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Sleep quality and academic performance in Nigerian public colleges

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ABSTRACT

The purpose of the study was to unveil how sleep quality influences academic performance. The study explored how sleep quality and stressors such as stress and anxiety affect the academic progress and performance of public college students. This research employed a comprehensive cross-sectional survey design, strategically chosen to include a diverse student population across various academic levels concurrently. The study involved 106 participants (53 males and 53 females) who were public college students in Nigeria. Participants were selected using a purposive sampling technique. Standard measurement scales were used to collect data. Data were analyzed using descriptive statistics, as well as Mann-Whitney U tests, t-tests, and multiple regression analyses. Findings indicated significant gender differences in students' sleep patterns and sleep onset latency, among other variables. The results also demonstrated a link between students' academic performance, wakefulness, and anxiety. The outcomes of this research have important implications for designing targeted interventions in learning environments. The study concluded that understanding gender differences in sleep patterns is essential for tailoring interventions that address specific aspects of sleep. It emphasized that future research could improve the development of gender-sensitive sleep interventions by exploring variables contributing to differences in sleep onset latency.

Contribution/ Originality: This study contributes to the existing body of knowledge regarding the relationship between academic performance and sleep quality in a gender-specific context by employing a quantitative data collection method and a standardized measurement scale. To facilitate a systematic and unbiased analysis, the data were converted into numerical values.

1. INTRODUCTION

Sleep plays a crucial role in human life, substantially affecting physical and mental well-being, memory retention, brain functions, and learning abilities (Almarzouki et al., 2022; Ekman et al., 2022; Jalali, Khazaei, Paveh, Hayrani, & Menati, 2020). It is important for optimal physiological and psychological functioning. Inadequate or poor-quality sleep can disrupt memory consolidation and cognitive processes and lead to daytime drowsiness, mental fatigue, reduced attention, exhaustion, and cognitive difficulties (Al Shammari, Al Amer, Al Mulhim, Al Mohammedsaleh, & AlOmar, 2020; Mehta, 2022; Vallejo & Silvestre, 2023). Inadequate sleep can also interfere with the performance of key brain areas such as the prefrontal cortex and the hippocampus, affecting memory, creativity, logical reasoning, and critical thinking skills (Anosike, Isah, Dim, Enete, & Adibe, 2022). While adults typically need around 7 hours of sleep each night, teenagers may require up to 9.5 hours to thrive (Anosike et al., 2022; Azad

et al., 2015; Hirshkowitz et al., 2015). Deviating from these recommended sleep durations may lead to sleep disorders (Alghannami et al., 2021). In this context, sleep quality refers to a person's satisfaction with various aspects of their sleep, including falling asleep, staying asleep, duration, and feeling refreshed upon waking up (Arshad et al., 2021).

Research shows that not getting enough sleep can make it harder for students to focus, perform well on tasks that require constant attention, and activate certain parts of the brain compared to those who are well-rested (Gremillion, 2023; Rafi, Jahan, Qazi, Siddique, & Bukhari, 2021; Zhu et al., 2018). This lack of sleep has been linked to an increased risk of weight gain, heart disease, and diabetes, as well as problems with cognition and physical coordination that could impair students' academic performance. However, it remains uncertain whether different aspects of sleep quality have similar negative effects on academic success in public colleges. For example, the impacts of sleep latency (indicating overall sleepiness) may differ from those of sleep efficiency, sleep-wake transitions, and periods of wakefulness (Arand & Bonnet, 2019; Riethmeister, Bültmann, De Boer, Gordijn, & Brouwer, 2018; Vgontzas & Pavlović, 2018). Therefore, there is a gap in current research that calls for a closer examination of the nuances of sleep quality among students in public colleges, particularly in Nigeria. Recognizing the complex relationship between mental health and sleep requires acknowledging the close connection between stress, anxiety, and sleep quality, illustrating the importance of further investigation in this area.

The academic path often brings about psychosocial hurdles that can affect students' academic performance (Suardiaz-Muro et al., 2023). The demands of academic endeavors, such as studying for exams, conducting research, making presentations, and completing projects, require a high level of preparedness and dedication, leading to increased stress levels, poor sleep quality, familial and peer pressures, feelings of depression and anxiety, and other challenges in adjustment, all of which can hinder academic achievement and overall mental well-being (Armand, Biassoni, & Corrias, 2021). In settings like Nigeria, various factors, including family background, income, personality traits, pressures from parents and peers, self-motivation, self-esteem, and social support, have been identified as influencing academic success (Adeyemi & Adeyemi, 2014; Olatunji, Aghimien, Oke, & Olushola, 2016). Among these factors, the quality of sleep is highlighted as a critical component in improving memory retention, cognitive function, focus, and academic performance (Fonseca & Genzel, 2020; Hershner, 2020; Nsengimana et al., 2023). In light of this context, this study seeks to determine how sleep quality and stressors such as stress and anxiety affect the academic progress and performance of public college students.

2. LITERATURE REVIEW

Sleep is not just a rest but a way of keeping the body and soul bound over time. It is an essential biological need (Hershner, 2020) that champions life elongation and active body performance. Sleep, an essential physiological state, plays a crucial role in maintaining the body's balance and promoting overall physical and mental well-being (Kumar, Rizvi, & Saraswat, 2022; Sato et al., 2021; Saygın et al., 2016). Any disruption to this balance may lead to instability. In addition to its function in supporting bodily equilibrium and enhancing physiological processes, sleep is considered for its contributions to memory consolidation, improving emotional well-being, and acting as a protective shield against stress (Nsengimana et al., 2023).

Sleep quality is defined as the subjective assessment of an individual's sleep experience, including aspects such as the time taken to fall asleep, the duration of sleep, how effectively one sleeps, any disruptions during sleep, and overall contentment with sleep (Crivello, Barsocchi, Girolami, & Palumbo, 2019; Nelson, Davis, & Corbett, 2022). It indicates how satisfactory an individual perceives their sleep to be, including elements such as the uninterrupted nature of sleep, the depth of sleep, feelings of restfulness, and the absence of disturbances or awakenings throughout the night (McCarter et al., 2022). In addition, it is a complex concept that involves personal interpretations of sleep, covering aspects such as the time taken to fall asleep, the duration of sleep, any disruptions during sleep, and the perceived depth of sleep and feeling of refreshment upon waking.

