

Case Study

Knowledge of sleeping quality and academic performance among foundation-year health science students at Saudi University

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ABSTRACT

This study investigates the relationship between sleep quality and academic performance among Foundation-Year Health Science students at Saudi University in Riyadh. Using a cross-sectional design and an online questionnaire distributed via social media, data was collected from students, revealing that 94% were 18 or above, with 77.6% having a GPA of 4.5 to 5. Analysis showed that 48.25% of students achieved the recommended hours of sleep per night, while 42.29% believed their sleeping pattern affected their mental health. The most common pre-sleep habit was using electronic devices (62.70%), and headaches were reported as the most significant physical issue resulting from poor sleep quality (40.3%). Furthermore, approximately half of the respondents believed their sleeping patterns affected their academic performance. The study concludes that good sleep quality is prevalent among students, but poor sleep quality negatively impacts mental health and academic performance. It recommends replicating the research across different institutions to validate findings and suggests awareness campaigns regarding the detrimental effects of electronic device use before bedtime. These findings contribute to a better understanding of sleep patterns and highlight the importance of promoting healthier sleep habits among college students.

Keywords: Sleep quality, Academic performance, Knowledge, Foundation-year students, Health science

Introduction

Sleep is a crucial factor in human health because it influences cognitive processes, emotional stability, and physical health. One of the quality-of-life attainment difficulties among students is ensuring adequate sleep quality and getting enough time to sleep [1]. This is most likely to be the case because their academic performance will be on the downward side [2]. It is quite paradoxical to realize that there has been a lot of research on the relationship between sleep and academics. However, not enough

attention has been paid to first-year students who have a tough time adjusting to college life [3, 4].

In addition, several researches have been carried out to determine the connection between sleep quality with the academic achievement of university students. In their study, Shen *et al.* concluded that the positive effects were related to duration and quality of sleep and the negative effects were with the decrease in sleep and decline in its quality among adolescents [5]. LeBlanc *et al.* (2020) found that long-term non-Hodgkin lymphoma survivors experienced persistent fatigue as one of the side effects [6]. Al-Husseini *et al.* (2022) found that reduced sleep quality had adverse effects on the students' study achievements and heightened the rates of psychological unrest among Saudi medical students [7]. Another study by Qanash *et al.* (2021) also revealed that Students of healthcare had poor sleep quality and lower academic achievement, which was linked to electronic device addiction [8]. Al-Khani *et al.* (2019) noted that the medical students with poor sleep quality had more depressive, anxiety, and stress symptoms than the others, but unexpectedly

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higher academic performance [9]. Alzunidi *et al.* (2022) described the distribution of sleep depth, room-sharing status, and academic achievement by gender and major among medical and pharmacy students [10]. Jalali *et al.* (2020) found a moderate relationship between the quality of sleep and academic success [11]. Lastly, a study by Nosetti *et al.* (2021) concluded that sleeping patterns were affected by young people's routines before sleep, such as electronic devices [12].

Hence, the purpose of this study is to fill the gap in this area by learning about the significance of sleep quality and sleep patterns and their impact on academic performance among Health Science students in the Foundation Year at Saudi University in Riyadh.

In the Saudi Arabian context, where a large percentage of the population consists of young adults who are studying for higher education [13], investigating sleep patterns and their effect on academic outcomes is very significant. The foundation year, a vital period of adjustment for many students, is characterized by various obstacles and stress factors that might cause healthy sleep patterns to be disturbed, thus affecting their overall health and educational performance.

The foundation year is the time when the students are facing a lot of changes and development; it is, therefore, very important to understand their sleep patterns and their relationship with academic success. By studying the different factors affecting sleep and sleep patterns, this research aims to find recommendations that can assist and solve sleep problems within the college-age community. This can be achieved by adopting a cross-sectional method to establish if sleep patterns have any influence on academic performance or not. The analysis of these data will assist teachers, health experts, and political leaders in getting significant results. Eventually, the research for this work aims to describe the nature of the two-way relationship between sleep, student well-being, and educational outcomes and to create the basis for the promotion of the holistic growth and development of first-year students at Saudi University.

