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Correlation between Sleep Quality and Study Concentration among Medical and Health Sciences Students at Universitas Khairun

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ABSTRACT

Introduction. Sleep is a basic physiological need, and its quality strongly influences an individual's alertness and concentration on the following day. Medical and health sciences students face demanding academic workloads that often compromise sleep, which may in turn reduce study concentration. This study aimed to determine the correlation between sleep quality and study concentration among students of the Faculty of Medicine and Health Sciences. **Methods.** This was a cross-sectional study conducted from 8 July to 27 December 2024 involving 91 students recruited by cluster random sampling from the Medicine, Pharmacy, and Psychology study program. Sleep quality and self-reported study concentration were measured using the Pittsburgh Sleep Quality Index (PSQI) and the Student Learning Concentration Questionnaire-Indonesian version (SLCQ-I). Association was assessed with Spearman's rank correlation on the ordinal categories (sleep quality: poor/good; concentration: low/moderate/high). **Results.** Most respondents were 18-22 years old, female (61.5%), and enrolled in Medicine (40.7%), Pharmacy (34.1%), and Psychology (25.3%). Poor sleep quality was found in 80.2% of students, and low study concentration in 83.5%. Spearman's correlation was strong and positive (r_s=0.821; 95% CI 0.65-0.96; p<0.001), indicating that good sleep quality was associated with higher concentration categories. **Conclusion.** In this cross-sectional, self-reported sample, poor sleep quality was strongly associated with low study concentration. The design does not allow causal inference.

1. Introduction

Sleep is a fundamental physiological need for the survival and daily functioning of every living being. During sleep, an individual's consciousness is reduced, yet brain activity remains present and, at certain stages, cerebral oxygen uptake even exceeds the levels observed during wakefulness.[1]

Good sleep quality refers to a satisfying sleep experience that leaves an individual feeling refreshed and fit upon waking, without excessive fatigue, dizziness, yawning, or daytime drowsiness, provided that sleep duration is adequate.[2] Adequate sleep is determined by two components, namely sleep quantity (total sleep time) and sleep quality (depth of sleep).[3]

Insufficient sleep is increasingly common among adolescents and young adults and has been linked to a range of adverse effects, one of the most important being reduced concentration during learning activities.[3] Irregular sleep patterns, characterized by inconsistent duration and poor depth of sleep, have also been shown to affect physical and emotional health, metabolic processes, and neurocognitive performance.[4]

Concentration refers to an individual's ability to focus attention on the task at hand.[5] Concentration can be influenced by internal and external factors; internal factors include physical and psychological states such as boredom, sleep deprivation, and low motivation to learn, while external factors include environmental comfort, lighting, noise, crowding, and the physical condition of the study space. Because concentration is closely linked to sleep quality, good sleep quality is considered an important prerequisite for optimal study concentration.[6]

Poor sleep quality is recognized globally as a common problem among university and health-profession students, and classification systems for sleep-wake disorders highlight how widespread and clinically relevant such disturbances can be for daily functioning and academic performance.[7] Understanding the extent and correlates of poor sleep

quality in local student populations, such as those at Universitas Khairun, is therefore an important step toward developing targeted, context-appropriate interventions.

Although the relationship between sleep quality and academic performance has been explored in several settings, data specific to health sciences students in North Maluku, including at Universitas Khairun, remain limited. Indonesian studies that examined sleep quality and study concentration together have mostly involved medical or preclinical students,[4] and a study of 71 medical students in Medan found no association between the two.[8] It is not known whether the association holds when pharmacy and psychology students are studied alongside medical students in the same faculty, or among students in North Maluku assessed with the PSQI and the Indonesian version of the Student Learning Concentration Questionnaire (SLCQ-I).

Beyond simple wakefulness and unconsciousness, sleep is organized into a cyclical architecture that alternates between non-rapid eye movement (NREM) sleep, itself comprising lighter and deeper stages, and rapid eye movement (REM) sleep, with several such cycles recurring across a typical night. Adequate progression through these stages, particularly the deeper NREM stages and REM sleep, is thought to support memory consolidation and next-day cognitive readiness, so that curtailed or fragmented sleep can be expected to compromise the attentional resources needed for sustained learning.[9]

Therefore, this study aimed to determine the correlation between sleep quality (PSQI) and self-reported study concentration (SLCQ-I) among students of the Faculty of Medicine and Health Sciences, Universitas Khairun. We hypothesised that poorer sleep quality is associated with lower study concentration.