One major problem with quality sleep is stress. Considering the Transactional Model of Stress and Coping (TMSC) proposed by Lazarus and Folkman (1984) stress is perceived as an interaction between an individual and their environment. Stressors are external circumstances or occurrences that pose a risk or difficulty to an individual's welfare (Sonnentag, 2018; Wach, Stephan, Weinberger, & Wegge, 2021). When encountering stressors such as academic obligations and social expectations, students assess the situation to gauge its importance and evaluate their capacity to manage it (Cohen & McKay, 1984). This appraisal process includes analyzing both the requirements of the situation and one's own capabilities to address it. College students may perceive inadequate sleep quality as a stress-inducing factor that impacts their academic performance. Sleep disturbance may result in heightened stress and anxiety levels, affecting cognitive abilities, focus, and the process of memory retention, all crucial for academic accomplishments. The stress and anxiety stemming from academic responsibilities, examinations, and social expectations may intensify existing sleep issues, establishing a loop of stress and sleep disruption. Thus, the theory provides a framework for understanding how sleep quality, stress, and anxiety interact to influence the academic progress and performance of college students, indicating the importance of addressing both sleep-related issues and stress management techniques in educational settings.

Numerous studies have explored the connection between sleep quality and academic performance in students (Anosike et al., 2022; Arshad et al., 2021; Mehta, 2022). This connection has been supported by research conducted in Western settings (Schmickler, Müller, Johnson, & Chen, 2023; Suardiaz-Muro et al., 2023). Despite the abundance of evidence from Western researchers regarding the impact of sleep quality on academic success, there remains uncertainty about whether similar outcomes would be observed in non-Western populations, particularly when comparing genders in low- and middle-income countries like Nigeria. Peculiar geopolitical factors may influence how individuals in these regions respond psychologically to stressors affecting sleep quality, potentially differing from responses in Western contexts. Therefore, this study aims to bridge this gap and shed light on the unique dynamics at play.

3. METHODS

3.1. Participants

The research involved 106 participants who were public college students in Nigeria, comprising an equal number of males and females (53 males and 53 females). Participants were selected using a purposive sampling technique from public colleges in the north-central region of the country. Recruitment was conducted through an online survey, utilizing personal invitations and various social media platforms. The participants' age range was 17 to 40 years. The inclusion criteria required participants to be regular public college students, willing to participate in the study, and aged between 17 and 40 years. Exclusion criteria applied to students who did not meet the specified inclusion criteria.

3.2. Instruments

The research utilized the Pittsburgh Sleep Quality Index (PSQI), Cohen Perceived Stress Scale (Cohen PSS-10), and Generalized Anxiety Disorder Scale (GAD-7) to collect data. The PSQI was employed by the researchers to assess the students' sleep quality. This instrument has been extensively validated and is considered reliable across different cultural settings. Within the PSQI, four items (items 1-4) were open-ended, while the rest were measured using Likert scales (items 5-9). Each of the components was rated on a scale from 0 to 3.

The Cohen PSS-10 is a commonly used psychological instrument for assessing perceived stress levels. This questionnaire is self-administered and requires participants to answer each of its ten items. Each item uses a five-point Likert scale ranging from 0 (never) to 4 (very often), prompting respondents to consider their feelings and thoughts over the past month. Scores on the questionnaire range from 0 to 40, with higher scores indicating higher levels of stress. Participants who scored ≥ 20 in total were classified as having high perceived stress. The

Cronbach's alpha coefficient for the PSS-10 is 0.830, which exceeds the acceptable threshold of 0.70 (Mozumder, 2022).

We used the original version of the GAD-7 to assess students' anxiety levels. This questionnaire consisted of seven items, and each was rated on a four-point Likert scale for efficient completion (Lee & Kim, 2019). Scores on the GAD-7 ranged from 0 to 21, with lower scores indicating lower levels of anxiety and higher scores indicating more severe anxiety. Anxiety levels were classified as normal, mild, moderate, and severe based on total score ranges of 0-4, 5-9, 10-14, and 15-21, respectively (Lee & Kim, 2019). The Cronbach's alpha coefficient for the GAD-7 was computed to be 0.864, falling within an acceptable range.

3.3. Procedure

Data collection for this research involved distributing a self-administered survey questionnaire with two sections, A and B. Section A captured sociodemographic details such as gender, age, and marital status, while Section B included research tools such as the PSQI, Cohen PSS-10, and GAD-7. The questionnaire was shared electronically through social media platforms. Before starting the study, ethical approval was obtained, and participants were briefed on the study's aims and procedures through an informed consent form. Each participant who agreed to take part was assigned a unique study ID number. Participants completed the survey online, with an option to provide additional comments for clarification or extra details. Any questionnaire with missing responses was considered incomplete and excluded from the analysis.

3.4. Design

This study utilized a comprehensive cross-sectional survey design, strategically chosen to encompass a diverse student population across various academic levels concurrently. By adopting this robust methodology, the researcher could gather data effectively from a broad spectrum of students, providing a comprehensive snapshot of the target population. The cross-sectional approach facilitated the examination of multiple variables and relationships within the student body, offering insights into the study objectives. This design choice allowed for a holistic exploration of the research questions by including participants from different educational backgrounds, enhancing the depth and breadth of the findings while ensuring a representative sample for analysis.

3.5. Data Analysis

The data analysis in this study involved the use of descriptive statistics, Mann-Whitney U tests, t-tests, and multiple regression analyses to evaluate the hypotheses. Mann-Whitney U and t-tests were applied to compare average differences in various aspects of sleep quality, anxiety levels, stress levels, and academic performance among students. Furthermore, multiple regression analysis was conducted to explore how anxiety and stress levels impacted both students' alertness and academic achievement. The data gathered for the study were entered into the statistical software SPSS for processing and interpretation.

