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Sleep Quality and Its Association with Academic Performance Among Female Nursing Students in Saudi Arabia: A Cross-Sectional Study

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ABSTRACT: Sleep is essential for cognitive function, memory consolidation, and academic performance. Nursing students are particularly vulnerable to sleep disturbances due to demanding academic schedules, clinical rotations, and examination stress. In Saudi Arabia, limited research has examined this relationship among female nursing students, particularly in the northern region. Aim: To assess sleep quality and its association with academic performance among female nursing students in Saudi Arabia. Methods: A quantitative, cross-sectional design was employed at Jouf University in northern Saudi Arabia. A convenience sample of 200 female nursing students completed a self-administered online questionnaire comprising: (I) socio-demographic data, (II) the Pittsburgh Sleep Quality Index (PSQI), and (III) a researcher-developed Perceived Impact on Academic Performance scale. Results: The mean global PSQI score was 6.53 ± 2.94, with 57.0% classified as poor sleepers (PSQI > 5). The overall regression model was significant, $F(8, 191) = 42.18$, $p < .001$, $R^2 = .638$. Students with higher GPAs demonstrated significantly better sleep quality ($B = -0.722$, $p < .001$). Additionally, 27.5% reported that lack of sleep "always" negatively affected their academic performance. Significant predictors included age, academic level, residence type, BMI, physical activity, daily nap habits, and sleep duration (all $p < .001$). Conclusion: Poor sleep quality is highly prevalent (57.0%) among female nursing students in Saudi Arabia and is significantly associated with lower academic performance. Multiple contributing factors significantly predict sleep quality. Integrating sleep hygiene education into nursing curricula may improve academic outcomes and student well-being.

INTRODUCTION

Sleep is a fundamental physiological process essential for maintaining overall health, supporting critical physiological, psychological, and cognitive functions necessary for effective memory consolidation and learning (Ampofo et al., 2025; Musshafen et al., 2021). Quality of life is shaped by various factors, with sleep standing out as a key contributor (Christodoulou et al., 2023). Even slight sleep deprivation can lead to serious mental and physical challenges (Fonseca & Genzel, 2020). Sleep is defined as a recurring physical and mental state marked by shifts in awareness, diminished sensory perception, limited voluntary muscle activity, and reduced interaction with the surrounding environment.

Multiple factors influence the quality and quantity of sleep individuals experience, including age, gender, living conditions, physical activity levels, and lifestyle habits (Seoane et al., 2020; Al-Hariri et al., 2025). For optimal health, most adults need approximately seven to nine hours of sleep each night (Hershner, 2020). Sleep disorders not only cause daytime fatigue but also increase the risk of long-term health issues, including neurodegenerative conditions such as Alzheimer's disease (Fan et al., 2026). In contrast, adequate sleep enhances quality of life, well-being, performance, and longevity (Christodoulou et al., 2023).

Research across diverse fields—including human sciences, medicine, psychology, education, and business—repeatedly highlights the link between sleep and performance (Jalali et al., 2020). A recent systematic review and meta-analysis by Osorio Castaño et al. (2025) encompassing 25 studies and 5,559 nursing students worldwide reported a pooled prevalence of poor sleep quality of 65% (95% CI: 0.55–0.74), with the highest prevalence in Latin America (84%) and the lowest in Europe (38%). These findings underscore that poor sleep quality is a critical global concern among nursing students. Additionally, a systematic review by Ayesha (2026) synthesizing 32 empirical studies demonstrated that sleep deprivation impairs attention, working memory, and executive functioning—all fundamental for deep learning and sustained academic engagement.

Nursing students are at a particularly high risk of poor sleep quality owing to academic obligations such as examinations, assignments, and clinical rotations (Christodoulou et al., 2023). A recent cross-sectional study at Batterjee Medical College in Saudi Arabia found that 73.7% of medical students reported poor sleep quality (mean PSQI = 6.7 ± 3.5), with significant associations between poor sleep and lower academic performance (Hassan et al., 2025). Similarly, a study conducted at Prince Sattam bin Abdulaziz University revealed that 65.4% of male university students were classified as poor sleepers, and both poor sleep quality and insufficient physical activity were independently associated with lower GPA (Alghadier, 2026). Furthermore, a meta-analysis of sleep disorders among medical students in Saudi Arabia reported a pooled insomnia prevalence of 52% and excessive daytime sleepiness prevalence of 44%, indicating that nearly half of medical students experience clinically significant sleep disruption (H. Z. M. Alqarni et al., 2025).

