A Study of Sleep Patterns and Academic Performance Among Undergraduate Students at an Indian Urban College

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***Abstract*—This paper explores the association between sleep patterns and academic achievement among undergraduate students in Mumbai. Previous literature on this subject matter has been undertaken in North America and Europe which makes generalizations to other contexts very difficult. A 17-item questionnaire was distributed to 71 undergraduate students for two weeks during January 2026 using convenient sampling method. Four pre-specified hypotheses in terms of odds ratio were examined by conducting Fisher's exact test using collapsed 2x2 contingency tables rather than Chi-Square test since more than 75% of cells of some contingency tables had expected count less than five. None of the four pre-specified associations achieved statistical significance (all p>0.05). Sleep deprivation is prevalent: 64.8% of the subjects slept less than 7 hours on weekdays, 69.0% went to bed after midnight, and 83.1% used electronic gadgets before going to bed either sometimes or always. Trends in directions were varied: higher usage of devices prior to bedtime was linked to poorer quality of sleep, which is in line with previous research findings; however, trends in sleep duration and time of going to bed were counter-intuitive and did not reach significance. In spite of prevalent sleep deprivation in this group, there was no significant link found between sleep-related factors and subjective rating of academic achievement, probably due to low statistical power of the study (N=71).**

***Index Terms*—academic performance; electronic devices; Fisher's Exact Test; sleep deprivation; sleep hygiene; sleep patterns; undergraduate students.**

I. INTRODUCTION

Sleeping is not the requirement necessary for learning but assists in concentration and memorization of the information that is needed by the students while doing homework or attending classes. Yet, lack of sleep is widespread among college students [1] as they experience lack of sleep and its negative effects due to poor sleep habits, like the inability to concentrate and memorize information along with bad academic performance. In contrast, those who get sufficient sleep outperform other students [2].

There are a number of factors accounting for problems with falling asleep and getting enough sleep by students. First, studying, tests, and deadline work prevent students from having enough time to rest, and the second one is the use of electronics in late hours [3]. Consequently, it leads to the development of an irregular sleep schedule, poor quality of sleep, and chronic sleep deprivation in students. Sleep deprivation is very harmful to cognition, such as attention, working memory, and executive function of the brain [4].

II. LITERATURE REVIEW

A. Sleep and Learning Effectiveness

As learning requires cognitive abilities such as concentrating, memory retention and decision-making, and all of them are promoted by adequate sleep, students who sleep enough have better opportunities to succeed in their classes [1]. An appropriate study in this respect is [2]; the authors tracked sleeping habits of college students using wearable devices over the entire semester and came to an unexpected conclusion – regularity of sleeping matters as much as duration. That means that students having a consistent sleep schedule performed better than those who slept the same amount of time but had no consistent bedtime or wake up time.

B. Consequences for Cognitive Functions from Sleep Deficiency

When the students lack sleep, their consequences will be diminished alertness, working memory deterioration and delayed reaction time [4]. This fact is important since all of these mental processes are actively used at college, during lectures, discussions, tasks and exams.

C. Insufficient sleep prevalence

It is significant to state that approximately 71% of university students have insufficient sleep because they spend only 5–6 hours sleeping each night while it should be between 7 and 9 hours [3]. Lack of sleep occurs as a result of combining studying, working, social life, and usage of devices.

D. Sleep Timing and Circadian Rhythms

The body's internal circadian rhythm controls sleep-wake timing; any mismatch between the body's rhythm and outside timings (like early school timings) creates "social jet lag," which results in fatigue, loss of focus, forgetfulness, and poor academic performance.

E. Neurocognitive Basis

The brain region most impacted by sleep deprivation is the prefrontal cortex since it controls functions such as self-regulation, planning, and decision making [5]. Research has shown through brain scans that regions of the brain involved in high-level cognitive functions become less active in cases of sleep deprivation.

F. Electronic Devices and Sleep

The use of cell phones, tablets, and computers before sleeping is associated with increased time required for falling asleep and decreased time spent sleeping [6] because of two factors: the cognitive and emotional stimulation by the content that does not allow relaxing and melatonin production inhibition by blue light exposure.

G. Sleep, Mental Health and Academic Performance

The factors sleep, mental health and academic performance are related to each other because of the self-perpetuating circle which states that sleep deprivation increases the vulnerability to develop symptoms of depression and anxiety which influence the concentration and academic performance, thus creating further stress.

H. Intervention Strategies and Sleep Hygiene

The efficacy of the educational intervention strategies on sleep hygiene has been established through empirical studies carried out through systematic reviews in the field of public health [7].