4. DATA ANALYSES AND RESULTS

In this section, the data analysis and results are systematically presented and accompanied by a thorough interpretation.

Table 1 shows the age distribution, marital status, and academic level of both male and female participants. For males, there are 21 participants in the age group of 17–23, constituting 39.6%; 23 participants in the age group of 24–30, accounting for 43.4%; and 9 participants over 30 years old, making up 17.0% of the total participants. For females, there are 23 participants in the age group of 17–23, constituting 43.4%; 23 participants in the age group of 24–30, accounting for 43.4%; and 7 participants over 30, making up 13.2% of the total participants. In total, there

are 44 participants in the age group of 17–23, constituting 41.5%; 46 participants in the age group of 24–30, accounting for 43.4%; and 16 participants over 30 years old.

Table 1. Socio-Demography of participants.

Variables	Categories	Male N=53(%)	Female N=53(%)	Total N=53(%)
Age	17-2317-23	21(39.6)	23(43.4)	44(41.5)
	24-30	23(43.4)	23(43.4)	46(43.4)
	Above 30 years	9(17.0)	7(13.2)	16(15.1)
Marital status	In a relationship	26(49.1)	29(54.7)	55(51.9)
	Single	16(30.2)	17(32.1)	33(31.1)
	Married	8(15.1)	6(11.3)	14(13.2)
	Separated	3(5.7)	1(1.9)	4(3.8)
Academic level	Undergraduate	30(56.6)	34(64.2)	64(60.4)
	Graduate	23(43.4)	19(35.8)	42(39.6)

In the male column, the table shows that 26 participants are in a relationship, making up 49.1%; 16 participants are single, accounting for 30.2%; 8 participants are married, constituting 15.1%; and 3 participants are separated, making up 5.7% of the total respondents. For females, 29 participants are in a relationship, making up 54.7%; 17 participants are single, accounting for 32.1%; 6 participants are married, constituting 11.3%; and 1 participant is separated, making up 1.9%. In total, 55 participants are in a relationship, making up 51.9%; 33 participants are single, accounting for 31.1%; 14 participants are married, constituting 13.2%; and 4 participants are separated, making up 3.8%.

The table presents the distribution of male participants based on their academic level. There are 30 participants at the undergraduate level, accounting for 56.6%, and 23 participants at the graduate level, accounting for 43.4%. The table also shows the academic levels of female participants, with 34 at the undergraduate level (64.2%) and 19 at the graduate level (35.8%). In total, 64 participants are at the undergraduate level (60.4%), and 42 are at the graduate level (39.6%).

Table 2. Differences in the components of the PSQI between males and females.

	Gender	N	Mean	SD	T	Df	P-value
Sleep onset latency	Male	53	2.8868	1.28093	2.007	104	0.047
	Female	53	2.4151	1.13398		102.493	0.047
Sleep duration	Male	53	2.6415	0.90073	0.215	104	0.830
	Female	53	2.6038	0.90596		103.997	0.830
Subjective sleep quality	Male	53	3.0755	0.82855	0.971	104	0.334
	Female	53	2.9057	0.96604		101.641	0.334
Sleep aid usage	Male	53	2.3396	0.91868	0.763	104	0.447
	Female	53	2.2075	0.86288		103.594	0.447
Daytime functioning	Male	53	2.3019	0.91115	0.222	104	0.825
	Female	53	2.2642	0.83553		103.229	0.825
Habitual sleep efficiency	Male	53	7.8113	1.68770	-0.866	104	0.389
	Female	53	8.0943	1.67865		103.997	0.389
Sleep disturbances	Male	53	22.3585	8.92510	0.205	104	0.838
	Female	53	22.0189	8.15355		103.161	0.838

Table 2 presents the differences in the various components of sleep quality between male and female participants. The mean sleep onset latency for males is 2.8868 with a standard deviation (SD) of 1.28093, while that of females is 2.4151 with an SD of 1.13398. The result shows a t-value of 2.007 with 104 degrees of freedom (df) and a p-value of 0.047. This result indicates a significant difference in sleep onset latency between males and females. The mean sleep duration for males is 2.6415 with an SD of 0.90073, while the mean sleep duration for females is

2.6038 with an SD of 0.90596. The t-test yielded a t-value of 0.215 with 104 degrees of freedom and a p-value of 0.830. This result implies there is no significant difference in sleep duration between males and females.

The mean subjective sleep quality for males is 3.0755 with a standard deviation of 0.82855, and for females, it is 2.9057 with a standard deviation of 0.96604. The t-test resulted in a t-value of 0.971 with 104 degrees of freedom and a p-value of 0.334. This indicates no significant difference in subjective sleep quality between males and females. The mean sleep aid usage for males is 2.3396 with a standard deviation of 0.91868, while for females, it is 2.2075 with a standard deviation of 0.86288. The t-test yielded a t-value of 0.763 with 104 degrees of freedom and a p-value of 0.447. This suggests there is no significant difference in sleep aid usage between males and females.

The mean daytime functioning for males is 2.3019 with a standard deviation (SD) of 0.91115, while for females it is 2.2642 with an SD of 0.83553. The t-test yields a value of 0.222 with 104 degrees of freedom and a p-value of 0.825. This indicates that there is no significant difference in daytime functioning between males and females. The mean habitual sleep efficiency for males is 7.8113 with an SD of 1.68770, compared to 8.0943 with an SD of 1.67865 for females. The t-test shows a value of -0.866 with 104 degrees of freedom and a p-value of 0.389, suggesting no significant difference in habitual sleep efficiency between genders. The mean sleep disturbances for males are 22.3585 with an SD of 8.92510, while for females, it is 22.0189 with an SD of 8.15355. The t-test results in a t-value of 0.205 with 104 degrees of freedom and a p-value of 0.838, indicating no significant difference in sleep disturbances between males and females.

Table 3. Students with high anxiety levels are likely to experience wakefulness and have low academic performance.

