

Correlation between sleep quality and academic performance among Nigerian students

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Abstract

Background: Sleep is essential for cognitive processes, yet students often sacrifice rest for academic gain. While a few studies have attempted to understand the impact of sleep quality on academic performance, the relationship between both remains underexplored, especially in Nigeria.

Objectives: (1) To determine the relationship between sleep quality and academic performance, and (2) to identify other factors (socio-economic) that influence students' academic performance.

Materials/Methods: This cross-sectional study utilized a structured online questionnaire to survey 448 undergraduate students across diverse states in Nigeria. Sleep quality was assessed using a derived score that considered both duration of sleep and perceived restfulness. Data was analysed using Pearson's Chi-square tests and independent samples t-tests. Significance was set at $p < 0.05$

Results: The analysis revealed no statistically significant relationship between sleep quality and academic performance ($\chi^2 = 7.838$, $p = 0.645$). A trend from an independent sample t-test suggested that poor sleepers likely achieved better scores (Mean = 2.25) than good sleepers (Mean = 2.44). However, this was not statistically significant ($p = 0.064$). Regarding other factors, only the university level ($\chi^2 = 56.363$, $p < 0.001$) and course of study ($\chi^2 = 20.417$, $p = 0.001$) were found to be significant determinants of academic performance.

Conclusion: While sleep quality may be important for every student, it is likely not the principal determinant of academic performance. The findings suggest a resilience among high-achieving students that enables them to maintain good grades despite poor sleep habits.

Keywords: Sleep Quality; Academic Performance; Undergraduate Students

1. Introduction

Academic performance is a key predictor of future success and a major focus for students, educators, and parents across the globe [1]. Broadly defined, a student's academic performance is the extent to which a student has achieved their short- or long-term educational goals [2]. In tertiary institutions, this is most commonly reflected through letter grades ranging from A to F, which serve as standardized benchmarks for a student's mastery of a subject [3].

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Notably, beyond mere intelligence, many factors influence a student's academic performance [4]. One of the most overlooked of these factors is the student's "sleep quality [4,5]." Undergraduate students often sacrifice "quality sleep" for extra study time, all in a bid to secure higher grades [5]. Unfortunately, research suggests that this may be counterproductive. Sleep itself is a physiological process essential for memory consolidation, the process by which the brain converts short-term information to long-term knowledge that can be recalled later. Consequently, when sleep is compromised, cognitive functions such as focus and problem solving diminish, potentially turning a potential 'A' into a 'C' or 'D' due to mental fatigue [6].

Despite its impact, the specific relationship between sleep and academic achievement remains underexplored, and the existing results, inconsistent. This is especially true in Nigerian contexts where undergraduates often navigate an environment of intense competition and socioeconomic strain [7,8]. This study was developed to address this gap by examining these dynamics across a national representative sample rather than isolated universities. Ultimately, whether sleep quality is a definitive driver of academic success is essential for informing institutional policies and interventions aimed at ensuring student well-being [9].

Therefore, this study aims to evaluate the relationship between sleep quality and academic performance among undergraduate students in Nigeria. Specifically, the objectives are: (1) to determine the relationship between sleep quality and academic performance, and (2) to identify other factors (socio-economic) that influence students' academic performance.

2. Materials/methods

2.1. Study design

This study employed a cross-sectional study design.

2.2. Study setting

The study was conducted across various states in Nigeria, which is the most populous nation in Africa and is divided into six geopolitical zones [10]. Specifically, data was collected across various tertiary institutions, including both federal and state-owned universities.

2.3. Study participants

Participants included all consenting Nigerian undergraduate students aged 18 years and above from all levels (100 to 600l). Participation was voluntary, and informed consent was obtained from each participant before completing the survey.

2.4. Inclusion and exclusion criteria

The inclusion criteria encompassed all Nigerian undergraduate students currently enrolled in accredited tertiary institutions who provided informed consent to participate. Participants were excluded if they: (1) were currently on academic leave, (2) had temporarily withdrawn from their programs, or (3) submitted incompletely filled questionnaires.