I. Gaps in the Literature

Despite ample evidence supporting a connection between sleep and academic achievement, prior studies have largely been conducted using self-reporting of sleep across a cross-sectional design, which makes it difficult to infer causality.

III. METHODOLOGY

A. Research Design

This study employed a quantitative, cross-sectional descriptive-correlational design using a structured electronic questionnaire, consistent with prior survey-based sleep research in college populations.

B. Participants and Sampling

Seventy-one undergraduate students were sampled using convenient sampling, whereby the first 71 respondents to finish the online survey were selected for participation. The ages ranged between less than 16 and above 25 years, with the bulk aged between 18 and 21 years (57.7%) (Table I).

TABLE I AGE DISTRIBUTION OF RESPONDENTS (N = 71)

Age Group	n	%
Under 16	2	2.8%
16–18	3	4.2%
18–21	41	57.7%
21–25	20	28.2%
25+	5	7.0%
Total	71	100%

C. Instrument and Data Collection

The data was collected through a structured survey questionnaire that comprised 17 items through Google Forms for two weeks in January 2026. The questionnaire comprised four sections, which were (A) Demographic Data, (B) Sleep Hours and Quality, (C) Lifestyle Data, and (D) Impact on Academics.

D. Data Preparation

Prior to conducting any kind of analysis, there was an audit done of the initial data set to ensure that the data was consistent and complete. There were no duplicates or missing values in the important dependent and independent variables. The data problems included data entry issues with the variable Gender, which had been input as "unspecified" and not imputed as Gender is not part of the hypotheses of the study; and whitespace duplicates in the variable Education Level.

E. Data Analysis and Testing of Hypotheses

Descriptive statistics in terms of frequencies, percentages, and cross-tabulations provided an overview of the sample and its sleep patterns. The following four hypotheses were developed before the statistical analysis:

- H1a: Sleep duration influences academic performance.
- H1b: Frequency of use of electronic devices before sleeping is associated with the quality of sleep.
- H1c: Quality of sleep affects academic performance.
- H1d: Sleeping time affects daytime drowsiness.

The null hypothesis (H_0) in each case was that there was no association between the two variables.As the answers to the questions were in ordinal scale and the expected cell counts in some of the cross-tabulations were less than 5 in more than 75–81% of the cells (violating assumptions of Chi-square test), the categories were combined into dichotomous categories (sleep hours: less than 7 hours versus 7+ hours, performance: below average/average versus good/excellent) and Fisher's exact test was performed as it does not rely on an asymptotic approximation and works well with small tables. The level of significance used was $\alpha = 0.05$ in all cases. All analyses were conducted using Python (pandas and SciPy).

F. Ethics

Participants took part on a completely voluntary basis. The right of withdrawal at any time was communicated to the participant. The results obtained were kept anonymous.

IV. RESULTS

A. Demographic Profile

According to Fig. 1, the highest proportion (57.7%) of respondents belonged to the 18-21 years age category, whereas another 28.2% of them were within the 21-25 years age category.

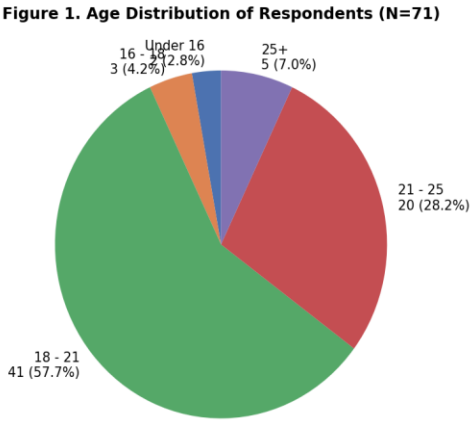

Fig. 1. Age distribution of respondents (N = 71).

B. Sleep Duration Patterns

Lack of sleep was quite common among these individuals (Fig. 2). A large percentage of respondents (33.8%) reported sleeping for 5 to 6 hours during weekdays; adding up those who sleep between 6 and 7 hours, 64.8% of them do not sleep for 7 hours a day. On the other hand, 14.1% sleep for 7 to 8 hours, while 8.5% sleep for less than 5 hours.

Insufficient sleep was common among these subjects (Fig. 2). The highest proportion of respondents (33.8%) reported 5–6 hours of sleep on weekdays; combined with those getting 6–7 hours, a total of 64.8% did not get 7 hours of sleep per night. In contrast, 14.1% got 7–8 hours and 8.5% got less than 5 hours of sleep.

