile preference	25 (10.5)
Sleep during examination (enough sleep)	Yes	45 (19)
	No	145 (61)
	Sometimes	47 (20)

Technology and study behaviour

About 70% of students reported using their mobile phones while studying, and of them, 56.5% used them for academic purposes, such as reviewing lectures or using educational apps. Only 13.9% used their phones primarily for social media, reflecting a shift toward educational technology integration. A statistically significant difference in mean GPA was observed among different learning styles (F=3.96, p=0.021). Students with a visual learning style achieved the highest mean GPA (4.72±0.31), followed by those with auditory (4.56±0.28) and tactile (4.42±0.36) preferences. This indicates that visual learners tend to perform better academically than other types. Similarly, the study environment significantly influenced GPA (F=3.72, p=0.03). Students who studied in a quiet room at home had a higher mean GPA (4.68±0.34) compared to those studying in the library (4.52±0.28) or in the presence of distractions such as television (4.31±0.47). These findings suggest that both learning style and study environment play important roles in academic performance.

Association between study hours and learning style

A significant association was found between study hours and preferred learning style (χ^2=10.82, p=0.029). The proportion of visual learners increased with longer study hours 44.1% among students studying less than 3 hours, 60% among those studying 3-5 hours, and 63.9% among those studying more than 5 hours daily. In contrast, auditory learners were more common among those studying less than 3 hours per day (50.8%). This pattern indicates that students who devote more time to studying are more likely to adopt a visual learning style, which may contribute to higher academic achievement.

Relationship between routine schedule and sleep quality during exam

A significant relationship was observed between maintaining a routine schedule and sleep quality during exams (χ^2=8.24, p=0.04). Students who consistently followed a routine reported a higher proportion of adequate sleep (53.3%) compared to those who followed routines only during exams (28.4%) or inconsistently (22.9%). These findings highlight that regular scheduling habits are associated with better sleep quality, which may positively affect concentration and academic outcomes during examinations. Phone use during study showed a significant association with academic performance (χ^2= 7.92, p=0.02).

Association between phone use during study and study performance

Students who used their phones primarily for study purposes had a higher proportion of high GPA (>4.5) results (60%), whereas those using phones for social media had lower academic performance (only 35% with GPA>4.5). Students who avoided phone use altogether showed moderate performance (48% with GPA >4.5). This suggests that purposeful academic use of mobile phones can enhance learning outcomes, while excessive social media use may negatively impact performance.

Predictors of high academic performance- binary logistic regression

Binary logistic regression analysis identified several significant predictors of high academic performance. Visual learning style (OR=1.84, p=0.022), daily study time ≥5 hours (OR=1.68, p=0.031), adequate sleep

(OR=2.20, p=0.005), and phone use for study (OR =1.78, p=0.028) were all positively associated with higher GPA. Although maintaining a routine schedule showed a positive trend (OR=1.54, p=0.08), it did not reach statistical significance. These results indicate that productive learning habits and lifestyle factors contribute significantly to better academic outcomes.

Table 3: Learning resource preferences of students.

Resource type	Always N (%)	Sometimes N (%)	Never N (%)
Textbooks	152 (64.1)	77 (32.5)	8 (3.4)
Lecture slides	141 (59.0)	90 (38.0)	6 (3.0)
Teacher handouts	126 (53.0)	101 (43.0)	10 (4.0)
Student handouts	88 (37.0)	120 (51.0)	29 (12.0)
Guidebooks	87 (37.0)	119 (50.0)	31 (13.0)
Internet	80 (34.0)	140 (59.0)	17 (7.0)

Table 4: Distribution of respondents according to using phone and reason for using phone during study.

Use of phone during study	Frequency (N)	Percentage (%)
Yes	166	70.00
No	71	30.00
Reason for using phone		
For study purpose	134	56.54
For making phone call	12	5.06
For social media	33	13.92
Others	15	6.32
Total	237	100.00

Table 5: Relationship between learning style, study environment and academic performance (GPA).

Learning style	Mean GPA ± SD	f value	P value
Visual (n=134)	4.72±0.31		
Auditory (n=94)	4.56±0.28	3.96	0.021
Tactile (n=9)	4.42±0.36		
Study environment			
Quiet room at home	4.68±0.34		
Library	4.52±0.28	3.72	0.03
Tv/other	4.31±0.47		

Table 6: Association between study hours and learning style.

Study hours (per day)	Visual (%)	Auditory (%)	Tactile (%)	X^2	P value
<3 h (n=59)	44.1	50.8	5.1		
3–5 h (n=95)	60.0	33.7	6.3	10.82	0.029
>5 h (n=83)	63.9	29.4	6.7		

Table 7: Relationship between routine schedule and sleep quality during exam.

Routine followed	Enough sleep (%)	Not enough sleep (%)	Total	X^2	P value
All the time	24 (53.3)	21 (46.7)	45		
Only during exam	29 (28.4)	73 (71.6)	102	8.24	0.04
Sometimes/none	17 (22.9)	57 (77.1)	74		

Table 8: Association between phone use during study and study performance.

Phone use	High GPA (>4.5) (%)	Low GPA (≤4.5) (%)	Total	X^2	P value
For study	84 (60)	56 (40)	140		
For social media	21 (35)	39 (65)	60	7.92	0.02
No phone use	12 (48)	13 (52)	25		

Table 9: Predictors of high academic performance- binary logistic regression.