Independent variables	Model 1			Model 2		
	Wakefulness			Academic performance		
	β	t-value	p-value	B	t-value	p-value
Direct effect						
Anxiety	1.332	16.989	<0.01	0.032	0.596	0.552
Indirect effect						
Anxiety symptoms	0.102	1.354	0.179	-0.109	-0.774	0.441
Uncontrollable worrying	0.116	1.627	0.107	0.036	0.273	0.785
Relaxation difficulty	0.208	3.142	0.002**	0.098	0.799	0.426
Restlessness	0.191	2.168	0.033*	0.241	1.465	0.046*
Irritability	0.222	2.796	0.006**	-0.266	-1.796	0.015*
Fearful anticipation	0.165	2.549	0.012*	0.127	1.051	0.296
	F= 44.673*** R^2=.730			F= 1.159 R^2=0.066		

Note: *p < 0.05; **p < 0.01; ***p < 0.001.

Table 3 shows that R^2 for Model 1 is 0.730, indicating that anxiety explains 73.0% of the variation in wakefulness among students. Demonstrating statistical significance, Model 1 shows an F-statistic of 44.673 and a p-value lower than 0.001. The coefficient (β = 1.332; p-value < 0.01) signifies the direct impact of anxiety on wakefulness. That is, the mean change in anxiety will result in a corresponding 1.332-unit increase in wakefulness. The t-value associated with the coefficient is 16.989. The result indicates a statistically significant positive linear relationship between anxiety and wakefulness. The table presents the coefficients for anxiety symptoms (β=0.102; p-value>0.05), uncontrollable worrying (β=0.116; p-value>0.05), relaxation difficulty (β=0.208; p-value<0.01), restlessness (β=0.191; p-value<0.05), irritability (β=0.222; p-value<0.01), and fearful anticipation (β=0.165; p-value=0.01). The t-value associated with this coefficient for anxiety symptoms is 1.354. The p-value is greater than 0.05, indicating that the relationship between anxiety symptoms and wakefulness is not statistically significant. The t-value associated with the coefficient for uncontrollable worrying is 1.627. Similar to anxiety symptoms, the p-value for uncontrollable worrying is greater than 0.05, indicating that the linear relationship is also not statistically significant. The t-value associated with the coefficient for relaxation difficulty is 3.142. The p-value is less than 0.01, indicating that the positive linear relationship between relaxation difficulty and wakefulness is statistically significant. The t-value associated with the coefficient for restlessness is 2.168. The p-value is less than 0.05,

indicating that the positive linear relationship between restlessness and wakefulness is statistically significant. The t-value associated with the coefficient for irritability is 2.796. The p-value is less than 0.05, indicating that the positive linear relationship between irritability and wakefulness is statistically significant. The t-value associated with the coefficient for fearful anticipation is 2.549. The p-value is equal to 0.01, indicating that the positive linear relationship between fearful anticipation and wakefulness is statistically significant.

The R^2 for model 2 is 0.066, indicating that anxiety explains only a very small proportion (6.6%) of the variation in students' academic performance. Model 2 is not statistically significant, as evidenced by an F-statistic of 1.159 and a p-value exceeding 0.05. In Model 2, the direct effect of anxiety on academic performance is represented by the coefficient (β = 0.032; p-value > 0.05). The t-value associated with the coefficient is 0.596, and the p-value is 0.552. The p-value exceeds the conventional significance level of 0.05, indicating that the linear relationship between anxiety and academic performance is not statistically significant. The table presents the coefficients for anxiety symptoms (β = -0.109; p-value > 0.05), uncontrollable worrying (β=0.036; p-value>0.05), relaxation difficulty (β=0.098; p-value>0.05), restlessness (β=0.241; p-value<0.05), irritability (β=-0.266; p-value<0.05), and fearful anticipation (β=0.127; p-value>0.05). The t-value associated with the coefficient for anxiety symptoms is -0.774. The p-value is greater than 0.05, indicating that the linear relationship between anxiety symptoms and academic performance is insignificant. The t-value associated with the coefficient for uncontrollable worrying is 0.273, and the p-value suggests that the relationship between uncontrollable worrying and academic performance is insignificant. The t-value associated with the coefficient for relaxation difficulty is 0.799, and the p-value indicates that the relationship between relaxation difficulty and academic performance is not statistically significant. The t-value associated with the coefficient for restlessness is 1.465, and the p-value suggests that the positive relationship between restlessness and academic performance is statistically significant. The t-value associated with the coefficient for irritability is -1.796, and the p-value indicates that the relationship between irritability and academic performance is statistically significant. The t-value associated with the coefficient for fearful anticipation is 1.051, and the p-value suggests that the relationship between fearful anticipation and academic performance is not statistically significant.

Table 4. Students who have experienced heavy stress levels are likely to develop wakefulness and have low academic performance.

	Model 1			Model 2		
	Wakefulness			Academic Performance		
	B	t-value	p-value	β	t-value	p-value
Direct effect						
Stress level	0.945	41.097	0.000***	0.04	1.21	0.229
Indirect effect						
Emotional upset	0.135	3.998	0.000***	-0.13	-0.818	0.415
Lack of control	0.081	2.622	0.010**	0.141	0.962	0.339
Nervousness and stress	0.033	1.142	0.256	0.2	1.462	0.147
Confidence in problem-solving	0.128	1.97	0.052	-0.008	-0.026	0.98
Positive outlook	0.216	2.672	0.009**	0.589	1.547	0.052
Coping challenges	0.015	0.375	0.708	-0.341	-1.842	0.049*
Irritation management	0.197	4.696	0.000***	0.24	1.208	0.23
Lack of sense of control	0.212	3.344	0.001***	-0.47	-1.573	0.119
Anger due to lack of control	-0.041	-0.871	0.386	-0.186	-0.834	0.406
Feeling of overwhelm	0.107	2.831	0.006**	0.179	1.009	0.315
	F= 218.387***			**F=** 1.117***		
	R^2=0.958			R^2=0.105		

Note: *p < 0.05; **p < 0.01; ***p < 0.001.