2. Methods

This study used a cross-sectional approach, conducted at the Faculty of Medicine and Health Sciences, Universitas Khairun, from 8 July to 27 December 2024. The inclusion criteria were being a registered active student of the 2022 or 2023 cohort of the Medicine, Pharmacy, or Psychology study Programs at the Faculty of Medicine and Health Sciences, Universitas Khairun, and being willing to participate as a respondent. The exclusion criteria were an incomplete questionnaire and absence on the day of data collection. Age was recorded in completed years.

The target population was students of the Faculty of Medicine and Health Sciences, and the accessible population was students of the 2022-2023 cohorts of the Medicine, Pharmacy, and Psychology program (N = 331: 144 in the 2022 cohort and 187 in the 2023 cohort). Six clusters were defined as Program-by-cohort groups, and the sample was allocated across them in proportion to size: Medicine 15 (2022) and 22 (2023), Pharmacy 16 and 15, and Psychology 10 and 13, giving 91 students (41 and 50 per cohort). The minimum sample size was calculated with Slovin's formula (5% margin of error) separately for each cohort, and the sample per cluster was determined from the sampling fraction of each cluster, giving a total of 91 students.

Data were collected using two self-administered questionnaires in Indonesian: the Pittsburgh Sleep Quality Index (PSQI), which assesses seven components of sleep quality over the preceding month,[10,11] and the Student Learning Concentration Questionnaire-Indonesian version (SLCQ-I), an Indonesian version of an English-language concentration questionnaire that was validated in medical students at Universitas Malahayati.[12] Validation in medical students does not necessarily establish equivalent performance in pharmacy and psychology students, so internal consistency was tested by the authors (Cronbach's alpha 0.924 for the 19-item PSQI and 0.924 for the 19-item SLCQ-I). The SLCQ-I items are general statements about learning attitudes without a specified recall period. Before data collection, respondents provided informed consent and signed a statement of willingness to participate as a research subject.

The PSQI evaluates seven components of sleep over the preceding month, each scored from 0 to 3, which are summed into a global score used to classify sleep quality as good or poor.[10] The SLCQ-I has 19 favourable (not reverse-scored) items rated on a 7-point Likert scale (1-7); its domains are salience filter, sensitivity control, competitive selection, and working memory, and higher total scores indicate better concentration.[12] An overview of the domains covered by each instrument is provided in Table 1.

Table 1. Overview of the measurement instruments used in this study (PSQI and SLCQ-I)

Instrument	Domains/components assessed	Scoring & categorization
PSQI (19 items)	Subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, daytime dysfunction	Global score 0-21; ≤5 good, >5 poor sleep quality (higher score = poorer sleep)
SLCQ-I (19 items)	Salience filter, sensitivity control, competitive selection, working memory	7-point Likert (1-7); total 19-133 (higher = better); low 19-84, moderate 85-114, high 115-133

The two main variables examined in this study were sleep quality and study concentration. Sleep quality was assessed using the 19-item PSQI, which yields a global score ranging from 0 to 21 (a higher score indicates poorer sleep); a global score of ≤5 was categorized as good sleep quality, while a score of >5 was categorized as poor sleep quality.[10] Study concentration was self-reported using the 19-item SLCQ-I, with total scores (19-133) categorised as low (19-84), moderate (85-114), or high (115-133) concentration according to the scoring key of the questionnaire.[12] Additional variables collected, namely sex, age, study program, and cohort, were used to describe the characteristics of the study sample.

Data were processed using IBM SPSS version 29. Univariate analysis was used to describe respondent characteristics (sex, age, study program, cohort, sleep quality, and study concentration), while bivariate analysis was used to examine the correlation between sleep quality and study concentration. Because both variables are ordinal categories, normality and homogeneity-of-variance tests were not required, and Spearman's rank correlation was used. The coefficient was computed on the ordinal category codes (sleep quality: poor = 1, good = 2; study concentration: low = 1, moderate = 2, high = 3), so a positive coefficient means that good sleep quality is associated with a higher concentration category. Ties were handled with average ranks, tests were two-sided (alpha = 0.05), and the 95% confidence interval was obtained by percentile bootstrap (5,000 resamples) from the paired categories. Questionnaires with missing responses were excluded (complete-case analysis). A Pearson chi-square test was also performed as a supportive analysis. No adjusted analysis was performed.