2.5. Sample size

The sample size was calculated using the Cochran formula:

$$n = \frac{Z^2 p (1-p)}{d^2}$$

Where

- n = minimum sample size
- Z = Z-score = 1.96
- p = estimated proportion of the population with the characteristic of interest = 73.7% (prevalence of poor sleep quality obtained from a study among Nigerian university students by Hassan et al. [7].
- d = absolute error

After inputting the necessary details, the estimated sample size was 298 participants.

However, in a bid to increase the statistical power and generalizability of our results, we increased the sample size to 448 participants.

2.6. Data collection and analysis

Data was collected through a structured, self-administered online questionnaire. The instrument captured socio-demographic characteristics, academic performance (self-reported letter grades), and sleep metrics. Sleep quality was assessed using a derived scoring system that integrated quantitative duration with qualitative satisfaction, consistent with CDC and National Sleep Foundation standards.

Table 1 Derivation of sleep quality score

Sleep Hours	Think getting enough sleep?	Sleep Quality Score	Interpretation
≥7 hours	Yes	3	Good sleep
≥7 hours	No	2	Adequate but unrested
<7 hours	Yes	2	Short but satisfied
<7 hours	No	1	Poor sleep

According to national sleep foundation <https://www.sleepfoundation.org/how-sleep-works/how-much-sleep-do-we-really-need> and CDC https://www.cdc.gov/sleep/about_sleep/how_much_sleep.html

2.7. Statistical analysis

Analysis was performed using descriptive and inferential statistics. Pearson's Chi-square test was employed to examine associations between categorical variables, such as university level and performance. An independent sample t-test was conducted to compare academic outcomes between good and poor sleepers. Statistical significance was set at $p < 0.05$.

2.8. Ethical considerations

Participation in the study was entirely voluntary. Participants were required to read and sign an electronic informed consent form before accessing the questionnaire. The informed consent form detailed the study's purpose and the assurance of confidentiality. They were informed that the study posed no foreseeable risks, and they were free to withdraw from the study at any time without prejudice. Since no experimentation was done on the participants, ethical approval was not necessary.

3. Results

Table 2 Socio-demographic characteristics of respondents

Variable		Frequency	Percentage (%)
Age (Years)	15-24 years	332	74.11%
	25-34 years	108	24.11%
	35-49 years	8	1.79%
Mean +/- SD		23 years +/-4	
Gender	Female	278	62.05
	Male	170	37.95
Marital Status	Married	13	2.90
	Single	435	97.10
Religion	Christianity	430	95.98

	Islam	11	2.46
	Other	7	1.56
State	Akwa Ibom	61	13.62%
	Benue	10	2.23%
	Cross River	205	45.76%
	Delta	5	1.12%
	Edo	9	2.01%
	North Central	3	0.67%
	Northwest	5	1.12%
	Rivers state	11	2.46%
	South East	99	22.10%
	South West	40	8.93%
University Level	100L	83	18.53
	200L	56	12.50
	300L	68	15.18
	400L	143	31.92
	500L	55	12.28
	600L	43	9.60
Monthly Income	less than N20,000	156	34.82
	N20,000- N49,999	132	29.46
	N50,000 - N99,999	79	17.63
	N100,000 - N149,999	37	8.26
	N150,000 or more	44	9.82

A total of 448 participants were surveyed. The mean age was 23 years (± 4 years), with the majority aged 15–24 years (58.04%, 332), females (62.05%, 278), single (97.10%, 435) and identified as Christians (95.98%, 430). Participants were drawn from various states, with the highest representation from Cross River State (45.76%, 205). The participants were from various academic levels, with the largest group in 400 Level (31.92%), followed by 100 Level (18.53%), 300 Level (15.18%), 200 Level (12.50%), 500 Level (12.28%), and 600 Level (9.60%). Regarding monthly income, 34.82% earned less than ₦20,000, 29.46% earned between ₦20,000–₦49,999, and 17.63% between ₦50,000–₦99,999. This is well represented in Table 2

