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Original Research

Evaluation of Nutritional Awareness, Hygiene Practices, and Lifestyle Factors on Health Outcomes and Academic Concentration Among Tertiary Level Students in Chattogram, Bangladesh

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ABSTRACT

Background: Nutritional habits, hygiene practices, and lifestyle attitudes are recognized as important decisive factors of health and academic performance among university students. However, available literature from developing countries, particularly Bangladesh, remains limited. This study aimed to evaluate the relationship between nutritional awareness, hygiene practices, lifestyle factors, and their effects on health outcomes and academic concentration among tertiary-level students in Chattogram City, Bangladesh. **Methods:** A cross-sectional study was conducted among 93 tertiary-level students selected through convenience sampling. Data were collected using a structured questionnaire covering demographic characteristics, dietary habits, hygiene practices, lifestyle factors, and academic performance indicators. Composite scores for hygiene and nutrition were generated by converting ordinal variables into numerical scales. Descriptive statistics (mean ± standard deviation) were calculated, followed by correlation analysis and multiple linear regression to assess associations between independent variables and outcomes like academic concentration and grade point average (GPA). **Results:** The mean age of participants was 20.51 ± 1.74 years. The average sleep duration, screen time, GPA, and academic concentration scores were 6.66 ± 0.91 hours, 5.39 ± 2.17 hours, 3.41 ± 0.42, and 6.58 ± 1.60, respectively. Correlation analysis showed weak relationships among variables, with sleep duration showing a weak positive association with academic concentration ($r = 0.14$) and GPA ($r = 0.08$), while screen time revealed a weak negative correlation with GPA ($r = -0.07$). Regression analysis pointed out that none of the examined factors were statistically significant ($p > 0.05$). **Conclusions:** The findings suggest that individual lifestyle, nutritional, and hygiene factors have limited independent influence on academic performance and concentration among

students. Academic success cannot be explained by some specific lifestyle variables in isolation, but rather through complex interactions among multiple determinants. Future studies with larger sample sizes and longitudinal designs are recommended to better understand these relationships.

Keywords: Nutrition; hygiene; lifestyle; academic performance; students; Bangladesh

1. INTRODUCTION

Lifestyle-related behaviors, including dietary practices, hygiene habits, sleep patterns, and physical activity, are increasingly recognized as critical determinants of both physical health and cognitive performance among university students.[1,2] The transition from secondary to tertiary education is often associated with significant environmental and behavioral changes, including irregular eating patterns, inadequate sleep, and increased screen exposure, which may negatively impact academic outcomes.[3–5]

Nutritional factors, particularly breakfast consumption and fruit intake, have been widely studied in relation to cognitive function and academic performance. Regular breakfast consumption has been linked to improved memory, attention, and overall academic achievement.[6–8] However, some studies have reported inconsistent findings, suggesting that the quality and composition of meals may be more important than frequency alone.[9,10] Similarly, fruit and vegetable intake has been associated with better mental health and cognitive performance due to their antioxidant and micronutrient content.[11,12]

Hygiene practices also play a crucial role in maintaining health and preventing infectious diseases, which may indirectly affect academic engagement and performance.[13,14] Adequate hand hygiene and sanitation practices have been shown to reduce absenteeism and improve overall well-being among students.[15] Despite their importance, the direct relationship between hygiene practices and academic outcomes remains underexplored.

Sleep duration and quality are among the most significant lifestyle factors influencing cognitive function. Sleep deprivation has been consistently associated with impaired attention, reduced memory consolidation, and lower academic performance.[16–18] In contrast, adequate sleep duration has been shown to enhance learning capacity and concentration.[19] Concurrently, excessive screen time, particularly through mobile devices and social media, has been linked to reduced academic performance, increased distraction, and poor sleep quality.[20–22]

Physical activity is another important determinant of both physical and cognitive health. Regular exercise has been associated with improved brain function, enhanced mood, and better academic outcomes.[23,24] However, sedentary lifestyles and prolonged screen exposure have become increasingly prevalent among students, potentially counteracting these benefits.[25]

Despite extensive global research, studies examining the combined effects of nutritional habits, hygiene practices, and lifestyle factors on academic outcomes in developing countries remain limited. In Bangladesh, particularly in Chattogram City, rapid urbanization and lifestyle transitions may influence student behaviors and health outcomes.[26,27] However, comprehensive studies integrating multiple behavioral factors in this context are scarce.