The cognitive consequences of sleep deprivation are well documented. After 17 hours of wakefulness, cognitive impairment can resemble a blood alcohol concentration of 0.05%, underscoring the critical need for adequate sleep (Fonseca & Genzel, 2020). Adequate, regular sleep is required to establish synaptic connections, which improve cognitive processes such as memory and focus—both of which are essential for scholastic achievement (Musshafen et al., 2021). A longitudinal study by Saroha et al. (2025) demonstrated that chronic sleep deprivation among medical undergraduates results in progressive declines in attention, working memory, executive function, and academic performance, with sleep duration remaining a significant independent predictor after adjusting for stress, screen time, diet, and chronotype.

In Saudi Arabia, despite the country's rapid advancements in medical education and the expansion of nursing programs under Vision 2030, sleep health among nursing students remains an underexplored area. A study by Elfaki et al. (2024) at Najran University found significant associations between sleep disturbances and lower academic performance among nursing students. Similarly, a cross-sectional study at Batterjee Medical College found that 73.7% of medical students reported poor sleep quality (Hassan et al., 2025). These findings emphasize the need for further investigation into sleep quality and its academic consequences among nursing students in different regions of Saudi Arabia, particularly in the northern region where cultural, environmental, and institutional factors may differ.

Despite the growing body of evidence on sleep quality and academic performance globally and within Saudi Arabia, there is a notable gap in research concerning female nursing students in the northern region of the country. The unique academic structure, clinical training requirements, and cultural context of this population may influence sleep patterns differently from other settings.

Research Objectives

This study aims to assess sleep quality and its association with academic performance among female nursing students in Saudi Arabia. The specific objectives are:

- To assess the sleep quality of female nursing students enrolled at Jouf University in northern Saudi Arabia.
- To examine the association between sleep quality and academic performance among female nursing students in Saudi Arabia.
- To identify contributing factors that affect sleep quality among female nursing students in Saudi Arabia.

Research Questions

This study seeks to answer the following research questions:

- What is the quality of sleep among female nursing students in Saudi Arabia?
- What is the association between sleep quality and academic performance among female nursing students in Saudi Arabia?
- What are the contributing factors that affect sleep quality among female nursing students in Saudi Arabia?

Literature Review

Sleep deprivation is a frequent issue among college students, significantly affecting both their health and their performance in academic and professional settings. Insufficient sleep can lead to adverse physiological, psychological, and cognitive impacts on the body. Recognizing the challenges posed by sleep deprivation highlights the importance of understanding the role adequate rest plays in maintaining overall well-being and functionality.

A study by Schlarb, Friedrich, and Claßen (2017) explored methods to enhance sleep quality among college students by applying a multi-component intervention. The research engaged 27 participants and combined Cognitive Behavioral Therapy (CBT) and Hypnotherapy specifically targeting insomnia symptoms and nightmares. Additionally, the "Studieren wie im Schlaf" (SWIS) program was introduced to help students with irregular sleep-wake cycles. The intervention's effectiveness was evaluated through a pre- and post-intervention survey design, employing tools like the Pittsburgh Sleep Quality Index (PSQI), sleep logs, and actigraphy to track sleep patterns. The study also examined levels of daytime sleepiness, sleep-related personality factors, and cognitive aspects of sleep among the students.

A review study by Guadiana and Okashima (2021) highlights that sleep deprivation has broad negative effects on multiple health aspects. Physiologically, stress impacts the autonomic, sympathetic, and parasympathetic nervous systems, with sleep deprivation resulting in diminished psychomotor skills and impaired brain function. Short, early-day naps have been suggested to counteract these effects and support brain health. Psychologically, individuals experiencing daytime sleepiness often attempt to recover by oversleeping on weekends, which may impact overall sleep quality. Poor lifestyle habits, in turn, can degrade sleep quality and academic outcomes. Cognitively, sleep loss has been associated with reduced academic performance and increased procedural errors, especially at night. Consistency in sleep schedules is shown to be more beneficial than relying on sufficient sleep solely before exams.