Ethical considerations. The study was approved by the Komite Etik Penelitian Universitas Khairun (Research Ethics Committee, Universitas Khairun), approval number 037/UN44/C9/KEP/2024, dated 12 December 2024. Respondents gave informed consent and were identified by initials to protect confidentiality.

3. Results

This study was conducted at the Faculty of Medicine and Health Sciences, Universitas Khairun, from 8 July to 27 December 2024, using primary data collected from students of the Medicine, Pharmacy, and Psychology study programs. A total of 91 respondents were included in the analysis. Respondent characteristics and the distribution of sleep quality and study concentration are presented in Tables 2-7, followed by the bivariate analysis in Table 8.

Characteristics of Respondents

Table 2 shows that the majority of respondents were female, comprising 56 students (61.5%), while male respondents accounted for 35 students (38.5%). Table 3 shows that most respondents were 19 years old (47 students; 51.6%), followed by 20 years old (22 students; 24.2%) and 18 years old (12 students; 13.2%).

Table 2. Distribution of respondents by sex

Sex	Frequency (n)	Percentage (%)
Male	35	38.5
Female	56	61.5
Total	91	100

Table 3. Distribution of respondents by age

Age (years)	Frequency (n)	Percentage (%)
18	12	13.2
19	47	51.6
20	22	24.2
21	9	9.9
22	1	1.1
Total	91	100

Table 4. Distribution of respondents by study program

Study Program	Frequency (n)	Percentage (%)
Medicine	37	40.7
Pharmacy	31	34.1

Study Program	Frequency (n)	Percentage (%)
Psychology	23	25.3
Total	91	100

Table 5. Distribution of respondents by cohort

Cohort	Frequency (n)	Percentage (%)
2022	41	45.1
2023	50	54.9
Total	91	100

Table 6. Distribution of respondents by sleep quality

Sleep Quality	Frequency (n)	Percentage (%)
Poor	73	80.2
Good	18	19.8
Total	91	100

Table 7. Distribution of respondents by study concentration

Study Concentration	Frequency (n)	Percentage (%)
Low	76	83.5
Moderate	12	13.2
High	3	3.3
Total	91	100

Table 8. Cross-tabulation of sleep quality and study concentration

Sleep Quality	Low n (%)	Moderate n (%)	High n (%)	Total n (%)	r_s	p
Poor	72 (98.6)	1 (1.4)	0 (0.0)	73 (100.0)		
Good	4 (22.2)	11 (61.1)	3 (16.7)	18 (100.0)	0.821	<0.001*
Total	76 (83.5)	12 (13.2)	3 (3.3)	91 (100)		

Table 4 shows that the largest proportion of respondents were Medicine students (37 students; 40.7%), followed by Pharmacy students (31 students; 34.1%) and Psychology students (23 students; 25.3%).

Table 5 shows that respondents from the 2023 cohort were slightly more numerous (50 students; 54.9%) than those from the 2022 cohort (41 students; 45.1%).

Overall, the demographic profile in Tables 2-5 indicates that the study sample was predominantly female, aged 18-20 years, and fairly evenly distributed across the Medicine, Pharmacy, and Psychology study Programs, with a slightly larger representation from the more recent (2023) cohort. Representativeness of the faculty population was not assessed because the sample was not compared with the faculty distribution. The following subsection describes the distribution of sleep quality and study concentration.

Sleep Quality and Study Concentration

Table 6 shows that most respondents had poor sleep quality, accounting for 73 students (80.2%), while only 18 students (19.8%) had good sleep quality. Table 7 shows that most respondents had a low level of study concentration (76 students; 83.5%), while 12 students (13.2%) had moderate concentration and only 3 students (3.3%) had a high level of study concentration.

Correlation between Sleep Quality and Study Concentration

Percentages are row percentages (denominator: students in each sleep quality group). *Spearman rank correlation (two-sided) on ordinal codes (sleep quality: poor=1, good=2; concentration: low=1, moderate=2, high=3); 95% CI 0.65-0.96 (percentile bootstrap); $p<0.001$.