Furthermore, previous research has reported mixed findings regarding the strength and significance of these associations.[28–30] This inconsistency highlights the need for context-specific investigations to better understand the interplay between lifestyle factors and academic performance.

Based on existing literature and theoretical frameworks, it is hypothesized that modifiable lifestyle and behavioral factors—including nutritional habits, hygiene practices, sleep duration, physical activity, and screen time—are associated with academic performance and academic concentration among tertiary-level students. Specifically, healthier behavioral patterns, such as regular breakfast consumption, adequate sleep, better hygiene practices, and higher levels of physical activity, are expected to be positively associated with improved academic outcomes. Conversely, increased screen time is hypothesized to show a negative

association with academic performance and concentration.

However, considering the evolving nature of modern student lifestyles—particularly the increasing integration of digital technology into academic activities—the strength and direction of these associations may not be uniformly significant. Therefore, the study also explores the possibility that these factors may demonstrate weak or context-dependent relationships with academic outcomes.

The present study aimed to evaluate the relationship between nutritional awareness, hygiene practices, lifestyle factors, and their impact on health outcomes and academic concentration among tertiary-level students in Chattogram City, Bangladesh. To the best of our knowledge, this is one of the few studies in Bangladesh that simultaneously evaluates lifestyle behaviors, nutritional patterns, and academic performance indicators within a single analytical framework among tertiary-level students.

2. METHODS

2.1 Study Design and Setting

A cross-sectional study was conducted among tertiary-level students in Chattogram City, Bangladesh, between July 2025 and October 2025. The study population was recruited from nine different upazilas and thirteen educational institutions to ensure broader representativeness. All participants were tertiary-level students aged between 20 and 25 years, reflecting a typical young adult academic population.

2.2 Study Population and Sampling

The study was conducted among tertiary-level students enrolled in public and private universities and colleges in Chattogram City, Bangladesh. Chattogram is one of the largest educational hubs in the country, comprising multiple higher education institutions across diverse academic disciplines. Participants were selected using a non-probability convenience sampling technique due to the absence of a complete and accessible sampling frame of all enrolled students, which made probability-based sampling impractical. Data were collected through direct contact with students on campus and/or voluntary participation based on availability and willingness to participate during the data collection period.

The study included a total of 93 participants. This sample size was determined based on feasibility, time, and resource constraints, and is appropriate for exploratory cross-sectional analyses aimed at identifying preliminary associations rather than generating population-level estimates. Inclusion criteria were: (i) currently enrolled tertiary-level students in universities or colleges in Chattogram City, and (ii) willingness to participate in the study. Participants with incomplete or inconsistent responses were excluded from the final dataset.

2.3 Data Collection Tool and Procedure

Data were collected using a structured, pre-tested questionnaire designed to capture demographic information, dietary habits, hygiene practices, lifestyle behaviors, and academic performance indicators. The questionnaire was administered in person and/or electronically.

2.4 Study Variables

The independent variables in this study included nutritional determinants such as breakfast frequency, fruit intake, and fast-food consumption; hygiene practices including handwashing frequency, use of sanitizer, and oral hygiene; and lifestyle factors such as sleep duration, physical activity, screen time, and smoking status. The dependent variables were academic concentration score and Grade Point Average (GPA). In addition, several covariates were considered, including age, gender, body mass index (BMI) category, and year of study.

2.5 Ethical practices

Ethical approval for conducting the study was obtained from the Institutional Ethical Review Committee, Faculty of Biological Sciences, University of Chattogram, Bangladesh (Approval Reference Number: AERB-FBSCU-20241018-(1)). The study was conducted in accordance with institutional ethical guidelines for human research.

2.6 Data Processing and Scoring

Ordinal variables were converted into numerical scales to facilitate quantitative analysis. Hygiene-related variables were coded from “Never” (1) to “Always” (5), while breakfast frequency was coded from “Never” (1) to “Daily” (5). Self-rated health status was categorized from “Poor” (1) to “Excellent” (4). Composite scores, including the Hygiene Score, were calculated by taking

the mean of the relevant variables, ensuring a standardized representation of behavioral patterns.

