

## Assessing Sleep Quality and Its Effects on Academic Performance among University Students

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### Abstract

**Background and Objective:** Insufficient sleep duration as well as quality is becoming endemic in our modern society. The time of going to bed and sleep quality and quantity are linked with students' learning abilities and academic accomplishment. Therefore, this paper firstly opted to measure the level of sleep quality of the students of Jahangirnagar University, Savar, Dhaka-1342, Bangladesh, and finally detect the association between quality of sleep and academic achievement among the students.

**Materials and Methods:** The primary data were collected through a self-administered questionnaire from 334 students with a response rate about 84 percent during February to March 2019. Pittsburgh Sleep Quality Index (PSQI) was used to measure the sleep quality of the students. The percent distribution, descriptive statistics, and multiple regression were employed to identify the influence of the components of sleep quality on academic performance.

**Results:** Only the sleep quality of one-fourth of the students was good. Moreover, sleep duration, subjective sleep quality, and daytime dysfunction were positively related to the academic performance; however, sleep latency, sleep disturbances, use of sleeping medications, and habitual sleep efficiency were inversely associated with the academic performance of the students.

**Conclusion:** Academic performance of a student was related to the components of sleep quality. Thus, this study indicates that students with poor academic performance have problems regarding sleep issues. Medical advice should be followed to maintain a healthier lifestyle including adequate rest time.

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### Introduction

Sleep plays a vital role in maintaining good health throughout the lifespan of a person (1). Several studies strongly recommend that time of going to sleep and both sleep quality and quantity are connected with students' learning abilities and academic success (2, 3). Moreover, the results of different studies depicted that more than 60 percent of college students' sleep quality was poor, which is the outcome of daytime sleepiness; also, these studies observed an increasing trend in both

physical and mental health problems (4, 5). In addition, restricted sleep in a simulated classroom led to lower exam scores, more distracted behaviors, and lower encouragement (6). Eller et al. stated that the significant sleep disturbances were observed among the medical students, which were related to depressive symptoms (7). Sleep disturbance seems to be prevalent in medical students due to a notable workload and residence (8) that is an alarming fact for considering the clinical responsibilities of the population of a country.

Sleep difficulties are the most frequent health illnesses among adults, with chronic insomnia being the most severe. Approximately, a quarter of individuals believe that the quality of their

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sleep is not good, and even self-reported sleep difficulties are underestimated. The population therefore requires an upgraded system for the diagnosis and treatment of sleep (9). Good sleep quality is considered necessary in order to generate precise work during the wakefulness period and, consequently, to gain a better quality of life. Many patients who exhibit insomnia are taking hypnotic medications to sleep. However, the cognitive behavioral therapy (CBT) which is focused on habit modification has been demonstrated to increase sleep efficacy in long term (10-12). There are different risk factors observed among the people who are suffering from sleep disorders, such as attitudes, beliefs, mental excitement, etc., and most of them are playing an essential role in the preservation of insomnia (11, 13, 14).

Tavernier and Willoughby pointed out that variable sleep patterns and involvement with high media usage were significantly related to sleep problems as well as poor sleep hygiene (15). Moreover, entering college, which is a major transition of life for a student, often requires leaving home, confronting demanding classes, and coping with new environmental as well as social contexts. This transitional phase is often associated with growing stress levels and in turn, has a profound and long-lasting impact on sleep (16). Lund et al. suggest that emotional and academic stress have an adverse influence on sleep (4). A qualitative study by Abdulghani et al. showed that stress, sleep deprivation, and homesickness were vital determinants for the academic success of college students (17). Several studies have shown a relationship between stress and sleep and observed an inverse relationship (18, 19). The quality of sleep and its duration not only affect the health and behavior problem but also school performance (2, 20, 21). Therefore, this paper firstly opted to measure the level of sleep quality of the students of Jahangirnagar University, Savar, Dhaka-1342, Bangladesh, by Pittsburgh Sleep Quality Index (PSQI) and finally detect the association between quality of sleep and academic achievement among the students.