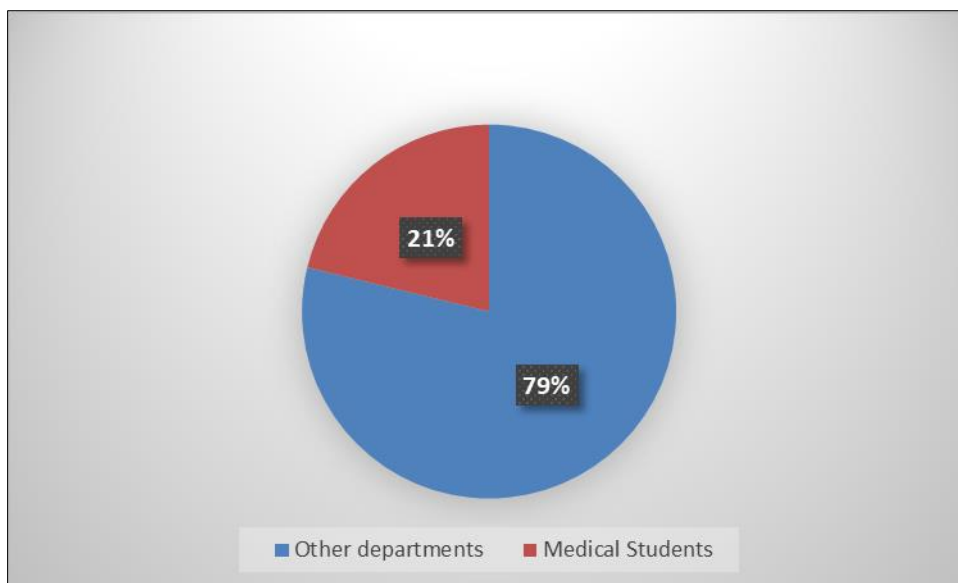


Figure 1 Bar chart showing the distribution of respondents by their course of study

As shown in Figure 1, out of the 448 respondents, (21.21%, 95) reported they were studying Medicine and Surgery, while the majority (78.79%, 353) were in other fields.

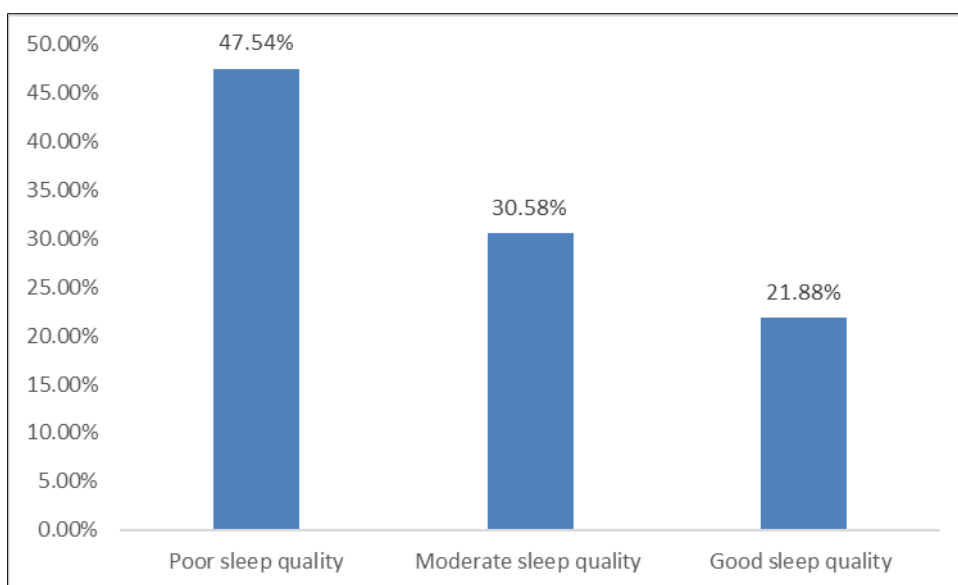


Figure 2 Bar chart showing sleep quality scores amongst respondents

The average sleep duration amongst the respondents was 5.9 hours. 59.4% of respondents (266) indicated that they are not getting enough sleep while the rest (182, 40.6%), reported that they are getting sufficient sleep.