2.7 Statistical Analysis

Data was analyzed using R (version 4.5.1) software. Descriptive statistics were expressed as mean ± standard deviation (SD). Pearson correlation analysis was used to assess relationships among continuous variables. Multiple linear regression models were constructed to identify predictors of academic concentration and GPA. Model assumptions were done using plots, and a p-value < 0.05 was considered statistically significant.

3. RESULTS

3.1 Descriptive Characteristics of the Study Population

A total of 93 tertiary-level students from Chattogram City participated in the study. The descriptive statistics of the study population are presented in Table 1. The mean age of the participants was 20.51 ± 1.74 years. The average sleep duration was 6.66 ± 0.91 hours per day, while the mean daily screen time was 5.39 ± 2.17 hours. The mean Grade Point Average (GPA) was 3.41 ± 0.42, and the average academic concentration score was 6.58 ± 1.60. The mean age of participants was within the early adulthood range, consistent with a tertiary-level student cohort. Sleep duration and screen time exhibited moderate variability, reflecting heterogeneous lifestyle patterns. Academic performance (GPA) and academic concentration scores also showed moderate dispersion, indicating variability in cognitive and academic outcomes among participants.

In addition, the socio-demographic profile of the participants indicated an approximately equal gender distribution (male: 50.5%, female: 49.5%). Most participants were undergraduate students across different academic years, with a higher proportion in the 3rd and 4th years. Regarding BMI classification, the majority of participants had normal BMI status (59.1%), while smaller proportions were categorized as underweight, overweight, or obese. Most participants were non-smokers (59.1%). In terms of self-reported health status, participants were distributed across categories, with relatively similar proportions reporting good and poor health conditions. These findings collectively reflect a heterogeneous sample in terms of demographic, lifestyle, and health-related characteristics.

3.2 Association Between Breakfast Frequency and Academic Performance

The mean ± SD GPA across different breakfast frequency groups demonstrated only minimal variation. The association between breakfast consumption and academic performance is illustrated in Figure 1, while group-wise summary statistics are presented in Table 2. Participants reporting "Daily" breakfast consumption demonstrated a mean GPA of 3.43 ± 0.41, which was comparable to those reporting "Often," "Sometimes," and "Rarely" consumption.

Table 1. Descriptive characteristics of study participants

Variable	Category	Value
Age (years)		20.51 ± 1.74
Sleep duration (hours/day)		6.66 ± 0.91
Screen time (hours/day)		5.39 ± 2.17
GPA		3.41 ± 0.42
Academic concentration score		6.58 ± 1.60
Gender	Female	46 (49.5%)
	Male	47 (50.5%)
Year of Study	1st	19 (20.4%)
	2nd	10 (10.8%)
	3rd	27 (29%)
	4th	27 (29%)
	Masters	10 (10.8%)
BMI Category	Normal	55 (59.1%)
	Obese	10 (10.8%)
	Overweight	19 (20.4%)
	Underweight	9 (9.7%)
Smoking Status	Non-smoker	55 (59.1%)
	Occasional	19 (20.4%)
	Regular	19 (20.4%)
Health Status	Average	22 (23.7%)
	Excellent	9 (9.7%)
	Good	31 (33.3%)
	Poor	31 (33.3%)
Recent Illness	No	55 (59.1%)
	Yes	38 (40.9%)

Continuous variables are presented as mean ± standard deviation (SD), while categorical variables are expressed as frequency (n) and percentage (%). Age is reported in years, sleep duration and screen time in hours per day, GPA on a 4.00 scale, and academic concentration score on the study-specific scale used in this research.

The distribution of GPA across breakfast categories shows considerable overlap, suggesting that breakfast frequency alone may not be a strong determinant of academic performance in this cohort. The observed pattern indicates a subtle positive trend, but without a pronounced or distinct separation between groups.

Table 2. Mean ± SD GPA across different breakfast frequency categories, showing that breakfast frequency alone did not significantly affect GPA in this study

Breakfast frequency	GPA (Mean ± SD)
Daily	3.43±0.41
Often	3.39±0.44
Rarely	3.41±0.46
Sometimes	3.43±0.38

Although a slight positive trend in mean GPA was observed with higher breakfast frequency, the differences across categories were minimal and overlapping. This suggests that breakfast frequency alone may not substantially influence academic performance in this cohort.