## Materials and Methods

**Data collection:** The primary data were collected from the students of Jahangirnagar University by using a stratified random sampling technique. Initially, 400 students from different faculties were requested to participate in this survey

and agreed to join in the present study. All participating students were well informed about the content of the questionnaire as well as the intention of this study and gave written consent. The primary data used in the analysis of this paper were collected by a well-trained team which consisted of five graduate students of the Department of Statistics. Firstly, the researchers of this paper conducted a training session on the data collection procedures. Then, they involved in data collection by a face-to-face interview with the students from different departments. The required data were collected over the period of February to March, 2019. However, 66 questionnaires with incomplete information on sleep quality were excluded, leaving a final analytical sample size of 334 students. The primary data were gathered with a self-administered questionnaire containing two sections. The first part was focused on socio-demographic characteristics which included sex, family, background, accommodation, eating behaviors, and other activities and the second part contained the questions related to PSQI (22).

**Assessment of sleep quality:** To assess the sleep quality, this paper considered PSQI which comprises 10 questions relating to sleep habits over a period of one month. It includes seven components regarding sleep habits during the past month including sleep duration, sleep latency, sleep disturbance, daytime dysfunction, use of sleeping medications, habitual sleep efficiency, and overall sleep quality. The PSQI is suitable for 18-year-old or older persons and measures the sleep quality over a time interval of one month (23, 24). The sleep quality score is a continuous variable (range: 0-21), with higher scores indicating poorer sleep quality. The duration of sleep measured by the PSQI questionnaire considers how many hours of actual sleep the participants got at night during the month prior to this study. Moreover, two variables were calculated here: 1) hours of sleep duration with the help of the PSQI component as a continuous variable and 2) a dichotomous variable based on sleep duration ( $> 7$  and  $\leq 7$  hours).

**Academic performance:** Academic performance means the knowledge and skills that students have learned in a subject or a course. It is basically a measure of how well students have performed in the various assessment items set for them based on some educational criteria determined by university or country. The students' performance is

assessed by several activities in Bangladesh like assignment, tutorial, quiz, presentation, viva, and examinations. From the session of 2006-2007, the uniform grading structure suggested by the University Grants Commission (UGC) of Bangladesh is implemented in all universities of Bangladesh. The authorities of a university complete the results of all kind of examinations according to this guideline and issue transcript accordingly. The subsequent table illustrates the distribution of marks and corresponding grade points used as the measurement of performance of students in a course (Table 1).

**Table 1.** Academic performance measurement indicators

Marks	Grade point	Marks	Grade point
80% and above	4.00	55% to less than 60%	2.75
75% to less than 80%	3.75	50% to less than 55%	2.50
70% to less than 75%	3.50	45% to less than 50%	2.25
65% to less than 70%	3.25	40% to less than 45%	2.00
60% to less than 65%	3.00	Less than 40%	0

## Results

The percent distribution of the demographic variables is presented in table 2. The results indicated that approximately 60 percent of the respondents were men and an almost equal number of students were selected from the second, third, and fourth year. From the five faculties, an equal number of observations were collected. However, from the business faculty, only 15 percent of the respondents were selected. Among the respondents, only 7 percent of students reported that their health condition was bad and the health of about 30 percent of the students was neither bad nor good, i.e., sometimes they were sick.

The results also depicted that approximately 80 percent of students had a nuclear family. Now, this tendency is increasing day by day in Bangladesh. Jahangirnagar University is the only residential university in Bangladesh. However, due to the session jam, it is not possible to accommodate all students at a university residential hall. Also, some students' homes were at Dhaka which is about 30 km far from the university campus and their parents preferred to live with their sons/daughters. That's why about 20 percent of the selected students lived at home. Approximately, 40 percent of students said that they had a relationship with their opposite sex (Table 2).

**Table 2.** Frequency distribution of the demographic variables of the respondents

Variable	n (%)	Variable	n (%)
Sex		Health status (self-reported)	
Men	195 (58.4)	Good	214 (64.1)
Women	139 (41.6)	Moderate	96 (28.7)
Total	334 (100)	Sick	24 (7.2)
Academic year		Total	334 (100)
First	36 (10.8)	Family type	
Second	90 (26.9)	Nuclear	262 (78.4)
Third	89 (26.6)	Joint	72 (21.6)
Fourth	86 (25.7)	Total	334 (100)
Masters	33 (9.9)	Type of accommodation	
Total	334 (100)	Hall/mess	264 (79.0)
Faculty		Home	70 (21.0)
Mathematical, Physical, and Biological Sciences	124 (37.0)	Total	334 (100)
Social Sciences	80 (24.0)	Having relation with opposite sex	
Arts	80 (24.0)	No	209 (62.6)
Business	50 (15.0)	Yes	125 (37.4)
Total	334 (100)	Total	334 (100)