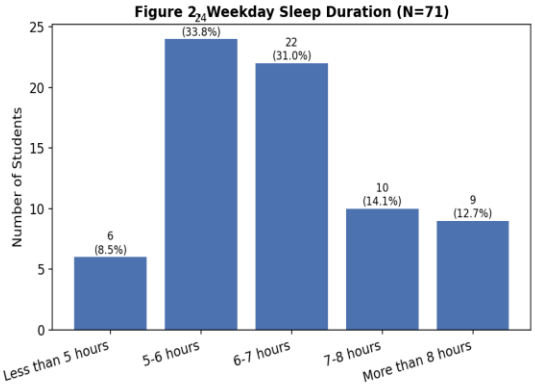

Fig. 2. Weekday sleep duration (N = 71).

C. Hypothesis Testing Results

Table II summarizes the results of the four pre-specified hypothesis tests. None of the four hypothesized associations reached statistical significance at $\alpha = 0.05$.

TABLE II SUMMARY OF FISHER'S EXACT TEST RESULTS (N = 71)

Hypothesis	Test	OR	p	Decision
H1a: Sleep duration × Academic performance	Fisher's Exact	0.51	0.364	Retain H_0
H1b: Device usage × Sleep quality	Fisher's Exact	0.34	0.202	Retain H_0
H1c: Sleep quality × Academic performance	Fisher's Exact	1.15	1.000	Retain H_0
H1d: Bedtime × Daytime sleepiness	Fisher's Exact	0.60	0.530	Retain H_0

From a descriptive standpoint, and counter to what was hypothesized, students who slept fewer than 7 hours reported a higher percentage of good/very good academic performance (76.9%, 40/52) than those sleeping 7 or more hours (63.2%, 12/19) (Fig. 3). This relationship was not statistically significant (OR = 0.51, p = 0.364), and given the small subgroup sizes it should not be over-interpreted, but the direction runs opposite to prior findings and is discussed further in Section V.

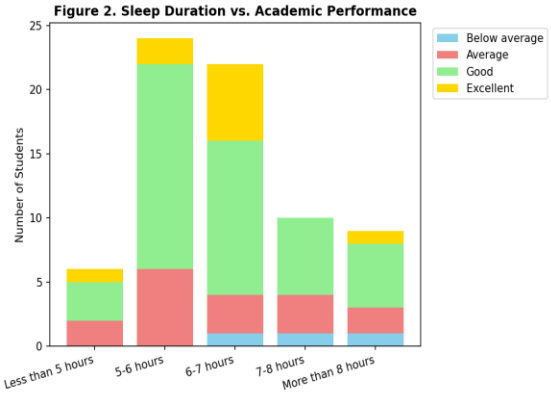

Fig. 3. Sleep duration vs. academic performance (full category breakdown).

Fig. 3(b) is the same correlation, broken down into the two categories used to test the formal hypothesis (less than 7 hours versus 7 or more hours). The Fisher's Exact Test outcome is noted in the figure.

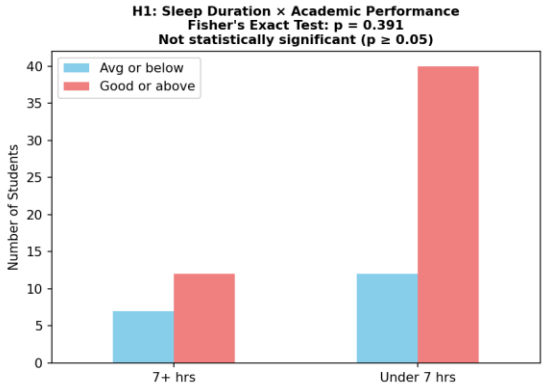

Fig. 3(b). Hypothesis test H1a: sleep duration × academic performance.

In the same way, those with frequent device use prior to sleeping had a greater percentage of low sleep quality than infrequent users (Fig. 4), though there was no significant relationship (OR = 0.34, p = 0.202).

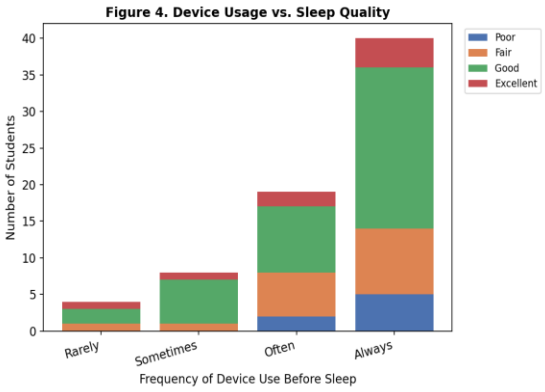

Fig. 4. Device usage vs. sleep quality (full category breakdown).