3.3 Association Between Sleep Duration and Academic Performance

The relationship between sleep duration and GPA is presented in Figure 2. A weak positive trend was observed, indicating that increased sleep duration may be associated with slightly higher GPA. However, the dispersion of data points suggests substantial variability and the absence of a strong linear relationship.

3.4 Association Between Screen Time and Academic Concentration

The association between screen time and academic concentration is illustrated in Figure 3. A slight upward trend was observed; however, the relationship was weak and inconsistent, indicating that screen time does not have a strong direct effect on concentration scores in this dataset.

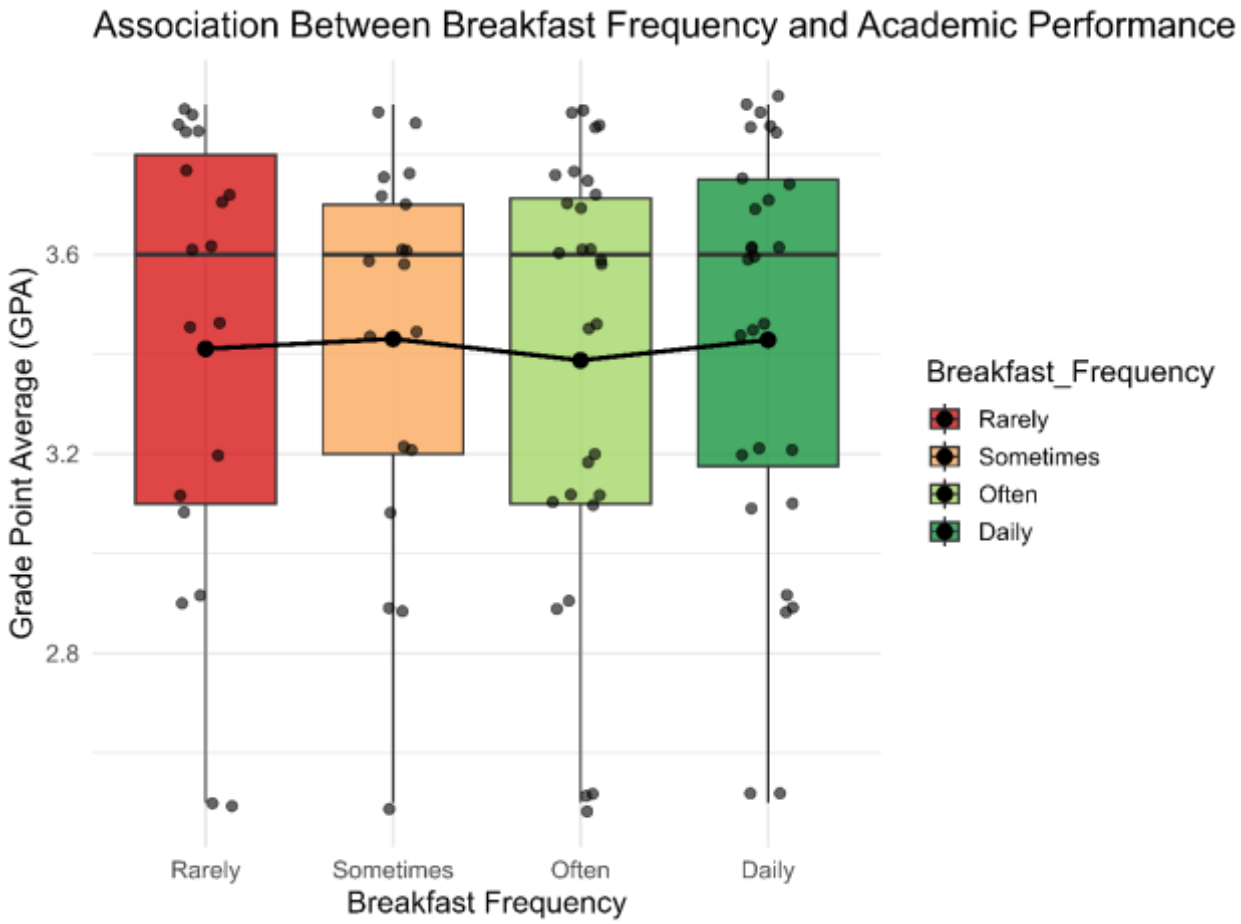