Table 4 reveals that in Model 1, the R^2 value is 0.958, indicating that stress levels account for 95.8% of the variability in students' wakefulness. Model 1 demonstrates statistical significance, which is affirmed by an F-statistic of 218.387, along with a p-value lower than 0.001. The direct effect of stress levels on wakefulness is

represented by the coefficient. (β = 0.945; p-value < 0.01). In practical terms, a one-unit increase in stress level corresponds to a 0.945-unit increase in students' wakefulness. The associated t-value of 41.097 further supports the statistically significant positive linear relationship between stress level and students' wakefulness. The results (β = 0.135; t-value = 3.998; p-value < 0.001) for emotional upset show a statistically significant positive linear relationship between emotional upset and students' wakefulness. The results (β = 0.081; t-value = 2.622; p-value = 0.010) indicate a statistically significant positive relationship between lack of control and students' wakefulness. The results (β = 0.216; t-value = 2.672; p-value < 0.01) for positive outlook show that there is a statistically significant positive relationship between positive outlook and students' wakefulness. The results (β = 0.197; t-value = 4.696; p-value < 0.001) for irritation management indicate a statistically significant positive relationship between irritation management and students' wakefulness. The results (β = 0.212, t-value = 3.344, p-value = 0.001) for lack of sense of control show that there is a statistically significant positive relationship between lack of sense of control and students' wakefulness. The results (β = 0.107; t-value = 2.831; p-value < 0.01) for feeling overwhelmed suggest a statistically significant positive relationship between feeling overwhelmed and students' wakefulness. Nervousness and stress (β= 0.033; t-value = 1.142; p-value > 0.05), confidence in problem-solving (β= 0.128; t-value = 1.970; p-value > 0.05), coping challenges (β= 0.015; t-value = 0.375; p-value > 0.05), and anger due to lack of control (β= -0.041; t-value = -0.871; p-value > 0.05) do not have a statistically significant relationship with students' wakefulness.

Stress levels explain 10.5% of the variation in academic performance, according to the overall model (Model 2), which is statistically significant with an F-statistic of 1.117 and an R^2 value of 0.105. A statistically significant negative correlation between coping challenges and academic performance is revealed by the coping challenges coefficient (β = -0.341; t = -1.842; p < 0.05). Regarding optimism, the findings (β = 0.589; t = 1.547; p-value = 0.052) indicate a slightly significant positive correlation. Several other factors do not show statistically significant relationships with academic performance, such as emotional upset (β = -0.130; t = -0.818; p-value > 0.05), lack of control (β = 0.141; t = 0.962; p-value = 0.339), nervousness and stress (β = 0.200; t = 1.462; p-value > 0.05), confidence in problem-solving (β = -0.008; t = -0.026; p-value > 0.05), irritation management (β = 0.240; t = 1.208; p-value > 0.05), lack of sense of control (β = -0.470; t = -0.834; p-value > 0.05), anger due to a lack of control (β = -0.186; t = -0.834; p-value > 0.05), and feelings of overwhelm (β = 0.179; t = 1.009; p-value > 0.05).

Table 5. Mean Score Frequencies.

Variables	N	Mean	Std. deviation	Minimum	Maximum
High stress level	106	24.3396	8.74	10.00	40.00
Wakefulness	106	22.1887	8.51	9.00	36.00
Anxiety level	106	15.1038	5.48	6.00	24.00
Academic performance	106	7.4717	2.94	4.00	14.00

Table 5 presents the mean scores of the variables. The mean stress level ($\bar{x}$= 24.34; SD = 8.74) is higher than the mean wakefulness score ($\bar{x}$= 22.19; SD = 8.51), which implies that, on average, participants tend to experience higher stress levels than wakefulness. The mean stress level ($\bar{x}$= 24.34; SD = 8.74) is substantially higher than the mean anxiety level ($\bar{x}$= 15.10; SD = 5.48). This indicates that, on average, participants report higher stress levels compared to their reported anxiety levels.

The mean stress level ($\bar{x}$= 24.34; SD= 8.74) is substantially higher than the mean academic performance ($\bar{x}$= 7.47; SD= 2.94). This indicates that, on average, participants experience higher stress levels than their academic performance suggests. The mean wakefulness score ($\bar{x}$= 22.19; SD= 8.51) is higher than the mean anxiety level ($\bar{x}$= 15.10; SD= 5.48). This implies that, on average, participants tend to report higher levels of wakefulness compared to their reported anxiety levels.

The mean wakefulness score ($\bar{x}$= 22.19; SD= 8.51) is higher than the mean academic performance ($\bar{x}$= 7.47; SD= 2.94). This implies that, on average, participants report higher wakefulness levels than their academic performance. The mean anxiety level ($\bar{x}$= 15.10; SD= 5.48) is higher than the mean academic performance ($\bar{x}$= 7.47; SD= 2.94). This indicates that, on average, participants tend to report higher anxiety levels compared to their academic performance. These mean comparisons provide a preliminary understanding of the central tendencies in the dataset.

The results in Table 6, obtained from the Mann-Whitney U test, the analysis show gender differences in anxiety levels, wakefulness, and academic performance among students. Based on gender differences in anxiety levels, the mean rank for males is 52.37, while for females it is 54.63. The Mann-Whitney result (U = 1344.500; p-value > 0.05) does not indicate a statistically significant difference in anxiety levels between male and female students. The p-value of 0.701 suggests that there is no significant difference in the distribution of anxiety levels between male and female students.

Table 6. There are gender differences in anxiety levels, wakefulness, and academic performance among the students.

Variables	Gender	N	Mean rank	Mann-Whitney U	Wilcoxon W	Z	p-value
Anxiety level	Male	53	52.37	1344.500	2775.500	-0.384	0.701
	Female	53	54.63				
Wakefulness	Male	53	55.25	1312.000	2743.000	-0.591	0.554
	Female	53	51.75				
Academic performance	Male	53	53.55	1402.000	1402.000	-0.016	0.987
	Female	53	53.45				

For wakefulness, the mean rank (male) is 55.25, while the mean rank (female) is 51.75. The Mann-Whitney result (U = 1312.000; p-value > 0.05) does not indicate a statistically significant difference in wakefulness between male and female students. The p-value of 0.554 implies that there is no significant distinction in the distribution of wakefulness scores between the two genders. Also, regarding academic performance, the mean rank for males is 53.55, while for females it is 53.45. The Mann-Whitney result (U = 1402.000; p-value > 0.05) indicates no statistically significant difference in academic performance between male and female students. The p-value of 0.987 suggests there is no significant variation in the distribution of academic performance scores between genders. The Mann-Whitney U test results do not support the hypothesis that there are significant gender differences in anxiety levels, wakefulness, or academic performance among the students in the sample.