Through an understanding of the distinction between sleep quality and patterns and their impact on academic performance among foundation-year health science students, this research aims to reveal a vital but frequently neglected part of student life. The findings of this study have the possibility of being used to create specific interventions, support services, and policy suggestions that can enhance the student's life and development and be the basis for the creation of an environment that is favorable for academic success and personal growth.

Materials and Methods

Data collection

The study was based on a cross-sectional design, and the goal was to gather data from Saudi University, Riyadh, students who had reached the first year of the health science program. The study utilized a survey questionnaire posted on Google Drive, and the campaign was carried out on social media to collect information on the subjects' sleep quality, time choices, and academic performance to create a big pool of data. The sampling technique

used was convenience sampling, thus a wide range of the target population was represented. Before the survey, participants had to give their written consent. The whole research was based on ethics, which was necessary to consider; thus, having informed consent from all the participants who were going to be part of the study was the first step. The main goal of this was to protect the rights of the participants and make sure that they were not being mistreated. The level of transparency is one of the main aspects of research studies on human subjects.

Data analyses

The collected data were followed up by an analytical process using Excel software that offered both descriptive and inferential statistical techniques. Relative frequency analysis and percentages were applied to ascertain the frequency rates and distribution of the independent determinants, including sleep quality, sleep patterns, and academic performance, among the foundation-year health science students. However, in addition, the mean and standard deviation were figured out to determine the central tendency and variability of the feature variables. By employing such a technical approach, it was possible to determine patterns, trends, and sources of data fluctuations among the study's population. Therefore, it facilitated the attainment of a holistic understanding of sleep among the target population, including its quality and consequences for academic results.

Results and Discussion

Table 1 presents survey demographics: 94% of respondents were 18 years or older, while 6% were less. Concerning GPA, 78 percent had 4.5 to 5, 18.90% was 4 to 3.5, and 3.50% between 2.5 to 3. Maritally, 88% were married, 9% single, 1% divorced, and 2% widowed. Regarding smoking habits, 8.50% smoked, 91.50% were not. These numbers give information about the sample's age, educational background, marital status, and smoking habits so that the sample's characteristics are known, and we can tell the relation between the variables within the data.

Table 1. Socio-demographic distribution among female participants

Variables	N = 201	%	
Age	Age ≥18	189	94%
	Age <18	12	6%
Marital status	Single	177	88.10%
	Married	18	9%
	Divorced	2	1%
	Widowed	4	1.90%
Smoker	Yes	17	8.50%
	No	184	91.50%
GPA	From 4,5 to 5	156	77.60%
	From 4 to 3,5	38	18.90%
	From 3 to 2,5	7	3.50%

N= Number of Students; GPA= Grade Point Average, range from 1-5

Figure 1, presented in this section, demonstrates the student's understanding of the impact of sleeping habits on academic performance on a scale of 1-10. It divides the effect of sleep habits into four categories: 1-3 (unsatisfactory), 4-6 (satisfactory), 7-8 (good), and 9-10 (excellent). The chart indicates that students understood that their sleeping habits affect their academic performance. A good understanding of the effect of sleeping patterns was at 36.93%. Next are students with a fair scale (average) at 29.55%. Students with an excellent understanding of sleep come in third, at 19.32%. Students with a poor understanding of the impact of sleeping habits on academic performance have the lowest percentage, at 14.20%.

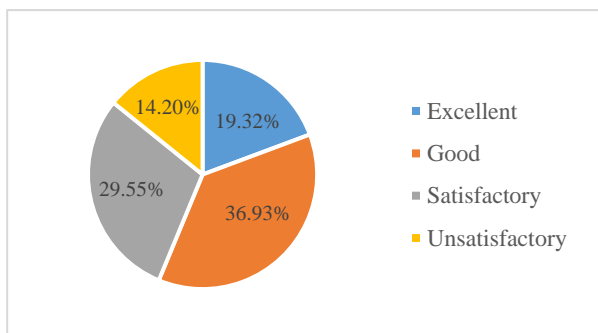


Figure 1. The effect of sleeping habits on academic performance

Figure 2 below, titled "Quality of Sleep," shows the distribution of people's opinions across four sleep quality categories. The largest slice of the pie chart is labeled "7-8 (Good)" and accounts for 40% of the people. This suggests that the most considerable portion of the people represented in the chart enjoy good-quality sleep. The second-largest slice is labeled "4-6 (Fair)". It represents 39% of the people, who have a fair quality of sleep. The third-smallest slice is labeled "9-10 (Excellent)". It represents 14% of the people. The smallest slice "1-3 (Poor)" represents 7% of the people according to the chart.