Predictor variable	B	SE	OR (95 % CI)	P value
Visual learning style	0.61	0.27	1.84 (1.09–3.11)	0.022
Daily study ≥ 5 h	0.52	0.24	1.68 (1.06–2.67)	0.031
Adequate sleep	0.79	0.29	2.20 (1.25–3.86)	0.005
Routine schedule	0.43	0.25	1.54 (0.95–2.49)	0.08
Phone use for study	0.58	0.27	1.78 (1.06–2.99)	0.028

DISCUSSION

This study examined the learning styles and study habits of undergraduate medical students at Green Life Medical College, Dhaka. The findings revealed that a majority of students preferred the visual learning style, studied for 3–5 hours daily, frequently used smartphones during study (mainly for academic purposes), and most experienced inadequate sleep during examination periods. Visual learners achieved higher GPAs compared to auditory or tactile learners, and consistent study schedules and adequate sleep were positively associated with academic performance. These findings contribute valuable insights into how individual learning preferences, behavioural patterns, and lifestyle factors collectively influence medical students' academic outcomes.

The predominance of the visual learning style (56.5%) in this study mirrors earlier findings among Bangladeshi medical students, where visual and multimodal preferences were most common.[3] Similar trends were also reported in Turkey and Egypt, where more than half of health science students displayed strong visual or multimodal tendencies.[2-7] Visual learners typically prefer diagrams, flowcharts, and videos—resources that align well with medical education's emphasis on anatomy and clinical problem-solving. Our finding that visual learners achieved significantly higher GPAs (p=0.021) supports prior studies showing that visual or multimodal learners tend to perform better academically.[1-4] Conversely, other authors have argued that strict matching of teaching methods to learning styles (the "meshing hypothesis") does not guarantee improved outcomes, advocating instead for multimodal, flexible instructional design.[10] Therefore, while visual materials should remain integral to medical instruction, educators should employ blended pedagogies that engage auditory and kinaesthetic learners as well.

Most students in this study reported studying 3–5 hours daily, with 43% following a study schedule only during examinations. These results correspond with findings from Bangladesh and India, where students also displayed moderate but inconsistent study habits and time-management practices.[4,5] The current study demonstrated a positive correlation between study duration and GPA, consistent with Brambila-Tapia et al (2024), who found that disciplined study routines and longer focused sessions predicted higher academic achievement.[11] However, excessive study hours without effective strategies can lead to fatigue and reduced learning efficiency, underscoring the importance of quality over quantity in study practices.

Sleep quality emerged as a significant determinant of academic success. Students who maintained consistent study routines and adequate sleep achieved better grades, aligning with evidence that sufficient rest enhances memory consolidation and cognitive performance.[12] In contrast, sleep deprivation has been shown to impair attention, reasoning, and motivation.[13] Hence, medical schools should encourage sleep hygiene and time-management awareness as part of academic mentoring.

The widespread use of smartphones (70%) among participants' highlights technology's growing role in medical education. A majority (56%) reported using phones for study purposes, which was significantly associated with higher GPA. This finding aligns with research showing that purposeful smartphone use—for e-learning platforms, accessing lectures, and reviewing notes—enhances academic engagement.[14,15] However, social-media use during study was linked to lower performance, supporting evidence that distraction and multitasking reduce concentration and efficiency.[9,16] Thus, digital literacy and self-regulation training should be incorporated into medical curricula to ensure that technology serves as an academic aid rather than a distraction.

Students who studied in quiet environments demonstrated significantly higher GPAs (p=0.03), confirming that low-distraction settings are conducive to effective learning. Scoulas et al similarly reported that quiet library spaces were positively correlated with academic success among university students.[17] Nonetheless, collaborative study environments remain valuable for promoting communication and problem-solving skills. Hence, medical institutions should provide both silent and interactive study zones to support diverse learning preferences.

Regression analysis in this study identified four significant predictors of high GPA: visual learning style, study duration ≥5 hours, adequate sleep, and academic use of smartphones. These factors jointly explained a meaningful proportion of academic variance, demonstrating the multifactorial nature of medical students' success. Comparable findings from Saudi

Arabia and Turkey have shown that learning styles, sleep quality, and digital behaviours collectively influence academic outcomes.[2,18]

Strengths and limitations

This study contributes valuable baseline data on the learning styles and study habits of Bangladeshi medical students within a private institution, a context often underrepresented in literature. However, limitations include the use of convenience sampling, self-reported data, and the cross-sectional design, which precludes causal inference. Future research employing longitudinal or mixed-methods approaches could provide deeper insights into how learning styles evolve across academic years and influence long-term academic outcomes.

CONCLUSION

The present findings demonstrate that medical students at Green Life Medical College predominantly adopt a visual learning style and moderate study habits characterized by inconsistent schedules and sleep deprivation during examinations. Faculty development initiatives should therefore emphasize diversified teaching methods, integrating visual aids, active learning strategies, and digital technology.

Encouraging balanced study practices, adequate rest, and use of online educational resources can further enhance student learning, retention, and well-being. Adapting the medical curriculum to align with these preferences can improve both academic achievement and overall learning satisfaction.

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