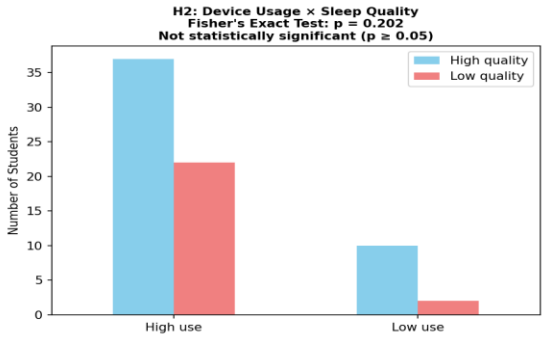

Fig. 4(b). Hypothesis test H1b: device usage × sleep quality.

No meaningful association was found between sleep quality and academic performance (Fig. 5; OR = 1.15, p = 1.000), the weakest of the four relationships examined.

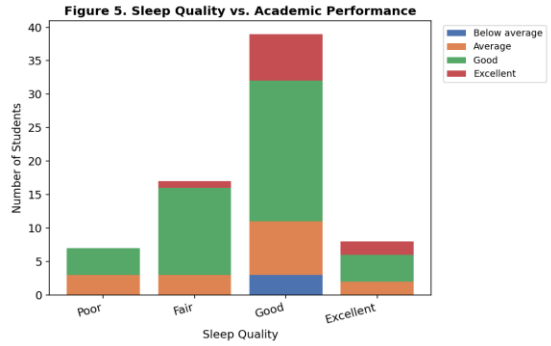

Fig. 5. Sleep quality vs. academic performance (full category breakdown).

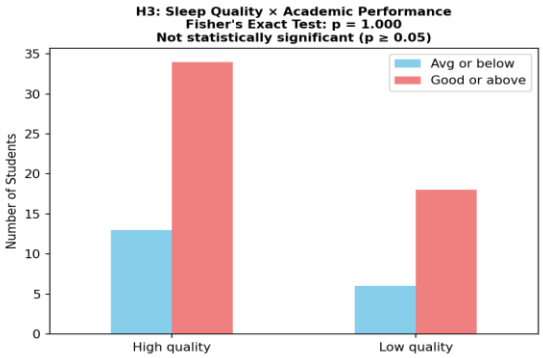

Fig. 5(b). Hypothesis test H1c: sleep quality × academic performance.

Individuals who went to bed before midnight had a tendency to have higher likelihoods of having frequent sleepiness during the day than those going to bed after midnight (27.3% [6/22] vs. 18.4% [9/49]) (Fig. 6), although the association was not statistically significant (OR = 0.60, p = 0.530). It is worth noting that 69 out of 71 students felt sleepy “sometimes” or more frequently during the day.

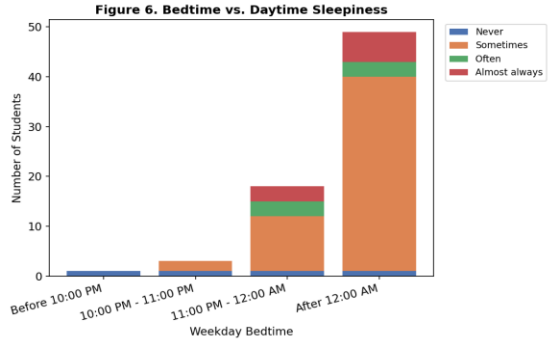

Fig. 6. Bedtime vs. daytime sleepiness (full category breakdown).

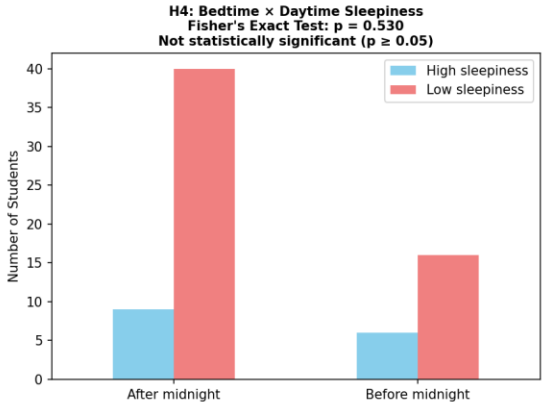

Fig. 6(b). Hypothesis test H1d: bedtime × daytime sleepiness.

D. Summary of Key Patterns

- 69.0% (49 out of 71) of participants went to bed after midnight during the weekdays.
- 83.1% of participants used electronic devices "all the time" or "sometimes" before going to sleep.
- 42.3% had less than six hours of sleep during the weekdays, while only 14.1% slept for 7-8 hours.
- 86% of participants rated their school performance "good" or "excellent," indicating low variability in the dependent variable.
- None of the four correlations between the two variables was statistically significant.