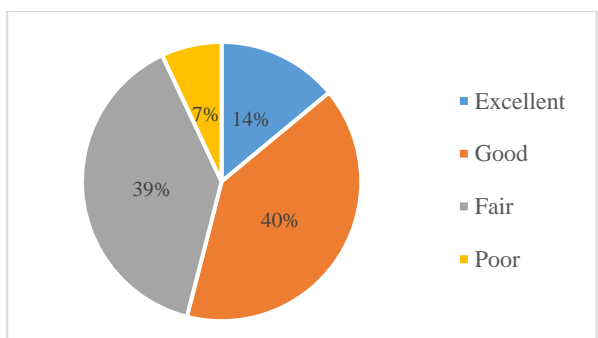


Figure 1. Quality of Sleep

Figure 3 below shows the percentage of people who change their sleeping patterns during exams. The title of the chart is "Perception of Sleeping Pattern during the Academic Year." The chart is divided into three slices. The largest slice is labeled "Yes" and accounts for 60.7% of the people. This means that over half of the people surveyed reported changing their sleep patterns during exams. The second-largest slice is labeled "Sometimes"

and accounts for 23.9% of the people. This category likely refers to people who reported changing their sleep patterns during exams sometimes but not consistently. The smallest slice is labeled "No" and represents 15.4% of the people. This means that a smaller portion of the people surveyed reported not changing their sleep patterns during exams. **Figure 3** also reflects the impact of fatigue on homework among surveyed students. Notably, 51% reported occasional tiredness, making it the most prevalent response. On the other hand, a considerable 37% reported continuous fatigue when writing assignments. In addition, 12% claimed that they always felt fresh while at work.

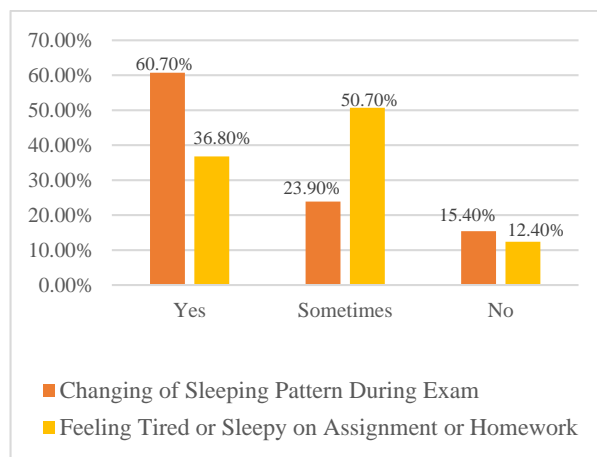


Figure 2. Perception of Sleeping Pattern during the Academic Year

Figure 4 shows the results of a survey on the physical issues people experience as a result of poor sleep. According to the survey, headaches are the most common issue, with 40.8% of people reporting experiencing headaches. Insomnia is the second most common issue, with 18.4% of people reporting experiencing insomnia. Difficulty concentrating (16%) and nausea (11.4%) were less common. The survey also found that 12.4% of people reported none of these health issues.