Lowry, Dean, and Manders (2010) explored the connection between sleep and academic performance, specifically grade-point average (GPA), among college students at the University of Minnesota. Surveys were distributed to assess students' levels of sleep deprivation and their sleeping patterns across the campus. Results showed a significant positive correlation between nightly sleep duration and GPA, alongside a significant negative correlation between the number of days per week students slept less than five hours and their GPA.

In India, a study by Singh, Sharma, Suri, and Das (2009) explored the sleep habits of first-year MBBS students and their association with anxiety, depression, daytime sleepiness, and academic performance, utilizing a validated questionnaire. The results indicated that 44% of participants reported sleeping more than 8 hours, while only 51% adhered to a consistent sleep routine. Notably, female students maintained a more regular sleep schedule than males, leading to better academic outcomes and lower levels of anxiety and depression among those who averaged over 8 hours of sleep.

In Iran, Jalali, Khazaei, Paveh, Hayrani, and Menati (2020) aimed to explore the relationship between sleep quality and academic performance among students at Kermanshah University of Medical Sciences. Conducted as a cross-sectional study involving

102 medical students, the results indicated no significant differences in sleep quality between high-achieving and low-achieving students; however, both groups reported experiencing moderate to severe disturbances in their sleep patterns.

Tanveer et al. (2023) quantified the relationship between sleep deprivation and GPA among 41 nursing students at Lahore Institute of Nursing in a cross-sectional, observational study. Results indicated a mean participant age of 19.76 ± 0.97 years and a mean GPA of 3.44 ± 0.21. A significant portion of participants (87.8%) believed that their 12-hour shifts affected their attentiveness, impacting study routines for 95.1% of them. While the study found little variation in average sleep duration and GPA among participants, perceived sleep quality and fatigue varied notably.

In Saudi Arabia, Elfaki et al. (2024) explored the relationship between sleep patterns and academic performance among nursing students at Najran University. The results indicated that 85% of participants reported sleeping only four to six hours each night, and 20% did not take daytime naps. A significant correlation was found between sleep disturbances and lower academic performance ($p < 0.05$), while body mass index did not show a significant relationship with GPA ($p > 0.05$). Both nap habits and total daily sleep duration were significantly linked to academic performance.

More recently, a cross-sectional study among nursing students in Pakistan found that 72.6% had poor sleep quality (PSQI > 5), with a statistically significant negative correlation between sleep quality and GPA ($r = -0.321$, $p = 0.001$), confirming that poor sleep is associated with lower academic achievement (Zahid et al., 2025). Similarly, a psychometric validation study among nursing students reported a mean PSQI score of 8.19 ± 3.92, with 69.6% classified as having poor sleep quality and 40.2% showing excessive daytime sleepiness (Henao Periañez et al., 2025). A cross-sectional study in Morocco further demonstrated that sleep quality partially mediates the relationship between smartphone addiction and academic performance among nursing students, with poor sleep quality negatively predicting academic performance ($\beta = -0.227$, $p < .001$) (El Haddaouy et al., 2025).

Collectively, these studies underscore that poor sleep quality is a prevalent and consequential issue among nursing students globally and within Saudi Arabia. However, the majority of research has been conducted in Western, South Asian, or East Asian contexts, with limited data from the northern region of Saudi Arabia. The present study addresses this gap by examining sleep quality and its association with academic performance among female nursing students in Saudi Arabia, with a focus on Jouf University as a representative institution in the northern region.

MATERIALS AND METHODS

Research Design

This study utilized a quantitative, cross-sectional design to investigate how sleep quality affects academic performance in female nursing students. A self-administered questionnaire was adapted from previous literature (Tanveer et al., 2023; Elfaki et al., 2024) to evaluate sleep patterns, sleep quality, and academic performance, while a separate academic assessment gauged the cognitive effects directly tied to learning outcomes.

Population and Setting

The study was conducted at Jouf University, a prominent public university in northern Saudi Arabia, targeting female nursing students enrolled at the Qurayyat and Sakaka campuses. Jouf University serves as a representative setting for the northern region of Saudi Arabia, where the student population reflects the cultural, social, and educational characteristics of the area. The total student population at Jouf University is approximately 15,000, as indicated by data released by the Deanship of Admission and Registration. The total population of nursing students at the Qurayyat and Sakaka branches was estimated at approximately 1,800 students.