About 47.54%, 213 had a poor sleep quality score, 30.58%, 137 scored a moderate sleep quality, and 21.88%, 98 had a good sleep quality score.

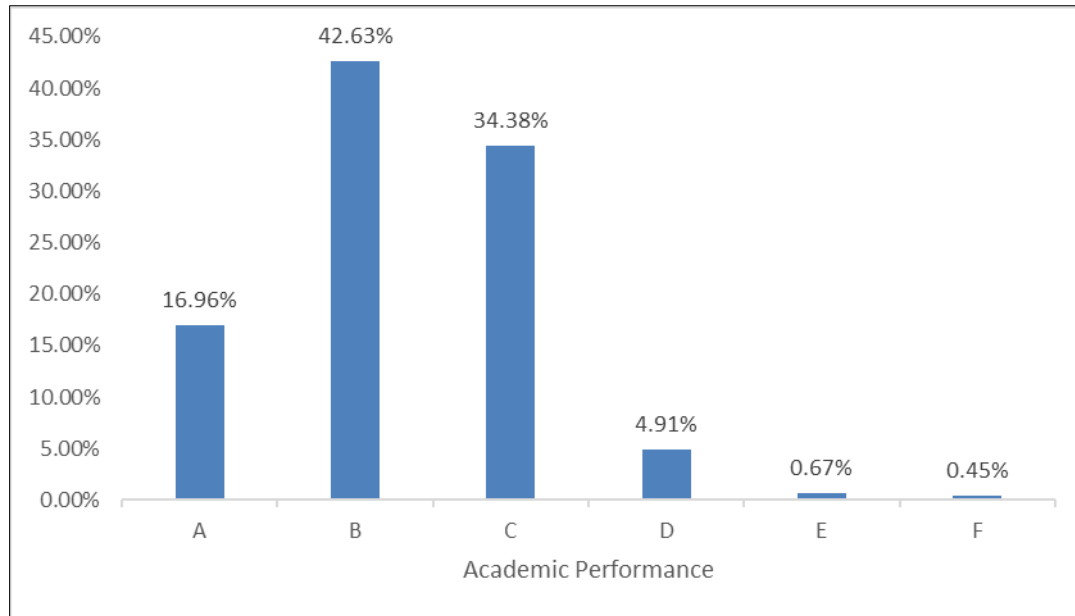


Figure 3 Academic performance amongst respondents

Amongst the 448 respondents, Majority (42.63%, 191) scored a 'B' grade, (34.38%, 154) a 'C', and (16.96%, 76) an 'A'. Only (4.91%, 22) scored a 'D', while less than 1% scored an 'E' (0.67%, 3) or an 'F' (0.45%, 2).

Table 3 Relationship between sociodemographic characteristics and academic performance

Variable	Academic Performance						χ^2	df	P-value
	A N (%)	B N (%)	C N (%)	D N (%)	E N (%)	F N (%)			
Age group (Years)							8.015	10	0.627
15-24 years	60 (13.4)	135 (30.1)	112 (25.0)	20 (4.5)	3 (0.7)	2 (0.4)			
25-34 years	15 (3.3)	51 (11.4)	40 (8.9)	2 (0.4)	0 (0)	0 (0)			
35-49 years	1 (0.2)	5 (1.1)	2 (0.4)	0 (0.0)	0 (0.0)	0 (0.0)			
	76 (16.9)	191 (42.6)	154 (34.3)	22 (4.9)	3 (0.7)	2 (0.4)			
Gender							2.536	5	0.771
Female	50 (11.2)	111 (24.8)	99 (22.1)	15 (3.3)	2 (0.4)	1 (0.2)			
Male	26 (5.8)	80 (17.9)	55 (12.3)	7 (1.6)	1 (0.2)	1 (0.2)			
	76 (17)	191 (42.7)	154 (34.4)	22 (4.9)	3 (0.6)	2 (0.4)			
Marital Status							1.272	5	0.938
Married	2 (0.4)	7 (1.6)	4 (0.9)	0 (0.0)	0 (0.0)	0 (0.0)			
Single	74 (16.5)	184 (41.1)	150 (33.5)	22 (4.9)	3 (0.7)	2 (0.4)			
	76 (16.9)	191 (42.7)	154 (34.4)	22 (4.9)	3 (0.7)	2 (0.4)			