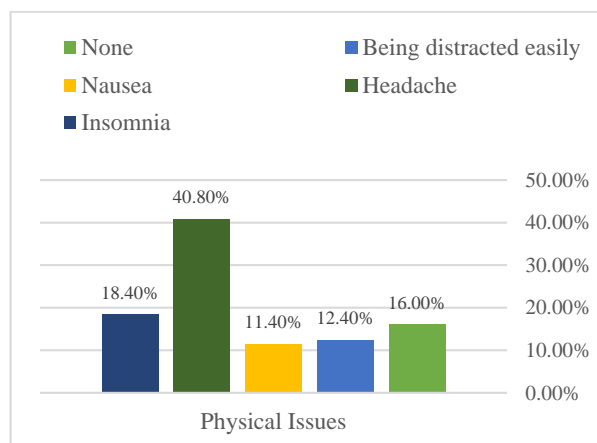


Figure 4. Physical Issues as a Result of Poor Sleeping

Figure 5 below presents the pre-sleeping habits of participants, indicating notable patterns. A notable 62.7% used electronic gadgets before going to sleep, which is a form of screens everywhere. Additionally, 16.4% confessed to drinking

stimulant drinks such as coffee or tea, which might interrupt sleep patterns. Similarly, 10.4% admitted to sleeping in well-lit environments, indicating difficulties in providing proper sleeping conditions. Interestingly, another 10.4% did not mention any bad habits prior to sleep; hence, this could be a deliberate attempt to stick to healthy sleep patterns.

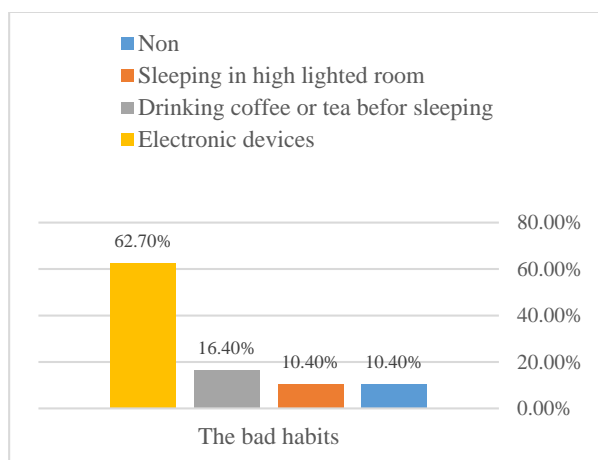


Figure 5. Bad Habits Before or During Sleeping

Table 2 provides an overview of survey results regarding the effects of sleep on mental health, memory, and concentration. It was found that 42.29% of respondents stated that they thought their sleep time and pattern influenced their mental health and 42% said it did at some point. Regarding memory, 40.8% responded that they often experienced episodes of memory loss, especially when they did not sleep well the previous night; 32.34% of respondents said that this happens often, with only 34% claiming that it happens rarely. A significant 65.68% said that the lack of sleep would likely affect their concentration or ability to focus throughout the day. Regarding the frequency of getting sleep at night, over half of the respondents (55.22%) said they sleep for 5-7 hours, 28.85% of them sleep for more than 7 hours, and 15.42% sleep for less than 5 hours of sleep per night. The survey raises awareness of the relationship between the respondents' sleep cycle and different aspects of cognitive and mental health.

Table 2. Survey Questions

Questions		N= 201	%
Do you think your sleeping pattern could affect your mental well-being?	Yes	143	42.29
	Sometimes	33	16.42
	No	25	12.44
Do you have trouble remembering information on the days that you did not sleep well?	Rare	65	32.34
	Sometimes	82	40.8
	Often	54	26.87
Do you think your lack of sleep will challenge your concentration or stay focused during the day?	Yes	132	65.68
	Sometimes	46	22.89
	No	21	10.45
On average, how many hours of sleep do you get per night?	Less than 5 hours	31	15.42
	5-7 hours	111	55.22
	> 7 hours	58	28.85

N= Number of Students

This study intended to investigate the importance of sleep quality, sleep patterns, and their impact on academic performance among Health Science students in the Foundation Year at Saudi University in Riyadh. Hence, in this concern, the discussion stresses the similarity of the results of the study with the previous research and shows the influence of sleep patterns on the academic performance of first-year Health Science students. This research is in line with the previous studies [1, 3, 4], and thus, it proves the direct connection between the sleeping patterns and academic performance of first-year Health Science students at the Saudi University. The findings of the study show that students who sleep for 7-8 hours are the ones who perform the best in their studies, and this is also the findings of Thabit and Alsulami (2023) [2]. On the other hand, students who sleep for 1-3 hours and thus suffer from poor sleep quality have the lowest academic achievement, and this is consistent with the findings of Shen al. (2018) [5]. Thus, the current results are consistent with the existing literature, and they show the long-term influence of sleep on education.