Table 7. Male students who have a high level of stress are more likely to develop wakefulness than female students.

Variables	Gender	N	Mean rank	Mann-Whitney U	Wilcoxon W	Z	p-value
High stress level	Male	53	54.60	1346.000	2777.000	-0.372	0.710
	Female	53	52.40				
Wakefulness	Male	53	55.25	1312.000	2743.000	-0.591	0.554
	Female	53	51.75				

The results in Table 7, derived from the Mann-Whitney U test, the analysis show gender differences in stress levels or wakefulness between male and female students. Male students with high stress levels have a mean rank of 54.60; female students with high stress levels have a mean rank of 52.40. The Mann-Whitney result (U = 1346.000; p-value > 0.05) does not reveal a statistically significant difference in stress levels between male and female students. The p-value of 0.710 indicates that there is no significant difference in the distribution of stress levels between the two genders. Male students with wakefulness have a mean rank of 55.25, while female students with wakefulness have a mean rank of 51.75. The Mann-Whitney result (U = 1346.000; p-value > 0.05) also, there is no indication of a statistically significant difference in wakefulness between male and female students. The p-value of 0.554 indicates that there is no significant variation in the distribution of wakefulness scores between male and female students. Therefore, the Mann-Whitney U test results do not support the hypothesis that there are significant gender differences in stress levels or wakefulness between male and female students in the sample.

5. DISCUSSION

Findings of the research showed that there are significant gender differences in one area of students' sleep patterns. More specifically, there is a significant difference in sleep onset latency between students who are male and female. This finding implies that there are significant differences in the length of time it takes for male and female students to fall asleep. Gender differences are not statistically significant in other aspects of sleep, such as duration, subjective quality, use of sleep aids, daytime functioning, habitual sleep efficiency, and sleep disturbances. The present study refutes the findings of Becker et al. (2018) that females reported more sleep disturbances, higher rates of sleep medicine use, higher levels of dysfunction during the day, and a longer time to fall asleep than males, but this agrees with the finding that women have lower sleep efficiency than males. This study supports the findings of Putilov et al. (2021) and Berutu and Mutiawati (2023) that the average duration of time spent sleeping did not significantly differ across genders. These findings indicate that, while gender-specific factors may impact sleep onset latency, other aspects of sleep patterns and quality are largely unchanged between male and female participants in the research.

Findings showed a link between students' academic performance, wakefulness, and anxiety. The study reveals that anxiety significantly influences students' wakefulness, underscoring its role in disrupting sleep. The findings of Becker et al. (2018) which linked anxiety symptoms to increased sleep disturbances, align with this. The study does, however, show that anxiety has no statistically significant direct effect on academic performance, indicating that although worry may impair sleep, it has no discernible direct effect on academic performance in public colleges. This finding advances (Zhang, Zhao, & Kong, 2019) that anxiety in math has a strong negative correlation with performance. Additionally, specific aspects of anxiety, such as difficulties relaxing, restlessness, irritability, and fearful anticipation, have a significant impact on students' wakefulness. This study indicates that disturbances in sleep patterns are a result of these anxiety-related issues. Interestingly, the only anxiety components that stand out as relevant when it comes to academic performance are restlessness and irritability, suggesting a complex link between anxiety components and academic outcomes. Interestingly, anxiety symptoms and uncontrollable worrying had no apparent influence on students' wakefulness, demonstrating the variety of ways that anxiety can present itself in sleep problems. The study of Wang et al. (2022) supports this finding. The connection between anxiety and academic performance is complex. This complexity indicates that difficulties in relaxing, anxiety symptoms, excessive worrying, and fearful anticipation do not appear to significantly impact academic performance.

The findings from the research highlight the complex connection between stress, wakefulness, and students' academic performance in public colleges. Interestingly, the level of stress appears to be a highly important and strongly connected element that directly affects how alert students are. This study suggests that there may be changes in sleep patterns because higher stress levels are linked to more frequent awakenings. This finding supports the assertion of Gaş, Ekşi Özsoy, and Cesur Aydın (2023) that the level of stress has an effect on the

wakefulness of students. Specific aspects of stress, such as emotional upset, lack of control, positive outlook, lack of sense of control, irritation management, and feeling overwhelmed, show a significant positive association with students' wakefulness. These highlight the complex relationship between stress and wakefulness by implying that different components of stress play a role in sleep disturbances. It highlights the subtle differences in how different stress components impact sleep patterns: anxiety and stress, confidence in problem-solving skills, coping issues, and anger due to loss of control are not significantly associated with students' wakefulness. On the other hand, there is little evidence that stress levels directly affect students' academic performance. Examining specific stress-related factors reveals a substantial effect on students' academic performance. The factors include anxiety, stress, confidence in problem-solving, coping difficulties, anger from emotional disturbance, a positive outlook, lack of control, irritation management, and a sense of overwhelm. This work shows that specific stress components influence academic outcomes, even though total stress levels may not have a direct impact on academic performance.

The findings of the research show that there are no significant gender differences in students' anxiety levels, wakefulness, or academic performance. These findings imply that, on average, anxiety levels, wakefulness patterns, and academic performance outcomes are similar across male and female students in the research. This finding refutes the finding of Gao, Ping, and Liu (2020) that female students obtained notably higher scores in anxiety compared to their male counterparts. The lack of statistically significant differences between the genders in these categories suggests that male and female students have rather similar psychological and academic experiences.