The frequency distribution of the variables related to sleep is presented in table 3. About 15 percent of the students reported no smoking habit; however, approximately 30 percent of the students reported using energy drinks or taking coffee or other substances with caffeine after dinner regularly. Only 15 percent of students said that they performed physical exercise regularly. About three-fourth of the students reported that they had academic pressure. Just above 20 percent of the respondents indicated going to bed with an empty stomach at night. However, one-fifth of the respondents reported that they went to bed immediately after taking dinner. Approximately, 40 percent of the students did not use a dark room for sleeping at night. About three out of four of the respondents were using bed for eating, calling on the phone, studying, or other non-sleeping activities. Results depicted that about one-fifth of the students watched TV a long time before the time of sleeping. However, about 70 percent of the respondents were active in social media like Facebook, Twitter, YouTube, etc. long time before sleeping (Table 3).

The average age of the respondents was just above 21 years with a minimum of 18 and a maximum of 26 years. The mean of grade point average (GPA) of the students in both Secondary School Certificate (SSC) and Higher School Certificate (HSC) was above 4.5 on a scale of 5.

**Table 3.** Frequency distribution of the variables related to sleep

Variable	n (%)	Variable	n (%)
Smoking		Going to bed with an empty stomach	
No	281 (84.1)	No	259 (77.5)
Yes	53 (15.9)	Yes	75 (22.5)
Total	334 (100)	Total	334 (100)
Using energy drinks		Going to bed immediately after eating	
No	238 (71.3)	No	266 (79.6)
Yes	96 (28.7)	Yes	68 (20.4)
Total	334 (100)	Total	334 (100)
Doing exercise regularly		Sleeping in a quiet and dark room	
No	283 (84.7)	No	131 (39.2)
Yes	51 (15.3)	Yes	203 (60.8)
Total	334 (100)	Total	334 (100)
Drinking coffee or other substances with caffeine after dinner		Using the bed for eating, calling on the phone, studying, or other non-sleeping activities	
No	239 (71.6)	No	87 (26.0)
Yes	95 (28.4)	Yes	247 (74.0)
Total	334 (100)	Total	334 (100)
Having academic pressure		Watching TV long time before sleeping	
No	86 (25.7)	No	267 (79.9)
Yes	248 (74.3)	Yes	67 (20.1)
Total	334 (100)	Total	334 (100)
Being active in social media long time before sleeping			
No	107 (32.0)		
Yes	227 (68.0)		
Total	334 (100)		

However, in the case of honors, the average cumulative GPA (CGPA) was about 3.7 on a scale of 4 with a minimum of 2.6 and a maximum of 3.8. The results depicted that the average daytime sleeping time was approximately one and a half hours with a maximum of three and a half hours. Interestingly, it can be seen from the results that students spent just above 9 hours for their study in a week on an average. The researchers think that it is quite below the average. During the past month of the survey, the students spent an average of more than 6 hours for actual sleep; however, they spent approximately 8 hours in bed in a day (Table 4).

Figure 1 depicts that only the sleep quality of one-fourth of the students was good. It is alarming that approximately three out of four students have poor sleep quality. Generally, it is believed that sleep quality is related to the physical as well as the mental condition of a student. Also, poor sleep quality disturbs the academic performance of a student.

The results of regression analysis are presented in table 4 and illustrate that the estimated regression model fits well and about 60 percent of variation of the dependent variable, i.e., the variation among CGPA of the university students, can be explained by the seven variables considered in this study which are related to sleep.