Table 8 shows that among the 73 students with poor sleep quality, 72 (98.6%) had low study concentration, 1 (1.4%) had moderate concentration, and none had high concentration. Among the 18 students with good sleep quality, 4 (22.2%) had low, 11 (61.1%) had moderate, and 3 (16.7%) high

concentration. Spearman's rank correlation on the coded categories gave r_s = 0.821 (95% CI 0.65-0.96; p<0.001), indicating a strong positive association: students in the good sleep quality category tended to be in higher concentration categories. The Pearson chi-square test was also significant (chi-square = 61.34, df = 2, p<0.001), but three of the six cells (50%) had expected counts below 5, so the rank correlation is the primary result. This association is unadjusted and based on two self-reports.

4. Discussion

This study involved 91 students of the Faculty of Medicine and Health Sciences, Universitas Khairun, aged 18-22 years, a range corresponding to late adolescence to early adulthood. Adults are recommended to sleep at least 7 hours per night.[13] Academic workload, accumulating assignments, module examinations, curriculum differences between Programs and cohorts, and extracurricular or organisational activities are possible contributors to short sleep, but they were not measured in this study and are offered only as hypotheses.

Sleep Quality of Students at the Faculty of Medicine and Health Sciences, Universitas Khairun

The majority of respondents (80.2%) were found to have poor sleep quality. Sleep duration, room lighting, room temperature, smoking, organisational involvement, and coffee consumption were not measured or analysed in this study and are therefore not reported as findings. Studies of medical students describe academic workload and pre-clinical coursework as contributors to short sleep,[14] and other factors reported to affect sleep quality include online-gaming habits, stress, underlying illness, and alcohol consumption;[15] smoking has also been associated with poor sleep among university students.[16] These remain possible explanations for the high prevalence of poor sleep observed here.

A further contributor to poor sleep quality in this population may be disruption of normal sleep architecture itself: when total sleep time is curtailed, the proportion of restorative deep NREM and REM sleep is often reduced disproportionately, blunting the physiological recovery processes that these stages support.[9] Over successive nights, this pattern of shortened and fragmented sleep can accumulate into a sleep debt that is not easily reversed by a single night of catch-up sleep, plausibly explaining why poor sleep quality was so widespread (80.2%) rather than confined to isolated periods of high academic demand.

A study of Pakistani medical students reported that most students had sleep durations shorter than six hours, largely because medical students represent a group at high risk of academic-year stress that can lead to psychological problems and, subsequently, sleep disturbances.[14] Comparable trends of deteriorating sleep quality with cumulative academic demands across different phases of the medical curriculum have also been documented in Brazilian medical students.[17] Beyond curricular workload, a physiological shift in circadian rhythm that commonly occurs in young adulthood may further delay sleep onset, compounding the effect of academic demands on overall sleep duration and quality.[18]

Beyond insufficient sleep duration, pre-sleep habits such as nighttime internet and computer use have been associated with poorer sleep among university students.[19] Prolonged evening light exposure from screens has similarly been linked to melatonin suppression and circadian disruption, further compounding sleep problems in this population.[20] Gadget use and respondents' explanations about academic stressors were not measured in this study and are therefore not reported as findings.

Sex-specific sleep quality was not analysed in this study, so no sex difference can be claimed; the larger number of women in the sample does not indicate a higher prevalence among women. A study of institutionalised adolescents reported an association between gender and sleep quality,[21] but that population may not be comparable with university students.

Study Concentration of Students at the Faculty of Medicine and Health Sciences, Universitas Khairun

The distribution of study concentration among respondents showed that the low-concentration category was the most common, comprising 76 students (83.5%), followed by moderate concentration in 12 students (13.2%) and high concentration in only 3 students (3.3%). Direct comparison with other university populations was not possible because comparable concentration measures and thresholds were not available; low self-reported concentration was highly prevalent in this sample.

Low study concentration may also carry downstream implications for academic performance, given that adequate concentration is a prerequisite for effective information processing and retention during lectures and self-directed study.[5] If left unaddressed, persistently low concentration could affect examination performance and overall academic achievement throughout the medical curriculum, reinforcing the importance of early identification and management of contributing factors such as poor sleep quality.[22]

Because concentration lapses during lectures or clinical skills training may not be immediately visible, low study concentration can also be under-recognized by both students and educators until it is reflected in assessment performance.[5] For a health-professions curriculum in particular, sustained attentional lapses during the acquisition of clinical reasoning or procedural skills carry implications that extend beyond individual grades, reinforcing the case for early screening and support rather than a purely reactive response once academic difficulties emerge.