The findings of the study indicate that there are no significant differences in stress levels or wakefulness between male and female students. This suggests that average stress levels and wakefulness patterns are comparable between male and female students. This finding supports (Deb, Strodl, & Sun, 2015) finding that there were no significant variations in academic stress based on gender. The lack of statistically significant differences between the genders in these domains highlights a certain level of homogeneity in the psychological and sleep-related experiences of male and female students in the group under study.

6. CONCLUSION AND IMPLICATIONS

The outcomes of this research have important implications for the design of focused interventions in learning environments. Comprehending the differences in sleep patterns between genders is crucial to tailoring interventions that target distinct facets of sleep well-being.

Future research could enhance the development of gender-sensitive sleep interventions by exploring the contributing variables to differences in sleep onset latency. The study demonstrates the complex relationship between anxiety, sleep, and academic performance, emphasizing the value of interventions that take these complex relationships into account. Anxiety has an extensive effect on students' well-being. In a similar vein, research on stress-related variables and how differently they affect wakefulness and academic performance draws attention to the importance of tailored interventions in enhancing the general well-being of students.

Furthermore, the study dispels stereotypes about gender-based differences in anxiety and sleep habits and highlights the importance of appreciating individual differences above generalized gender differences. This realization encourages the creation of inclusive support networks that address the various needs of every student, regardless of gender, and foster academic achievement and well-being.

The study makes recommendations for future directions in research, urging more investigation into the nuances of differences in sleep onset latency, anxiety components, and stress-related elements to continuously improve interventions and support systems in learning environments.

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REFERENCES

Adeyemi, A., & Adeyemi, S. (2014). Personal factors as predictors of students' academic achievement in colleges of education in South Western Nigeria. *Educational Research and Reviews*, *9*(4), 97-109.

Al Shammari, M. A., Al Amer, N. A., Al Mulhim, S. N., Al Mohammedsaleh, H. N., & AlOmar, R. S. (2020). The quality of sleep and daytime sleepiness and their association with academic achievement of medical students in the eastern province of Saudi Arabia. *Journal of Family & Community Medicine*, *27*(2), 97–102.

Alghannami, A. O., Alrashed, A. T., Alshehri, R. A., Alotaibi, S. O., Alharbi, M. K., Mukaddem, A., & Agha, S. (2021). The sleep pattern of medical students: Examining the impact of excessive internet use. *International Journal of Medicine in Developing Countries*, *5*(5), 1225–1231.

Almarzouki, A. F., Mandili, R. L., Salloom, J., Kamal, L. K., Alharthi, O., Alharthi, S., . . . Baglagel, A. M. (2022). The impact of sleep and mental health on working memory and academic performance: A longitudinal study. *Brain Sciences*, *12*(11), 1525.

Anosike, C., Isah, A., Dim, O. F., Enete, C. C., & Adibe, M. O. (2022). Effects of sleep quality on mental health and academic performance among final-year pharmacy students at a university in Enugu, Nigeria. *Future of Medical Education Journal*, *12*(4).

Arand, D. L., & Bonnet, M. H. (2019). The multiple sleep latency test. *Handbook of Clinical Neurology*, *160*, 393-403.

Armand, M. A., Biassoni, F., & Corrias, A. (2021). Sleep, well-being and academic performance: A study in a Singapore residential college. *Frontiers in Psychology*, *12*, 672238.

Arshad, A. R., Khan, M. H., Hasan, F., Khan, S., Ijaz, F., & Aftab, R. (2021). Quality of sleep and sleep disorders among medical students at a private medical college in Lahore, Pakistan. *Advanced Biomedical Research*, *12*(1), 1-8.

Azad, M. C., Fraser, K., Rumana, N., Abdullah, A. F., Shahana, N., Hanly, P. J., & Turin, T. C. (2015). Sleep disturbances among medical students: A global perspective. *Journal of Clinical Sleep Medicine*, *11*(1), 69-74.

Becker, S. P., Jarrett, M. A., Luebbe, A. M., Garner, A. A., Burns, G. L., & Kofler, M. J. (2018). Sleep in a large, multi-university sample of college students: sleep problem prevalence, sex differences, and mental health correlates. *Sleep Health*, *4*(2), 174-181.

Berutu, R., & Mutiawati, M. (2023). Understanding learning anxiety and mental health of final year students: A qualitative study. *ProGCouns: Journal of Professionals in Guidance and Counseling*, *4*(1), 42-51.

Cohen, S., & McKay, G. (1984). Social support, stress and the buffering hypothesis: A theoretical analysis. In A. Baum, J. E. Singer, & S. E. Taylor (Eds.), Handbook of Psychology and Health. In (Vol. 4, pp. 253–267). Hillsdale, NJ: Erlbaum

Crivello, A., Barsocchi, P., Girolami, M., & Palumbo, F. (2019). The meaning of sleep quality: A survey of available technologies. *IEEE Access*, *7*, 167374-167390.

Deb, S., Strodl, E., & Sun, J. (2015). Academic stress, parental pressure, anxiety and mental health among Indian high school students. *International Journal of Psychology and Behavioral Sciences*, *5*(1), 26–34.

Ekman, R., Fletcher, A., Giota, J., Eriksson, A., Thomas, B., & Bååthe, F. (2022). A flourishing brain in the 21st century: A scoping review of the impact of developing good habits for mind, brain, well-being, and learning. *Mind, Brain, and Education*, *16*(1), 13-23.

Fonseca, A. G., & Genzel, L. (2020). Sleep and academic performance: Considering amount, quality and timing. *Current Opinion in Behavioral Sciences*, *33*, 65-71.

Gao, W., Ping, S., & Liu, X. (2020). Gender differences in depression, anxiety, and stress among college students: A longitudinal study from China. *Journal of Affective Disorders*, *263*, 292-300.

Gaş, S., Ekşi Özsoy, H., & Cesur Aydın, K. (2023). The association between sleep quality, depression, anxiety and stress levels, and temporomandibular joint disorders among Turkish dental students during the COVID-19 pandemic. *The Journal of Craniomandibular & Sleep Practice*, *41*(6), 550-555.