**Table 4.** Descriptive statistics of selected variables

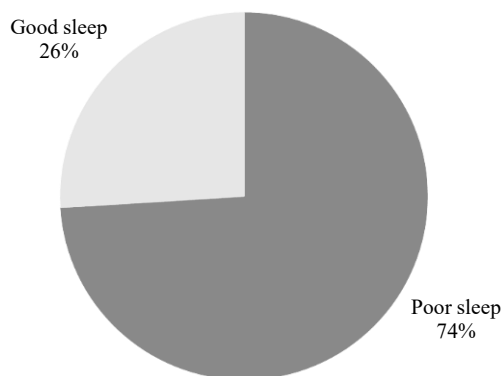
Variable	Minimum	Maximum	Mean ± SD	Skewness	Kurtosis
Age (year)	18.00	26.00	21.35 ± 1.52	0.281	-0.117
SSC result (GPA)	3.24	5.00	4.92 ± 0.21	-4.499	23.910
HSC result (GPA)	3.75	5.00	4.80 ± 0.27	-1.486	1.612
BSc result (CGPA)	2.60	3.88	3.69 ± 0.20	-1.851	4.126
Daytime sleepiness	0	3.30	1.48 ± 0.75	-0.445	-0.029
Weekly time spent for studying (hour)	0	48.00	9.29 ± 8.51	1.583	3.077
Weekly time spent for work (hour)	0	25.00	7.62 ± 7.12	0.752	-0.247
During the past month, how many hours of actual sleep did you get at night?	3.00	10.00	6.32 ± 1.39	0.090	0.014
During the past month, how many hours were you in bed?	5.00	12.00	7.73 ± 1.36	0.569	0.575

SSC: Secondary School Certificate; HSC: Higher School Certificate; BSc: Bachelor of Science; GPA: Grade point average; CGPA: Cumulative grade point average; SD: Standard deviation

**Table 5.** Results of regression model

Components of PSQI	Coefficients	SE	t	P-value	Model summary
Constant	3.476	0.214	16.228	< 0.001	
Subjective sleep quality	0.336	0.102	3.277	0.001	
Sleep latency	-0.077	0.096	-0.800	0.424	
Sleep duration	0.112	0.047	2.383	0.021	$R^2 = 0.782$ , adjusted $R^2 = 0.604$
Habitual sleep efficiency	-0.066	0.082	-0.807	0.420	
Sleep disturbances	-0.261	0.122	-2.141	0.033	
Use of sleeping medications	-0.160	0.086	-1.869	0.063	
Daytime dysfunction	0.035	0.097	0.358	0.721	

PSQI: Pittsburgh Sleep Quality Index; SE: Standard error

**Figure 1.** Sleeping status of the students

The summary output of the multiple regression model is presented in table 5. The independent variables of the regression model were selected by the stepwise method, i.e., the insignificant variables like age, sex, etc. were not included in the final model. From the results, it is seen that some of the variables have positive and some have negative impact on the academic performance of the university students, i.e., sleep duration, subjective sleep quality, and daytime dysfunction are positively related to the academic performance; however, sleep latency, habitual sleep efficiency, sleep disturbances, and use of sleeping medications were negatively associated with the academic performance of the students. Among the independent variables, subjective sleep quality, sleep disturbances, and use of sleeping medications were statistically significant at the significance level of 0.05 (Table 5).

## Discussion

Among the respondents, results revealed that only seven percent of students reported their

health condition as bad and the health of about 30 percent of the students was neither bad nor good, i.e., sometimes they were sick. Results revealed that about one-fifth of the students watched TV a long time before the time of sleeping. However, about 70 percent of the respondents indicated that they were active in social media like Facebook, Twitter, YouTube, etc. long time before sleeping. The results depict that the sleep quality of only one-fourth of the students was good which is consistent with the results of Lund et al. (4) and Keshavarz Akhlagh and Ghalebandi (24). From the results, it can be seen that subjective sleep quality, sleep disturbances, and use of sleeping medications were statistically significant at significance level of 0.05. Subjective sleep quality, sleep duration, and daytime dysfunction were positively related to academic performance; however, sleep latency, habitual sleep efficiency, sleep disturbances, and use of sleeping medications were negatively associated with the academic performance of the students. However, further research is required in order to draw concrete conclusions and future studies may lead to researchers to develop programs that may boost school performance by improving the sleep pattern of the university students.

## Conclusion

Students having poor academic performance suffer from the problems related to sleep quality and require medical advice for maintaining a healthier lifestyle including adequate rest time. Assessment of sleep quality may also be incorporated in annual student health checks as a holistic approach. This study also suggests that the university healthcare service providers should attempt to enhance students' awareness of sleep health and promote individuals' willingness by highlighting behaviors associated with enhancing sleep hygiene.

## Conflict of Interests

Authors have no conflict of interests.

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