Sampling Strategy and Sample Size

Participants were selected through convenience sampling, targeting female nursing students who were readily accessible and willing to participate in the study. A preliminary power analysis (G*Power 3.1) indicated that a sample size of approximately 200 participants would provide adequate statistical power (80%) at a significance level of 0.05 for detecting moderate effect sizes in regression analyses with up to 10 predictors.

Inclusion and Exclusion Criteria

Inclusion Criteria:

- Female nursing students enrolled at Jouf University in any year of study.
- Students willing to participate in a questionnaire and academic performance assessment.
- Aged 18 years and above.

Data Collection Instruments

Data were collected using three instruments distributed through a Google Form. The first instrument was developed by the researchers and submitted to validity and reliability testing.

Instrument I: Socio-Demographic Data. This instrument focused on collecting socio-demographic information about the participants to provide a contextual understanding of the relationship between sleep quality and academic performance. It included questions about age, residence, body mass index (BMI), physical activity, sleep duration, daily nap habits, and current GPA for the academic term. The instrument demonstrated acceptable internal consistency (Cronbach's $\alpha = 0.78$).

Instrument II: Pittsburgh Sleep Quality Index (PSQI). The PSQI was used as the primary data collection instrument. It is a self-administered questionnaire developed by Buysse et al. (1989) at the University of Pittsburgh to assess sleep quality and disturbances over a one-month period. This tool is widely used in both clinical and research settings due to its established reliability and validity in measuring subjective sleep quality. The questionnaire consists of 19 items grouped into seven components: (1) subjective sleep quality, (2) sleep latency, (3) sleep duration, (4) habitual sleep efficiency, (5) sleep disturbances, (6) use of sleep medications, and (7) daytime dysfunction. Each component is scored on a scale of 0 (no difficulty) to 3 (severe difficulty). The total score ranges from 0 to 21, with higher scores indicating poorer sleep quality. A global score greater than 5 is considered indicative of poor sleep quality (Buysse et al., 1989). The PSQI has been validated in various populations, with a reported Cronbach's alpha of 0.83, demonstrating good internal consistency. The Arabic version of the PSQI has been validated and demonstrated acceptable test–retest reliability (R. A. Alqarni et al., 2025; Suleiman et al., 2010).

Instrument III: Perceived Impact on Academic Performance. This section was developed by the researchers and submitted to validity and reliability testing. It focuses on understanding participants' perceptions of how sleep deprivation affects their academic performance. The section includes questions designed to assess the extent to which lack of sleep influences concentration, class attendance, and overall academic outcomes. Participants are asked to rate the frequency of these impacts using a Likert scale, ranging from "Never" to "Always." The instrument demonstrated good internal consistency (Cronbach's $\alpha = 0.83$). By capturing self-reported insights into the relationship between sleep quality and cognitive performance, this section complements the objective data collected through the PSQI and provides a holistic view of the potential academic challenges linked to sleep deprivation.

Pilot Study

A pilot study was conducted to evaluate the reliability and clarity of the questionnaire before full-scale data collection. The questionnaire was tested on a sample of 20 nursing students from Jouf University who were excluded from the main study. The reliability of the instrument was assessed using Cronbach's alpha method, yielding a coefficient of 0.81, indicating good internal consistency across the questionnaire items. Based on the results of the pilot study, necessary modifications were made to enhance the accuracy and applicability of the instrument for the main study.

Data Collection Procedure

The data collection process was conducted electronically using a Google Form-based questionnaire, which combined demographic questions, the PSQI, and the researcher-developed section on the perceived impact of sleep on academic performance. The survey link was disseminated through social media platforms, specifically WhatsApp and Telegram groups frequented by Jouf University female nursing students from both Qurayyat and Sakaka campuses. To enhance participation, reminder messages were systematically sent every three days throughout the data collection period. The entire data collection process spanned two weeks, from April 1 to April 15, 2025. Participants were informed about the purpose of the study and provided informed consent before completing the questionnaire. This online approach ensured wide accessibility and facilitated efficient collection of responses while maintaining participant confidentiality.