Religion							6.055	10	0.811
Christianity	72 (16.1)	184 (41.1)	148 (33.0)	21 (4.7)	3 (0.7)	2 (0.4)			
Islam	4 (0.9)	4 (0.9)	3 (0.7)	0 (0.0)	0 (0.0)	0 (0.0)			
Other	0 (0.0)	3 (0.7)	3 (0.7)	1 (0.2)	0 (0.0)	0 (0.0)			
	76 (17.0)	191 (42.7)	154 (34.4)	22 (4.9)	3 (0.7)	2 (0.4)			
State							51.559	45	0.413
Akwa Ibom	9 (2.0)	28 (6.3)	23 (5.1)	0 (0.0)	0 (0.0)	1 (0.2)			
Benue	2 (0.4)	5 (1.1)	3 (0.7)	0 (0.0)	0 (0.0)	0 (0.0)			
Cross River	30 (6.7)	88 (19.6)	68 (15.2)	18 (4.0)	1 (0.2)	0 (0.0)			
Delta	0 (0.0)	2 (0.4)	3 (0.7)	0 (0.0)	0 (0.0)	0 (0.0)			
Edo	2 (0.5)	6 (1.3)	1 (0.2)	0 (0.0)	0 (0.0)	0 (0.0)			
North Central	0 (0.0)	1 (0.2)	2 (0.5)	0 (0.0)	0 (0.0)	0 (0.0)			
Northwest	0 (0.0)	2 (0.4)	3 (0.7)	0 (0.0)	0 (0.0)	0 (0.0)			
Rivers state	0 (0.0)	5 (1.1)	4 (0.9)	2 (0.4)	0 (0.0)	0 (0.0)			
South East	18 (4.0)	40 (9.0)	36 (8.1)	2 (0.4)	2 (0.4)	1 (0.2)			
South West	15 (3.4)	14 (3.1)	11 (2.5)	0 (0.0)	0 (0.0)	0 (0.0)			
	106 (23.7%)	291 (65.0%)	154 (34.4%)	22 (4.9%)	3 (0.7%)	2 (0.4%)			
University Level							56.363	25	<0.001
100L	32 (7.1)	25 (5.6)	22 (4.9)	3 (0.7)	1 (0.2)	0 (0.0)			
200L	13 (2.9)	20 (4.5)	18 (4.0)	5 (1.1)	0 (0.0)	0 (0.0)			
300L	7 (1.6)	31 (6.9)	25 (5.6)	4 (0.9)	1 (0.2)	0 (0.0)			
400L	11 (2.5)	62 (13.8)	60 (13.4)	8 (1.8)	1 (0.2)	1 (0.2)			
500L	7 (1.6)	32 (7.1)	14 (3.1)	1 (0.2)	0 (0.0)	1 (0.2)			
600L	6 (1.3)	21 (4.7)	15 (3.3)	1 (0.2)	0 (0.0)	0 (0.0)			
	76 (17.0%)	191 (42.6%)	154 (34.4%)	22 (4.9%)	3 (0.7%)	2 (0.4%)			
Monthly Income							21.155	20	0.388
< N20,000	33 (7.4)	55 (12.3)	55 (12.3)	12 (2.7)	1 (0.2)	0 (0.0)			
N20,000- N49,999	21 (4.7)	63 (14.1)	41 (9.2)	6 (1.3)	0 (0.0)	1 (0.2)			
N50,000 - N99,999	13 (2.9)	33 (7.4)	30 (6.7)	2 (0.4)	0 (0.0)	1 (0.2)			
N100,000 - N149,999	4 (0.9)	18 (4.0)	14 (3.1)	0 (0.0)	1 (0.2)	0 (0.0)			
>N150,000	5 (1.1)	22 (4.9)	14 (3.1)	2 (0.4)	1 (0.2)	0 (0.0)			
Grand Total	76 (17.0%)	191 (42.6%)	154 (34.4%)	22 (4.9%)	3 (0.7%)	2 (0.4%)			
Studying Medicine and Surgery							20.417	5	0.001