Figure 1. Association between breakfast frequency and Grade Point Average (GPA) among tertiary-level students. The boxplot illustrates the distribution of GPA across different breakfast frequency categories, with mean values indicated by connected points. A slight increasing trend in GPA is observed with higher breakfast frequency; however, substantial overlap between groups suggests a limited independent effect of breakfast consumption on academic performance.

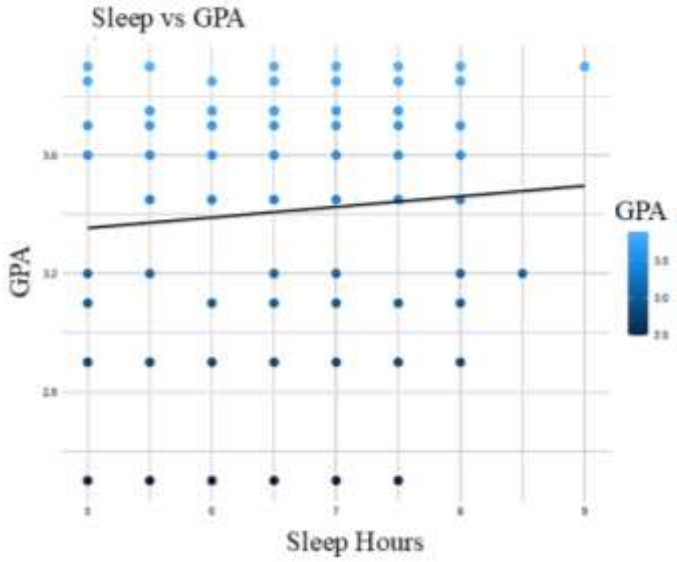

Figure 2. Relationship between sleep duration and GPA. The scatter plot with fitted regression line indicates a weak positive trend

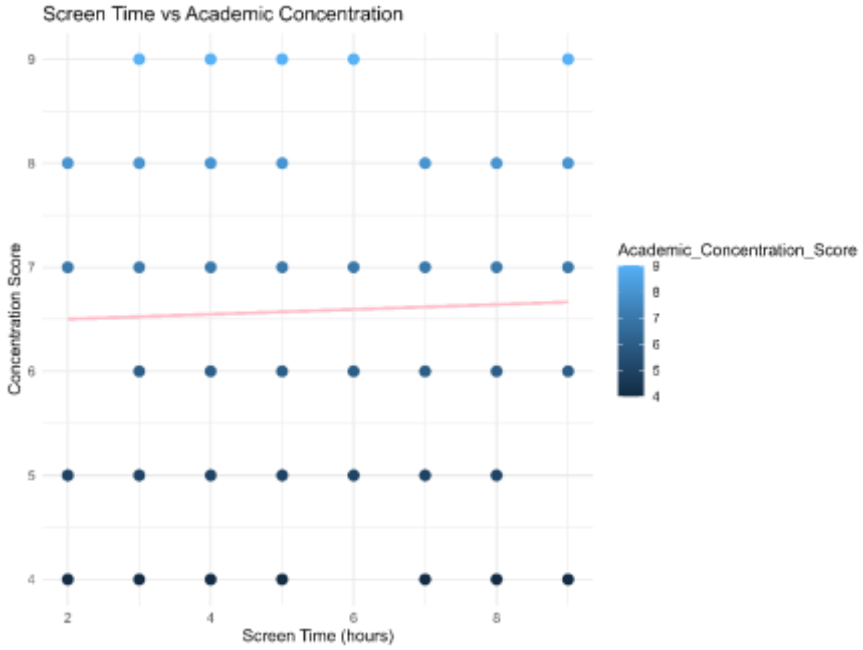

Figure 3. Relationship between screen time and academic concentration score. The scatter plot demonstrates a weak and inconsistent association.