Moreover, this study identifies a significant proportion of students (60.7%) who alter their sleep patterns during exams, echoing the transitional nature of sleep habits under academic stress, as observed by Jalali *et al.* (2021), and Qanash *et al.* (2021) [8, 11]. This also aligns with Thabit and Alsulami's (2023) assertion of the heightened susceptibility of first-year students to sleep disturbances due to the demands of college life [2]. The prevalence of fatigue during academic tasks, as evidenced by 37% experiencing continuous tiredness, is a noteworthy finding, echoing LeBlanc's *et al.* recognition of fatigue as a common impediment to student productivity [6]. Also, in terms of sleep quality, the results of this current study corroborate prior research indicating that the majority of students (40%) enjoy good quality sleep [2]. However, a substantial portion (39%) report fair sleep quality, suggesting room for improvement in sleep hygiene practices, consistent with Thabit and Alsulami's (2023) call for interventions promoting healthier sleep behaviors among college students [2].

The identification of common pre-sleep habits, such as using electronic gadgets (62.7%), aligns with the recognition of technology as a prevalent disruptor of sleep patterns [12]. Similarly, the prevalence of stimulant consumption (16.4%) echoes Nosetti *et al.*'s acknowledgment of caffeine's potential interference with sleep quality [12]. In addition to this, the findings of this study on sleep quality and academic performance are consistent with the results of Alhousseini *et al.* (2022), who found a strong association between poor sleep quality and lower academic performance among medical students at Alfaisal University in Riyadh [7]. Their findings revealed that students with lower GPAs tended to have higher scores on the Pittsburgh Sleep Quality Index (PSQI), indicating poorer sleep quality [7]. This corroborates your observation that students who achieved 7-8 hours of sleep (categorized as "good") exhibited the highest academic performance, while those obtaining only 1-3 hours (categorized as "poor") demonstrated the lowest academic achievement. Furthermore, Alhousseini *et al.* highlighted the relationship between sleep quality and psychological distress,

with higher levels of distress observed among respondents with poor sleep quality [7]. This aligns with the current research findings: 42.29% of students believed their sleeping patterns affected their mental health, underscoring the broader implications of sleep disruptions on overall well-being.

Furthermore, Qanash *et al.* (2021) provided complementary evidence on the detrimental impact of electronic device use on sleep quality and academic performance [8]. Their study revealed that 75% of healthcare students in Saudi Arabia always used smartphones at bedtime, and 53% had poor sleep quality [8]. This aligns with the current observation that the most common pre-sleep habit among your participants was using electronic devices (62.70%), potentially contributing to the disruption of healthy sleep patterns. On the other hand, Al-Khani *et al.* (2019) offered additional insights by exploring the associations between sleep quality, mental health indicators (depression, anxiety, and stress), and academic performance among medical students [9]. Their findings revealed that poor sleepers demonstrated higher academic performance than sufficient sleepers, which contrasts with the current observation of this research regarding better academic outcomes among students with adequate sleep duration. However, they noted that poor sleep quality was significantly associated with higher levels of depression, anxiety, and stress, echoing the mental health implications observed in your study.

Alzumidi *et al.* (2022) further examined the relationship between sleep patterns and academic performance among medical and pharmacy students in Riyadh, Saudi Arabia [10]. Their findings on the differences in sleep depth and room-sharing arrangements across genders and academic majors highlight the potential influence of demographic and environmental factors on sleep patterns [10]. While the current study did not delve into these specific factors, their findings underscore the multidimensional nature of sleep quality determinants and the need for a holistic approach to promoting healthier sleep habits among students. Additionally, the current study's findings resonate with broader international research on sleep and academic performance among college students. For instance, Thabit and Alsulami (2023) found a significant impact of sleep patterns on academic performance among pharmacy students, aligning with the current observations [2]. As a result, Suardiaz-Muro and Morante-Ruiz (2020) carried out a systematic review that proved the connection between sleep quality and academic achievement among university students, which supported the present findings [4].