No	46 (10.3)	156 (34.8)	129 (28.8)	19 (4.2)	2 (0.4)	1 (0.2)			
Yes	30 (6.7)	35 (7.8)	25 (5.6)	3 (0.7)	1 (0.2)	1 (0.2)			
Grand Total	76 (17.0%)	191 (42.6%)	154 (34.4%)	22 (4.9%)	3 (0.7%)	2 (0.4%)			

In table 3, it shows that there is a statistically significant relationship between university level and academic performance ($\chi^2 = 56.363$, $df=25$, $p = <0.001$). It implied that as university level increases, there is a gradual shift in academic performance pattern toward mid-range performance (B, C).

A statistically significant association was also found between students' course of study and their academic performance ($\chi^2 = 20.417$, $df = 5$, $p = 0.001$). Specifically, students in Medicine and Surgery, who comprise only about 21.2% of the total sample, had a higher proportion of top academic grades. 31.57% of medical students attained an A grade compared to 13.03% among non-medical students who attained the same grade. The linear-by-linear association test ($p = 0.004$) further suggests a trend indicating that students studying Medicine and Surgery were more likely to perform better academically.

Table 4 Relationship between sleep quality and academic performance

Variable	Academic Performance						χ^2	df	P-value
	A N (%)	B N (%)	C N (%)	D N (%)	E N (%)	F N (%)			
Sleep Quality score							7.838	10	0.645
Poor Sleep Quality	41 (9.2)	89 (19.9)	73 (16.3)	9 (2.0)	1 (0.2)	0 (0.0)			
Moderate Sleep Quality	25 (5.6)	58 (12.9)	43 (9.6)	9 (2.0)	1 (0.2)	1 (0.2)			
Good Sleep Quality	10 (2.2)	44 (9.8)	38 (8.5)	4 (0.9)	1 (0.2)	1 (0.2)			
Grand total	76 (17.0%)	191 (42.6%)	154 (34.4%)	22 (4.9%)	3 (0.7%)	2 (0.4%)			

Table 4 shows that there's no statistically significant association between sleep quality and academic performance among the respondents ($\chi^2 = 7.838$, $df = 10$, $p = 0.645$).

An independent samples t-test was conducted to compare academic performance between students with poor and good sleep quality. The difference was not statistically significant, ($t(309) = -1.86$, $p = 0.064$), although there was a trend suggesting that students with poor sleep quality may have slightly better academic scores (Mean = 2.25) than those with good sleep quality (Mean = 2.44).

4. Discussion

This cross-sectional study surveyed 446 undergraduate students across the different states in Nigeria, revealing a series of important findings. Our findings show a lack of statistically significant association between sleep quality and academic performance. Paradoxically, we observed that students with poor sleep quality achieved better quiz scores, albeit this finding was statistically non-significant. Our findings suggest that beyond sleep quality, other factors play varying roles in determining a student's academic performance.

Sleep is a fundamental physiological process that serves as a cornerstone for cognition. From a neurobiological perspective, sleep is not merely a state of rest but an active phase during which memory consolidation and information processing occur [6]. For a student, both of these processes are essential for academic success. Interestingly, the physiology of sleep supports various types of learning. During the earlier cycles of the night, non-rapid eye movement (NREM) sleep allows the consolidation of declarative memory. This involves the encoding of facts and figures that are required for academic examinations. In the same vein, during the rapid eye movement (REM) sleep, which becomes

prevalent during dawn, facilitation of procedural memory, creative problem solving, and emotional regulation occurs [11,12]. The influence of sleep on cognition has been postulated to be related to its enhancing effect on the prefrontal cortex, the part of the brain where executive function is processed [12].