3.5 Correlation Analysis

Correlation analysis revealed weak relationships among key variables. Sleep duration showed a weak positive correlation with academic concentration (r = 0.14) and GPA (r = 0.08). Screen time demonstrated a weak negative correlation with GPA (r = -0.07) and a negligible association with concentration (r = 0.03). The correlation matrix is presented in Table 3, and its graphical representation is shown in Figure 4.

Correlation analysis revealed generally weak relationships among the studied variables. Sleep duration demonstrated a weak positive correlation with academic concentration (r = 0.14) and GPA (r = 0.08). Screen time showed a weak negative correlation with GPA (r = −0.07) and a negligible association with concentration (r = 0.03).

Table 3. Correlation matrix of key study variables

Sleep hours	Screen time (hours)	GPA	Academic concentration score
1.0	-0.17	0.08	0.14
-0.17	1.0	-0.07	0.03
0.08	-0.07	1.0	0.16
0.14	0.03	0.16	1.0

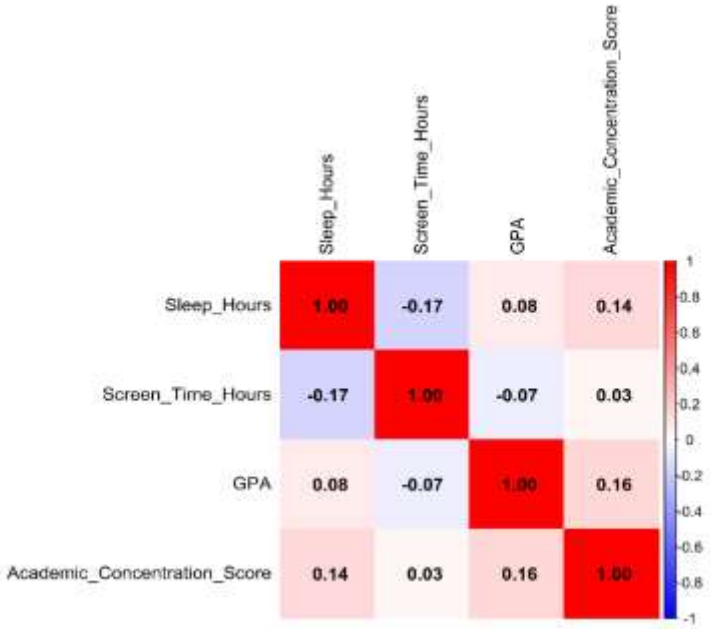

Figure 4. Correlation heatmap showing relationships among sleep duration, screen time, GPA, and academic concentration

3.6 Regression Analysis

3.6.1 Predictors of academic concentration

Multiple linear regression results are presented in Table 4. None of the independent variables—including sleep duration, screen time, physical activity, breakfast score, and hygiene score—were statistically significant predictors of academic concentration ($p > 0.05$). Although sleep duration showed a positive coefficient ($\beta = 0.34$), this association did not reach statistical significance ($p = 0.195$).

3.6.2 Predictors of academic performance (GPA)

Regression analysis for GPA is presented in Table 5. Similar to the previous model, none of the examined predictors demonstrated statistically significant associations ($p > 0.05$). Sleep duration showed a weak positive trend ($\beta = 0.062$), whereas screen time exhibited a weak negative association ($\beta = -0.012$), but both were non-significant.

4. DISCUSSION

The present study examined the relationship between nutritional attributes, hygiene behaviors, and lifestyle factors and academic outcomes among tertiary-level students. The descriptive findings (Table 1) indicate variability in sleep patterns, screen time, and academic performance, consistent with previous studies reporting heterogeneous lifestyle behaviors among university students.[4,5] Such variability may reflect differences in academic workload, personal habits, and environmental influences.

The analysis of breakfast frequency (Figure 1 and Table 2) pointed out minimal differences in GPA across categories of different breakfast groups. Although regular breakfast consumption has been associated with improved cognitive performance in several studies,[1,2,16] the present findings align with research suggesting that dietary quality and nutritional composition may play a more critical role than frequency alone.[9,18] This highlights the limitation of using a single dietary indicator to assess nutritional impact.