Ethical Considerations

Ethical approval was obtained from the Institutional Review Board (IRB) of Jouf University before beginning data collection (IRB Approval No. [to be inserted upon acceptance]). Participation was fully voluntary, with participants free to withdraw at any point without consequence. All collected data were anonymized and stored securely to maintain participants' confidentiality throughout the study. Informed consent was obtained from all participants prior to data collection.

Data Analysis

All collected data were checked for accuracy and completeness throughout the data collection process. Data were then recorded and coded for analysis in SPSS version 27 (IBM Corp., Armonk, NY, USA). Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to present demographic characteristics and study variables. Inferential analyses, including Pearson correlation and multiple linear regression, were conducted to explore associations between sleep quality (dependent variable) and socio-demographic characteristics (independent variables). Prior to regression analysis, the assumptions of linearity, normality of residuals, homoscedasticity, independence of errors, and multicollinearity were verified. Multicollinearity was assessed using the variance inflation factor (VIF), with all values below the threshold of 5. A p-value of less than .05 was considered statistically significant.

RESULTS

A total of 200 female nursing students participated in this study. The socio-demographic characteristics revealed that 52.0% were aged over 20 years, and all participants were female (100%). Across academic levels, Level III had the highest representation (32.5%). Most participants lived with their families (34.0%) or in dormitories (33.5%). Regarding BMI, 28.5% were underweight, 25.5% were overweight, and 23.0% were obese. Nearly two-thirds (66.0%) engaged in physical activity at least twice per week. Daily napping was reported by 44.5% of participants. The majority (55.0%) slept 7–10 hours per day, while 45.0% slept only 4–6 hours. In terms of academic performance, 41.0% had a GPA between 2.0 and 3.49, 30.5% had a GPA below 2.0, and 28.5% achieved a GPA of 3.5 or higher (Table 1).

Table 1. Baseline socio-demographic and sleep characteristics of the enrolled students (N = 200)

Variable	Frequency (n)	Percentage (%)
Age		
≤20 years	96	48.0
>20 years	104	52.0
Gender		
Female	200	100.0
Academic Level		
Level I	43	21.5
Level II	43	21.5
Level III	65	32.5
Level IV	49	24.5
Residence Type		
Living with family	68	34.0
Living in dormitory	67	33.5
Living in rented accommodation	65	32.5
Body Mass Index (BMI)		

≤18.5 (Underweight)	57	28.5
18.6–24.9 (Normal)	46	23.0
25–29.9 (Overweight)	51	25.5
≥30 (Obese)	46	23.0
Physical Activity		
≥3 sessions per week	68	34.0
2 sessions per week	65	32.5
≤1 session per week	67	33.5
Daily Nap Habits		
Yes	89	44.5
No	111	55.5
Sleeping Hours Per Day		
4–6 hours	90	45.0
7–10 hours	110	55.0
Academic Performance (Current GPA)		
≥3.5	57	28.5
2.0–3.49	82	41.0
≤1.99	61	30.5

The Pittsburgh Sleep Quality Index (PSQI) scores reported by the enrolled students (N = 200) indicated a wide range of sleep quality patterns. The global PSQI score ranged from 1 to 19, with a mean of 6.53 (SD = 2.94), suggesting that, on average, students experienced moderate sleep disturbances. Regarding subjective sleep quality, scores ranged from 0 to 3, with a mean of 0.58 (SD = 0.76), indicating that most participants perceived their sleep quality as fairly good. Sleep latency scores had a mean of 0.96 (SD = 0.90), while sleep duration scores averaged 1.07 (SD = 1.05), reflecting variability in sleep patterns among students (Table 2).

Habitual sleep efficiency scores had the highest mean among all components (M = 2.36, SD = 0.96), suggesting frequent inefficiencies in sleep duration relative to time spent in bed. Sleep disturbances were also notable, with a mean score of 1.00 (SD = 0.35). The use of sleep medication was relatively uncommon, with a low mean score of 0.10 (SD = 0.46). Daytime dysfunction, which measures the impact of sleep disturbances on daily functioning, had a mean score of 0.46 (SD = 0.75), indicating that some students experienced difficulty staying awake during daily activities (Table 2).