Our study's lack of a statistically significant association between sleep quality and academic performance deviates from traditional expectations. Gani et al. [13], for instance, observed that students who reported that they did not have enough sleep at night were less likely to do well academically. Similarly, Khare et al. [14] reported that the students who sleep for longer durations tend to have better grades and ultimately, better grade point averages (GPAs) than those who were sleep deprived. Nonetheless, our findings align with the "sleep deprivation hypothesis." This hypothesis suggests that although sleep may initially impair cognition, prolonged exposure can lead to neural adaptations aimed at maintaining performance levels without significant deficits [15,16]. This adaptation could explain why in our sample, variations in sleep quality did not translate to differences in academic outcomes. Interestingly, an independent t-test revealed a trend where poor sleepers were likely to achieve better scores than good sleepers, though this was not statistically significant. This suggests that these high-achieving students may already be habituated to this sleep routine and were using it as a compensatory mechanism to meet the academic demands.

Indeed, findings consistent with this hypothesis have been reported in previous studies, especially those done in recent times. In a 2025 study among medical students, Almalki et al. [17] reported that there were no associations between a student's quality of sleep and their academic performance. Similarly, in another study among undergraduates of the University of Port Harcourt Nigeria, Adeniji et al. [18] reported that overall, the duration of sleep had no significant effect on how well they performed academically. Consequently, we theorized that beyond sleep quality, other factors had varying levels of impact on academic performance. We identified the level of study and course of study as two significant influencers of academic performance. From our study, as the level of study increased, students were more likely to settle for average grades. Similarly, students who were not studying medicine and surgery were likely to report lower academic scores than those who were in medicine and surgery. This finding is consistent with another study among health science students in a medical university in the United Arab Emirates. Similar to our finding, the authors observed that year 1 and MD (Doctor of Medicine) students were less likely to have very good to outstanding CGPAs compared to students in higher levels or studying other courses [19]. Besides these, a few other studies have identified other factors associated with academic performance, including past academic history, family support, stress levels, and time management [18,20].

Our study offers a few strengths that should be considered when interpreting the results. For one, this study involved a broad geographical and demographic scope. It captures data from across the various geopolitical zones and not just one zone or university. Moreover, the inclusion of diverse academic levels (100l to 600l) allows for the identification of the "grade stabilization trend" where performance shifts toward mid-range (B and C) as students advance.

Despite these strengths, our study has a few limitations. For one, the reliance on self-reported sleep metrics and grades introduces the potential for recall or social desirability bias. To mitigate this, we utilized an anonymous online format that encouraged honest reporting and reduced student apprehension during data entry. In addition, to address the limitation that comes with using just quantitative sleep duration to assess sleep quality, we utilized a "derived sleep quality score." This ensured that we considered the individual biological variance in our analysis. The approach itself allowed us to distinguish between students who were biologically rested despite short sleep from those who were unrested despite adequate hours.

The study's findings also carry a few implications for Nigerian higher education. For one, the lack of a direct sleep-performance correlation indicates that students are chronically choosing sleep deprivation in search of good grades. While our findings suggest that this may in fact serve this purpose, there is still the question of the long-term risks to health. These include increased susceptibility to depression, anxiety, and burnout. Ideally, the National Foundation for Sleep suggests about 7 hours of sleep [21]. However, students in our sample reported getting an average of 5.9 hours of sleep every day. Consequently, it is important that students and universities alike recognize that "academic excellence" achieved through sleep sacrifice is unsustainable and may do more harm than good.

Leveraging the findings of this study, future research could take a few novel approaches to help improve the current understanding of the subject. We recommend that future research employ longitudinal designs to help clearly define the direction of causality between both variables. Also, future studies may benefit from adopting "objective sleep tracking" techniques such as actigraphy. This will help to eliminate self-report bias and accurately track sleep performance dynamics. Furthermore, investigating the role of "academic grit" and mental health as moderating variables could help provide deeper insights into the "resilience paradox" identified in our study.

5. Conclusion

The academic journey of the Nigerian undergraduate is defined by various factors, including personal ambition, physiological needs, and economic constraints. Our findings suggest that though sleep may be essential for healthy living, it is important that it is considered in the context of other factors in terms of its effects on students' academic performance.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare that they have no conflict of interest regarding the research, authorship, and/or publication of this study.

Statement of informed consent

"Informed consent was obtained from all individual participants included in the study."

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