The relationship between sleep duration and academic performance (Figure 2) demonstrated a weak positive trend, consistent with evidence linking adequate sleep to improved memory consolidation and cognitive function.[21,22] However, the absence of statistical significance suggests that sleep duration alone may not adequately explain academic outcomes without

Table 4. Multiple linear regression model predicting academic concentration

Term	Estimate	Std. error	Statistic	*p*-value
Intercept	4.60	1.43	3.22	0.002
Sleep hours	0.34	0.26	1.30	0.195
Screen time (hours)	0.05	0.08	0.57	0.568
Physical activity (min per week)	0.004	0.004	1.07	0.290
Breakfast score	-0.13	0.24	-0.5	0.599
Hygiene score	-0.09	0.26	-0.36	0.721

Table 5. Multiple linear regression model predicting GPA

Term	Estimate	Std. error	Statistic	*p*-value
Intercept	3.22	0.37	8.61	0.0000000000003
Sleep hours	0.06	0.07	0.92	0.360
Screen time (hours)	-0.012	0.02	-0.59	0.559
Breakfast score	-0.03	0.06	-0.50	0.617
Hygiene score	-0.01	0.07	-0.15	0.879

considering sleep quality and circadian rhythm variations.[5]

Screen time (Figure 3) did not show a strong negative association with academic concentration which is a strong striking point. While exaggerative recreational screen exposure has been associated with reduced attention and academic performance,[24,25] the findings of this study suggest that screen time may not inherently be detrimental rather it may positively effect academic concentration. In contemporary academic environments, digital platforms are increasingly used for educational purposes, including accessing study materials, attending online classes, and academic communication. Therefore, the impact of screen time may depend more on its purpose (academic vs. recreational) rather than duration alone.

Correlation analysis (Table 3 and Figure 4) further confirmed weak relationships among the variables, supporting previous findings that lifestyle factors often exhibit modest associations with academic outcomes when examined independently.[29]

Similarly, regression models (Table 4 and Table 5) failed to identify significant predictors of academic concentration and GPA. These findings reinforce the notion that academic performance is a complex, multifactorial construct influenced by psychological, socioeconomic, environmental, and institutional factors beyond the scope of the present study.[13,15]

Overall, the findings emphasize that academic success cannot be explained by some specific lifestyle variables in isolation, but rather through complex interactions among multiple determinants. The relatively small sample size and limited number of matrices may have reduced the statistical power to detect significant associations. As well as due to budgetary and manpower constraints, it was not possible to include a broader range of variables such as psychological stress, dietary quality, sleep quality, and socioeconomic status, which are known to influence academic performance.

Despite these limitations, this study provides valuable preliminary insights into the lifestyle patterns of tertiary-level students. Future research should involve larger, more diverse samples and incorporate multidimensional variables to better understand the complex interactions influencing academic outcomes. With adequate funding and resources, more comprehensive studies can be conducted to reveal a clearer and more holistic picture of student lifestyle and academic performance.

5. CONCLUSION

The present study demonstrates that nutritional habits, hygiene practices, and lifestyle factors exhibit weak and non-significant associations with academic performance and academic concentration among tertiary-level students. Although certain trends were observed—such as the positive influence of sleep and the nuanced role of screen time—these relationships were not statistically robust.

These findings highlight the increasing complexity of modern student life, where behavioral patterns are continuously evolving in response to

technological advancement, academic demands, and socioeconomic conditions. Notably, screen time is no longer solely indicative of distraction but also represents an essential medium for academic engagement and access to educational resources, particularly in resource-limited settings.

The study is limited by sample size and the restricted number of variables examined due to budgetary and logistical constraints. Academic performance appears to be influenced by multifactorial determinants beyond isolated lifestyle behaviors. Therefore, future research incorporating larger samples, comprehensive behavioral measures, and longitudinal designs is essential to provide a more holistic understanding of these complex relationships.

Ethical Approval

Ethical approval for conducting the study was obtained from the Institutional Ethical Review Committee, Faculty of Biological Sciences, University of Chattogram, Bangladesh (Approval reference number: AERB-FBSCU-20241018-(1)).

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Competing Interests

All the authors declare that there are no conflicts of interest.

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No funds were received for this study.

Underlying Data

Derived data supporting the findings of this study are available from the corresponding author on request.

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