Program-specific distributions of sleep quality and concentration were not analysed in this study, so no conclusion about similarity between Programs can be drawn; whether interventions should be faculty-wide or Program-specific remains a question for future research.

Table 9. Possible measures to evaluate in future studies to support student sleep quality and study concentration

Level	Suggested action
Individual / student	Maintain a consistent sleep-wake schedule; limit nocturnal use of smartphones and other screens; engage in regular physical activity
Individual / student	Use available campus counselling services to manage academic stress and identify early signs of poor sleep quality
Faculty/institution	Incorporate basic sleep-health education into orientation or early-semester activities
Faculty/institution	Moderate the distribution of assignments and examinations across the semester to reduce workload peaks

Correlation between Sleep Quality and Study Concentration

The Spearman correlation test in this study demonstrated a significant relationship between sleep quality and study concentration among students of the Faculty of Medicine and Health Sciences, Universitas Khairun (r_s=0.821; 95% CI 0.65-0.96; p<0.001), indicating a strong positive correlation: good sleep quality was associated with higher concentration categories. This supports the hypothesis of an association; the cross-sectional, self-reported, unadjusted design does not establish causation.

Evidence from other Indonesian student populations is not uniform. A study of preclinical students in Palangka Raya examined the same relationship,[4] whereas a study of 71 medical students at Universitas HKBP Nommensen, Medan, found no association (Fisher's exact test, p=0.571).[8] Differences in sampling, instruments, and analysis make direct comparison of coefficients inappropriate, and this study did not test whether Program mix or curricular demands explain differences between studies.

No hormones, sleep stages, or objective attention outcomes were measured in this study, so mechanisms cannot be tested here. From the physiological literature, stress-related arousal (for example, catecholamines and cortisol) may disturb sleep,[9] and sleep is understood to serve restorative and cognitive-consolidation functions that could affect daytime attention.[23] These explanations remain hypotheses for future studies. Because the design is cross-sectional, the direction of the association cannot be determined; a bidirectional relationship is plausible but was not tested here.

Concentration can be influenced by internal factors, such as physical condition and adequate rest, and external factors, such as an uncomfortable environment, extreme temperature, surrounding people, and inadequate study facilities. Coping strategies have been reported to moderate the effect of academic stress on concentration and academic performance,[22] and stress and coping have been described in medical students.[24] However, coping and information-retention ability were not measured here, so they cannot explain why one poor sleeper had moderate concentration (Table 8); they are suggested only as topics for future research.

The strengths of this study include the use of two previously validated Indonesian-language instruments (PSQI and SLCQ-I) with high internal consistency (Cronbach's alpha 0.924 for each) and a sample drawn from three different health-related study Programs, allowing for a broader picture of sleep-related concentration problems in this population. Nevertheless, the cross-sectional design limits causal inference. Both measures were self-reported, which may introduce recall, social-desirability, and common-method bias, and the PSQI daytime-dysfunction items may overlap conceptually with concentration. Categorisation of both scores loses information, and the high-concentration group was very small (n=3). Stress, mental health, caffeine, workload, and screen use were not measured and no adjusted analysis was performed, so the association is unadjusted; the sampling response rate and representativeness could not be assessed. Future studies using longitudinal designs and objective sleep-monitoring tools are recommended to strengthen these findings.

Because the sample was drawn from a single faculty at one institution, the findings may not generalize directly to health-science students in other regions of Indonesia with different curricular structures or sociocultural contexts; multi-site studies would help establish the broader applicability of these results.

These interventions were not evaluated in this study. Literature-informed measures such as sleep-health education, consistent sleep schedules, limiting nocturnal screen use, and counselling services could be considered, but their benefit for students at this faculty has not been demonstrated and their feasibility should be assessed. Prospective or interventional studies are needed before any recommendation can be made.

5. Conclusion

Most students had poor sleep quality (80,2%) and low self-reported study concentration (83,5%). Spearman's rank correlation showed a strong positive association between good sleep quality and higher concentration category (r_s = 0.821; 95% CI 0.65-0.96; p<0.001). This cross-sectional, self-reported, unadjusted association does not establish causation or show that improving sleep would improve concentration; longitudinal and interventional studies are needed.

6. Author Contribution

W.A.P. designed the study, collected and analyzed the data, and drafted the manuscript. D.R.P. supervised the study design and statistical analysis and critically revised the manuscript. A.H.H. supervised the research methodology and reviewed the final manuscript.

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