Gremillion, M. (2023). *Glucose as a mediator of the relationship between sleep and cognitive performance*. Retrieved from Doctoral Dissertation, Louisiana Tech University:

Hershner, S. (2020). Sleep and academic performance: Measuring the impact of sleep. *Current Opinion in Behavioral Sciences*, *33*, 51-56.

Hirshkowitz, M., Whiton, K., Albert, S. M., Alessi, C., Bruni, O., DonCarlos, L., . . . Kheirandish-Gozal, L. (2015). National Sleep Foundation's sleep time duration recommendations: Methodology and results summary. *Sleep Health*, *1*(1), 40-43.

Jalali, R., Khazaei, H., Paveh, B. K., Hayrani, Z., & Menati, L. (2020). The effect of sleep quality on students' academic achievement. *Advance in Medical Education and Practice*, *11*, 497-502.

Kumar, R., Rizvi, M. R., & Saraswat, S. (2022). Obesity and stress: a contingent paralysis. *International Journal of Preventive Medicine*, *13*(1), 95.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer.

Lee, B., & Kim, Y. E. (2019). The psychometric properties of the Generalized Anxiety Disorder scale (GAD-7) among Korean university students. *Psychiatry and Clinical Psychopharmacology*, *29*(4), 864-871.

McCarter, S. J., Hagen, P. T., Louis, E. K. S., Rieck, T. M., Haider, C. R., Holmes, D. R., & Morgenthaler, T. I. (2022). Physiological markers of sleep quality: A scoping review. *Sleep Medicine Reviews*, *64*, 101657.

Mehta, K. J. (2022). Effect of sleep and mood on academic performance—at interface of physiology, psychology, and education. *Humanities and Social Sciences Communications*, *9*(1), 1-13.

Mozumder, M. K. (2022). Reliability and validity of the Perceived Stress Scale in Bangladesh. *Plos One*, *17*(10), e0276837.

Nelson, K. L., Davis, J. E., & Corbett, C. F. (2022). Sleep quality: An evolutionary concept analysis. *Nursing Forum*, *57*(1), 144-151.

Nsengimana, A., Mugabo, E., Niyonsenga, J., Hategekimana, J. C., Biracyaza, E., Mutarambirwa, R., . . . Nduwayezu, R. (2023). Sleep quality among undergraduate medical students in Rwanda: A comparative study. *Scientific Reports*, *13*(1), 265.

Olatunji, S. O., Aghimien, D. O., Oke, A. E., & Olushola, E. (2016). Factors affecting performance of undergraduate students in construction related disciplines. *Journal of Education and Practice*, *7*(13), 55-62.

Putilov, A. A., Sveshnikov, D. S., Bakaeva, Z. B., Yakunina, E. B., Starshinov, Y. P., Torshin, V. I., . . . Lapkin, M. M. (2021). Differences between male and female university students in sleepiness, weekday sleep loss, and weekend sleep duration. *Journal of Adolescence*, *88*, 84-96.

Rafi, U., Jahan, S., Qazi, W. A., Siddique, S., & Bukhari, N. A. (2021). Effect of sleep quality on academic performance of undergraduate University level students. *Journal of Shifa Tameer-e-Millat University*, *4*(2), 95-99.

Riethmeister, V., Bültmann, U., De Boer, M., Gordijn, M., & Brouwer, S. (2018). Examining courses of sleep quality and sleepiness in full 2 weeks on/2 weeks off offshore day shift rotations. *Chronobiology International*, *35*(6), 759-772.

Sato, M., Betriana, F., Tanioka, R., Osaka, K., Tanioka, T., & Schoenhofer, S. (2021). Balance of autonomic nervous activity, exercise, and sleep status in older adults: A review of the literature. *International Journal of Environmental Research and Public Health*, *18*(24), 12896.

Saygın, M., Öztürk, Ö., Gonca, T., Has, M., Hayri, U. B., Kurt, Y., . . . Öztürk, M. (2016). Investigation of sleep quality and sleep disorders in students of medicine. *Turkish Thoracic Journal*, *17*(4), 132–140.

Schmickler, B., Müller, L., Johnson, P., & Chen, Y. (2023). The impact of stress and coping strategies on sleep quality: Evidence from Western contexts. *Journal of Health Psychology*, *28*(3), 456–472.

Sonnentag, S. (2018). The recovery paradox: Portraying the complex interplay between job stressors, lack of recovery, and poor well-being. *Research in Organizational Behavior*, *38*, 169-185.

Suardiaz-Muro, M., Ortega-Moreno, M., Morante-Ruiz, M., Monroy, M., Ruiz, M. A., Martín-Plasencia, P., & Vela-Bueno, A. (2023). Sleep quality and sleep deprivation: Relationship with academic performance in university students during examination period. *Sleep and Biological Rhythms*, *21*(3), 377-383.

Vallejo, R., & Silvestre, M. (2023). Effects of Sleep Deprivation on cognitive functions and academic achievement in students. *Sage Sci Rev Educational Technol*, *6*(1), 59-70.

Vgontzas, A., & Pavlović, J. M. (2018). Sleep disorders and migraine: review of literature and potential pathophysiology mechanisms. *Headache: The Journal of Head and Face Pain*, *58*(7), 1030-1039.

Wach, D., Stephan, U., Weinberger, E., & Wegge, J. (2021). Entrepreneurs' stressors and well-being: A recovery perspective and diary study. *Journal of Business Venturing*, *36*(5), 106016.

Wang, S., Hou, W., Tao, Y., Ma, Z., Li, K., Wang, Y., . . . Zhang, L. (2022). Mapping network connection among symptoms of anxiety, depression, and sleep disturbance in Chinese high school students. *Frontiers in Public Health*, *10*, 1015166.

Zhang, J., Zhao, N., & Kong, Q. P. (2019). The relationship between math anxiety and math performance: A meta-analytic investigation. *Frontiers in Psychology*, *10*, 1613.

Zhu, Y., Xi, Y., Fei, N., Liu, Y., Zhang, X., Liu, L., . . . Yin, H. (2018). Dynamics of cerebral responses to sustained attention performance during one night of sleep deprivation. *Journal of Sleep Research*, *27*(2), 184-196.