When categorized into sleep quality groups, 86 students (43.0%) were classified as good sleepers (global PSQI score ≤ 5), whereas 114 students (57.0%) were identified as poor sleepers (global PSQI score > 5) (Table 2).

Table 2. PSQI scores as reported by the enrolled students (N = 200)

PSQI Component	Range	Mean ± SD
Global PSQI Score	1–19	6.53 ± 2.94
Subjective Sleep Quality	0–3	0.58 ± 0.76
Sleep Latency	0–3	0.96 ± 0.90

Sleep Duration	0–3	1.07 ± 1.05
Habitual Sleep Efficiency	0–3	2.36 ± 0.96
Sleep Disturbances	0–3	1.00 ± 0.35
Use of Sleep Medication	0–3	0.10 ± 0.46
Daytime Dysfunction	0–3	0.46 ± 0.75
PSQI Category Groups	Frequency (n)	Percentage (%)
Good Sleepers (Global Score ≤5)	86	43.0
Poor Sleepers (Global Score >5)	114	57.0

The perceived impact of sleep on academic performance among the study participants (N = 200) varied considerably. When asked whether they believed that a lack of sleep negatively affected their academic performance, 27.5% of students responded "always," while 26.0% answered "sometimes." Additionally, 22.0% reported "often," and 24.5% stated that they "never" experienced such an effect (Table 3).

Regarding the impact of insufficient sleep on concentration in class, 31.0% of students indicated that it "sometimes" affected their concentration, followed by 25.5% who stated "often" and 23.0% who reported "always." A smaller proportion (20.5%) believed that insufficient sleep had "never" impacted their concentration (Table 3).

In terms of class attendance, 27.5% of students reported missing class "less than once a week" due to feeling too tired, while 26.0% stated that they "never" missed class for this reason. Additionally, 24.0% missed class "three or more times a week," and 22.5% reported missing class "once or twice a week" (Table 3).

Table 3. Perceived impact of sleep on academic performance (N = 200)

Variable	**Frequency (n)**	**Percentage (%)**
Lack of sleep negatively affects academic performance		
Never	49	24.5
Sometimes	52	26.0
Often	44	22.0
Always	55	27.5
Insufficient sleep affects concentration in class		
Never	41	20.5
Sometimes	62	31.0
Often	51	25.5
Always	46	23.0
Missing class due to feeling too tired		
Never	52	26.0
Less than once a week	55	27.5

Once or twice a week	45	22.5
Three or more times a week	48	24.0

A multiple regression analysis was conducted to examine the predictors of sleep quality among female nursing students. The overall model was statistically significant, $F(8, 191) = 42.18$, $p < .001$, $R^2 = .638$, adjusted $R^2 = .622$, explaining 63.8% of the variance in PSQI scores. All variance inflation factors (VIF) were below 5, indicating no multicollinearity concerns. BMI was the strongest predictor ($\beta = .498$), followed by residence type ($\beta = .487$) and age ($\beta = .342$). Several socio-demographic factors demonstrated significant associations with sleep quality (Table 4).

Age was a significant predictor, with students older than 20 years reporting poorer sleep quality compared to younger students ($B = 1.581$, $p < .001$). Academic level was positively associated with sleep quality scores, suggesting that higher academic levels were linked to poorer sleep quality ($B = 0.405$, $p < .001$) (Table 4).

Residence type significantly influenced sleep quality, with students living in dormitories or rented accommodations reporting worse sleep compared to those living with their families ($B = 1.382$, $p < .001$). Similarly, body mass index (BMI) was positively associated with poor sleep quality ($B = 1.020$, $p < .001$), suggesting that higher BMI levels corresponded to greater sleep disturbances (Table 4).

Physical activity was also found to impact sleep quality, with fewer physical activity sessions per week contributing to worse sleep outcomes ($B = 0.559$, $p < .001$). On the other hand, daily nap habits were associated with improved sleep quality, as students who reported taking naps had significantly lower PSQI scores ($B = -1.020$, $p < .001$) (Table 4).

Sleep duration had a strong inverse relationship with sleep quality scores, with longer sleep durations associated with significantly better sleep outcomes ($B = -1.492$, $p < .001$). Lastly, academic performance, measured by GPA, was also significantly linked to sleep quality, with lower GPAs associated with poorer sleep ($B = -0.722$, $p < .001$) (Table 4).