V. DISCUSSION

This research was aimed at defining the sleeping behavior of university students and determining whether there exists a statistical correlation between sleeping patterns and academic achievement. The findings of the research match those from literature concerning sleeping habits: many students lack proper sleep, most retire close to midnight, and use of gadgets before going to bed is common, as stated in [3] and [1]. However, unlike several other previous works that found correlations between sleep and performance, based on the use of large samples and objective sleep measures (for example, [2], N=100, thanks to the use of wearable sleep trackers), the current research did not find any significant correlations between the time of sleep, sleep quality, use of devices, bedtime, and self-assessment of academic performance. There can be at least three reasons for this inconsistency. Firstly, it was the small sample size (N=71) with categorical

variables represented in 2x2 tables combined with 86% of participants who declared their "good" or "excellent" academic performance – the ceiling effect. Secondly, self-assessment of academic performance was used instead of the GPA/grades, thus creating an increased potential for social desirability bias. Thirdly, objective sleep measure in [2] is expected to have been more reliable than the self-reported one in the current research.

Negative findings do not rule out the presence of a causal relationship between sleep deprivation and academic achievement because the theoretical and neuroscientific grounds mentioned in Section II (attentive, executive, and memory impairments resulting from sleep deprivation) have been already proven. In this way, the present study, considering its sample and methodology, was not in the right place to establish this kind of relationship.

VI. LIMITATIONS

Some limitations need to be pointed out. First of all, cross-sectional design prevents from making any conclusions about causality because it is impossible to know whether sleep problems come before academic problems or vice versa, whether academic problems come before sleep problems, or both. Second, the small sample size (N = 71) and categorial nature of dependent variables limited the ability to find any connections between those factors because of lack of statistical power. Third, all the data was based on self-reporting and thus had estimation, recall and social desirability bias (especially self-rating of academic performance because of its obvious ceiling effect).

VII. CONCLUSION AND RECOMMENDATIONS

There was an apparent presence of sleep deprivation among the 71 undergraduate participants; the majority were deprived of adequate sleep, the majority slept past midnight, and the majority used electronic gadgets excessively before bedtime. In terms of directionality, the results from the descriptive cross-tabulations showed inconsistent findings; gadget use followed the same direction as previous literature, whereas the results for sleep time and bedtime were contrary to previous literature but with no significant findings using Fisher's Exact Test. Because of the known association of sleep with academic performance through neurocognitive processes found in previous studies, it is highly likely that the null findings here are due to the small sample size.

Irrespective of statistical significance, the prevalence of sleep deprivation among participants calls for institution-led sleep hygiene intervention. The following recommendations are proposed:

A. Recommendations for Students

- Schedule yourself for sleep-wake consistency, including weekends.
- Have an early sleeping schedule, never past 11:00 p.m. on weekdays.
- Do not use phones or computers close to sleep time.
- Have a relaxing bedtime routine (like reading).
- Avoid any caffeine-containing beverages in the evening.
- Select a comfortable sleep environment (quiet, cool, dark)
- Schedule your studies using time management techniques.

B. Recommendations for Educational Institutions

- Avoid scheduling classes during very early morning hours, where possible.
- Educate about and create awareness on sleep hygiene.
- Establish a good sleep culture by communicating and through counseling on campus.
- Set "quiet" hours in dorms.
- Encourage teachers to plan assignments in a way that avoids late nights.

C. Recommendations for Parents and Families

- Ensure the formation of positive sleeping habits during term time and vacation.
- Do not consider sleep as an indulgence at the expense of studying.
- Take into consideration the family environment that might influence students' sleeping habits.

The future research needs to take into account bigger samples from various institutions, objective measurement of sleeping habits (for example, by using wrist actigraphy), and longitudinal research design, such as in [2].

APPENDIX: QUESTIONNAIRE STRUCTURE

Data were gathered using a structured 17-question questionnaire administered via Google Forms, divided into four parts:

A. Demographic Information

1. Age range 2. Gender 3. Level of education

B. Sleep Habits and Quality

4. Average sleeping hours during weekdays 5. Sleeping hours during weekends 6. Bed time during weekdays 7. Waking up time during weekdays 8. Feeling refreshed after waking up 9. Problem falling asleep 10. Quality of sleep

C. Lifestyle Factors

11. Device usage before sleeping

D. Academic Performance

12. Academic performance 13. Study time per day 14. Occurrence of daytime sleepiness 15. Sleep has an effect on academic performance 16. Feels fresh in the morning 17. Other comments

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