Conversely, other research has yielded contradictory results. Al Shammari *et al.* (2020) discovered that sleep quality and academic achievement among medical students did not have a significant relationship in the Eastern Province of Saudi Arabia [3]. The different results shown in the study underline the need for further research in order to fully grasp the details and factors that influence the relationship between sleep and academic performance across various students and situations.

Thus, this research has made a significant contribution to the increasing number of studies that prove the importance of sleep quality in the achievement of academic success and the overall health of university students, especially those who are students in

health sciences programs. The congruence of the present results with several studies in Saudi Arabia and abroad also strengthens the credibility of the observations, and thus, the universities and politicians should foster healthy sleeping habits and provide support services for the students. The discussion provided a more comprehensive view of the relationship between sleep quality, lifestyle factors, mental health, and academic performance by incorporating the findings of Alhousseini *et al.* (2022), Qanash *et al.* (2021), Al-Khani *et al.* (2019), and Alzumidi *et al.* (2022) [7-10]. The wider context not only strengthens the validity of the current findings but also shows the potential ways for future research and the interventions that can be used to solve the many problems of students in sleep optimization and health, which are connected to other parts of the student's life.

Strengths and limitations

Strengths: The cross-sectional approach used in the present study made it possible to collect data from a large population of foundation-year health science students, indicating the quality of sleep and academic performance of foundation-year health science students. Furthermore, the study overly used an online survey format to administer questions during the COVID-19 period to avoid putative respondent coercion.

Limitations: The Convenience Sampling might restrict the findings to these particular university students in Saudi Arabia only. One of the main limitations relates to the fact that the results are based on the respondents' self-reports, which might exaggerate or underestimate the respondents' perception of sleep quality and the effects it has on academic performance. Also, the study did not consider some features like the type of living arrangements students have, their after-school engagements, or the specific fields of education to which students are inclined which may affect their sleep-wake cycle and performance.

Conclusion

In conclusion, this research provides several vital insights into the sleep patterns and academic performance of first-year Health Science students at Saudi University. Firstly, the high prevalence of good-quality sleep among students is evident, with a significant portion reporting 7-8 hours of sleep, correlating with better academic performance. However, the study underscores the adverse impact of poor sleep quality on students' mental health, notably manifesting in frequent headaches. Moreover, the influence of electronic devices on sleep patterns is pronounced, with a majority of students engaging with screens before bedtime, potentially disrupting their sleep. Moreover, consuming caffeine before sleep comes out as a significant issue that influences the quality of sleep among students. Significantly, the study emphasizes students' recognition of the connection between poor sleep quality, a decrease in attention, and academic success. In general, these results indicate the necessity of enhancing healthier sleep practices and providing support

services to reduce the adverse effects of unhealthy sleep that affect students' well-being and academic performance.

Recommendations

According to the findings of this study, it is suggested that the research should be extended to students from different colleges and universities in order to confirm the patterns across different educational environments and demographic groups. This would allow for a more detailed examination of sleep patterns and their impact on academic performance, including targeted intervention development. Moreover, we need to gain a better understanding of the determinants of students' sleep behaviors, which include occupation, cultural background, and leisure activities. The nuanced understanding could guide the development of custom-made interventions aimed at solving specific sleep-related problems among students. In addition, it is critical to promote understanding of the harm of the use of modern gadgets and devices at bedtime. Educational campaigns and workshops allow the students to lead a healthier sleep regime by limiting screen time and creating a quite friendly environment to promote sleep. Secondly, universities should emphasize the provision of support services that help encourage good sleep practices and stress management. Institutions that provide counseling services, sleep workshops, and access to relaxation methods help students improve the quality of their sleep and their general well-being, thus creating an atmosphere suitable for academic progress and the development of the whole person.

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Conflict of interest: None

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Ethics statement: The Institutional Review Board of Princess Nourah bint Abdulrahman University, Riyadh, Saudi Arabia, approved and exempted this study (Ref. No. 24-0704). We obtained informed consent from the university students who agreed to participate in the online survey, as participation was voluntary, and no identifiable information was obtained.

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