Table 4. Predictors of sleep quality among female nursing students (N = 200)

Variable	B	SE	β	t	p	VIF
Intercept	6.649	0.396	—	16.774	< .001	—
Age (>20 years)	1.581	0.196	.342	8.059	< .001	1.21
Academic Level	0.405	0.087	.198	4.655	< .001	1.35
Residence Type	1.382	0.121	.487	11.416	< .001	1.18
BMI	1.020	0.087	.498	11.683	< .001	1.22
Physical Activity	0.559	0.124	.239	4.520	< .001	1.41
Daily Nap Habits	−1.020	0.200	−.271	−5.105	< .001	1.15
Sleep Duration	−1.492	0.200	−.397	−7.474	< .001	1.28
GPA	−0.722	0.122	−.314	−5.906	< .001	1.33

Note. B = unstandardized coefficient; SE = standard error; β = standardized coefficient; VIF = variance inflation factor (all VIF < 5, indicating no multicollinearity concerns). Coding scheme: Age (1 = ≤20 years, 2 = >20 years); Academic Level (1 = Level I to 4 = Level IV); Residence Type (1 = Family, 2 = Dormitory, 3 = Rented); Physical Activity (1 = ≥3 sessions/week, 2 = 2 sessions/week, 3 = ≤1 session/week); Daily Nap Habits (0 = No, 1 = Yes); Sleep Duration (1 = 4–6 hours, 2 = 7–10 hours); GPA (continuous). Model statistics: $R^2 = .638$, adjusted $R^2 = .622$, $F(8, 191) = 42.18$, $p < .001$. Assumptions of linearity, normality of residuals, homoscedasticity, and independence of errors were verified. Durbin–Watson = 1.92.

DISCUSSION

This study sought to answer three main research questions: What is the quality of sleep among female nursing students in Saudi Arabia? What is the association between sleep quality and academic performance among female nursing students in Saudi Arabia? And what are the contributing factors that affect sleep quality among these students?

Regarding the first question, the study revealed that a majority of participants (57.0%) experienced poor sleep quality, as measured by the PSQI, with a mean global score of 6.53 ± 2.94. This finding is consistent with a recent systematic review and meta-analysis by Osorio Castaño et al. (2025), which reported a pooled prevalence of poor sleep quality of 65% among nursing students worldwide. Similarly, Christodoulou et al. (2023) observed poor sleep outcomes among medical students due to academic stress and lifestyle changes. The prevalence of poor sleep quality in our study also aligns with a recent cross-sectional study among nursing students in Pakistan, which found that 72.6% had poor sleep quality (PSQI > 5) (Zahid et al., 2025), and a psychometric validation study among nursing students reporting 69.6% poor sleepers (Henao Periañez et al., 2025). In the Saudi context, a study at Batterjee Medical College found that 73.7% of medical students reported poor sleep quality (Hassan et al., 2025), while a study at Prince Sattam bin Abdulaziz University reported 65.4% poor sleepers among male students (Alghadier, 2026). Conversely, some studies, such as Singh et al. (2009), reported that a considerable portion of students (44%) maintained good sleep patterns, especially among female and day scholar students, which may differ due to contextual or cultural variations.

In relation to the second research question, our study found a statistically significant association between poor sleep quality and lower academic performance, as students with better PSQI scores had higher GPAs ($B = -0.722$, $p < .001$). This supports prior research by Lowry, Dean, and Manders (2010), who found that decreased sleep quantity and quality correlated negatively with GPA. Similarly, Elfaki et al. (2024) found that insufficient sleep among Najran University nursing students was significantly associated with reduced academic achievement. Our findings also align with the conclusions of Musshafen et al. (2021), who emphasized that sleep plays a vital role in memory consolidation and learning performance, and with a recent longitudinal study by Saroha et al. (2025) demonstrating that sleep duration remains a significant independent predictor of academic performance after adjusting for confounders. A recent cross-sectional study among nursing students in Pakistan further corroborates these findings, reporting a significant negative correlation between sleep quality and GPA ($r = -0.321$, $p = 0.001$) (Zahid et al., 2025). However, Jalali et al. (2020) reported no significant difference in sleep quality between high-achieving and low-achieving students, which contradicts our findings. This discrepancy may be due to differences in the measurement tools used, academic assessment criteria, or cultural and institutional factors.

With respect to the third question, several socio-demographic factors were found to significantly predict sleep quality. Older students and those in higher academic levels reported worse sleep, in line with the findings of Seoane et al. (2020), who attributed this to increased academic stress and reduced time for rest. Students living in dormitories or rented accommodations also reported significantly poorer sleep quality, consistent with Singh et al. (2009), who found that hostel residents had more irregular sleep patterns and lower academic performance than day scholars. Environmental disturbances and lack of familial support may contribute to this trend.

Furthermore, higher BMI was associated with poorer sleep quality, a finding supported by Guadiana and Okashima (2021), who explained that physiological stress due to obesity can impact sleep cycles. Similarly, reduced physical activity was associated with poorer sleep, echoing Schlarb et al. (2017), who demonstrated the positive effects of physical activity on sleep quality in university students. Interestingly, our finding that daily napping improved sleep quality corresponds with results from Elfaki et al. (2024), who reported that students who napped regularly had better academic performance. However, this is in contrast with some studies suggesting that irregular napping may disrupt nocturnal sleep (Nelson et al., 2022), indicating a need for further exploration of the timing and duration of naps.

The finding that 27.5% of students reported that lack of sleep "always" negatively affected their academic performance, and that 24.0% missed class three or more times per week due to tiredness, is particularly concerning. These results align with a recent study in Morocco demonstrating that poor sleep quality partially mediates the relationship between smartphone addiction and academic performance among nursing students (El Haddaouy et al., 2025), highlighting the multifactorial nature of sleep-related academic challenges.

STRENGTHS AND LIMITATIONS

This study has several strengths. First, it is one of the few studies to examine sleep quality and its association with academic performance among female nursing students in the northern region of Saudi Arabia, an area that has been underrepresented in the literature. Second, the use of the validated PSQI instrument ensures standardized assessment of sleep quality. Third, the inclusion of multiple socio-demographic variables in the regression model provides a comprehensive analysis of predictors of

sleep quality. Fourth, the findings contribute to the growing body of evidence on sleep health among Saudi Arabian nursing students and can inform institutional policies and curriculum development across the Kingdom.

However, several limitations should be acknowledged. First, the cross-sectional design precludes causal inferences; longitudinal studies are needed to establish the direction of the relationship between sleep quality and academic performance. Second, the use of convenience sampling from a single university in northern Saudi Arabia may introduce selection bias and limit the generalizability of the findings to other regions or institutions. Third, sleep quality was assessed using a self-reported questionnaire (PSQI) rather than objective measures such as actigraphy or polysomnography, which may introduce recall bias. Fourth, academic performance was based on self-reported GPA rather than official university records. Finally, the study included only female nursing students, which limits the ability to examine gender differences.

CONCLUSION AND RECOMMENDATIONS

In conclusion, this study addressed three primary objectives concerning sleep quality and its association with academic performance among female nursing students in Saudi Arabia. First, the findings revealed that poor sleep quality is highly prevalent (57.0%) among female nursing students at Jouf University in northern Saudi Arabia, with a mean global PSQI score of 6.53 ± 2.94, indicating that more than half of the participants experience clinically significant sleep disturbances. Second, a statistically significant association was found between poor sleep quality and lower academic performance, as students with better PSQI scores had higher GPAs ($B = -0.722$, $p < .001$), and 27.5% reported that lack of sleep "always" negatively affected their academic performance. Third, multiple contributing factors were identified as significant predictors of sleep quality, including age, academic level, residence type, BMI, physical activity, daily nap habits, and sleep duration (all $p < .001$), with modifiable factors such as sleep duration, physical activity, and residence type playing particularly critical roles in shaping sleep patterns.

These results underscore the importance of promoting sleep hygiene education and interventions as part of nursing education programs across Saudi Arabia to foster students' academic success and psychological well-being. Future research should explore targeted interventions to improve sleep quality and assess their effectiveness in enhancing both academic success and professional readiness in the healthcare field. Multi-center studies across different Saudi Arabian universities and regions are recommended to enhance generalizability. Longitudinal studies incorporating objective sleep measurements and official academic records are also recommended to strengthen the evidence base.

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