

Impact of sleep quality and general health on academic performance

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ABSTRACT


Background: Sleep has many important effects on the human body. One of its most important effects is on one's memory, where it plays a role in stabilizing perceived information and facilitating generalized knowledge. **Objective:** We attempted to correlate the quality of sleep and its effects on general mental health and academic performance of health sciences students. **Materials and Methods:** A cross-sectional study was carried out in a Saudi University in Riyadh, for 12 months starting September 2014. Validated self-reports: Pittsburgh Sleep Quality Index (PSQI) and General Health Questionnaire (GHQ), demographic, and academic information were collected from 378 students of both genders through convenience sampling technique. PSQI measures quality and disturbance while GHQ assesses psychological and occupational well-being. English version was used of both questionnaires and was validated in previous studies. We used frequency (%) for categorical variables and mean (standard deviation) for continuous variables. Total score for GHQ and PSQI scales were calculated and divided into categories based on quartiles. Pearson coefficient was used to examine correlation. Multiple linear regression model was applied to predict student grade-point average (GPA) from sleep quality score and health quality and to predict sleep quality from health quality score and students' GPA. We defined results to be statistically significant if $P < 0.05$. **Results:** PSQI and GHQ scores did not appear to predict academic performance; there was no significant correlation between student sleep quality and general health scores and GPA ($r^2 = 0.091$, $P = 0.477$). On reversing model, GHQ scores were found to significantly affect quality of sleep (odds ratio = 0.301, $P < 0.001$) while academic performance (GPA) was not found to significantly affect sleep quality ($P = 0.734$). **Conclusion:** We concluded that the effect of sleep quality and general mental well-being on academic achievement is inconclusive.

KEY WORDS: Sleep Quality; Academic Performance; General Health

INTRODUCTION

Sleep quality is defined as “the degree to which restful sleep is maintained during the night, where a healthy normal individual feels refreshed upon waking up and throughout the day.” Restful sleep is graded based on the following parameters: Latency until sleep onset, wakefulness after

sleep onset, and/or the duration of sleep.^[1] Sleep has many important effects on the human body. One of its most important effects is on one's memory, where it plays a role in stabilizing perceived information and facilitating generalized knowledge.^[2] Sleep deprivation is a very common behavior observed, especially in students during their academic life. The severity of sleep deprivation differs among students, but the psychological link and behavioral changes seen in patients are very much alarming.^[3] A recent study which was done in 2012 in Saudi Arabia indicated that late night sleeping and a decrease in total nocturnal sleep time during the weekdays or weekends and sleepiness during the day are negatively associated with poor academic performance in medical students.^[4] Another study shows that 21% of poor sleepers failed 1 or more years at school while similar problems

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were observed in just 11% of normal sleepers.^[5] General health problems affect the sleep quality with stress being the most common one. As a medical student when experiencing such stress, this will eventually cause poor sleep quality, it also will have a significant influence on one's cognitive performance.^[5] Thus, affecting the academic performance, which is seen mostly in the students' attention span, memory consolidation, and encoding. Physical and psychological health is also compromised with poor sleep quality and the percentage of disorders increases with the severity of the condition. All students experience stress, but the tremendous amount of knowledge a medical student is required to obtain in a short time period induces stress leading eventually to poor sleep quality and late nocturnal sleep associated with daytime sleepiness.^[6] To assess the quality of sleep, the Pittsburgh Sleep Quality Index (PSQI) is commonly used where it is considered the standard questionnaire used in measuring sleep quality and disturbance. In PSQI, the questions address sleep quality regarding duration and fragmentation in addition to susceptibility to health problems retrospectively over a 1-month period using self-reports. The PSQI scores were moderately to highly correlated with measures of sleep quality and sleep problems, and poorly correlated with unrelated constructs. Individuals with sleep problems, poor sleep quality, and sleep restlessness had significantly higher PSQI scores in comparison to individuals without such problems.^[7] Bahammam *et al.*^[4] conducted a previous similar research in Saudi Arabia on 2012, but our research describes a different population and sample size as well as studying the relation between sleep quality in addition to general health and the actual graded performance of medical, health sciences students using students' grade-point average (GPA), and the subjective stress they undergo before an exam and after. Demographics, daytime tiredness, class attendance, sleep habits, sleep duration, and fragmentation are included in the study.

Due to the significant applicability of knowledge and continuous information recall, we attempted to correlate the quality of sleep and its effects on general mental health and academic performance of health sciences students. For

this reason and many others including how common and popular this is seen among different age groups, this entity is considered a good domain for research.

MATERIALS AND METHODS

A cross-sectional study was carried out in a Saudi university in Riyadh, for 12 months starting September 2014. Through convenience sampling technique, 378 students of both genders were randomly chosen (Table 1). Validated self-report questionnaires: PSQI^[7] and General Health Questionnaire (GHQ),^[8] demographic, and academic information were used.

PSQI is used to measure sleep quality and disturbance. It addresses sleep duration and fragmentation, in addition to susceptibility to health problems retrospectively over a 1-month period.^[9] GHQ is used to assess psychological and occupational well-being.

English version of both questionnaires was validated in previous studies and was used in our study.

We used frequency (%) for categorical variables and mean (standard deviation) for continuous variables. Total score for GHQ and PSQI scales were calculated and divided into categories based on quartiles. Pearson correlation coefficient was used to examine correlation. Multiple linear regression model was applied to predict student GPA from sleep quality score and health quality. Multiple linear regression model was also used to predict sleep quality from health quality score and students' GPA.

We defined results to be statistically significant if $P < 0.05$.

RESULTS

Sleep quality and GHQ scores did not appear to predict academic performance as there was no significant correlation between student sleep quality and general mental health scores and GPA ($r^2 = 0.091$, $P = 0.477$).

Table 1: Distribution of students sleeping hours (by range) across academic year

Sleep hours	6 th year	5 th year	4 th year	3 rd year	2 nd year	Dentistry	Grand Total
12-2 am	73	43	28	14	26	12	196
3-5 am	22	6	5	6	6	4	49
6-8 am	1	1	1	4	6	5	18
9-11 am	2	0	3	3	3	5	16
12-2 pm	1	0	1	1	2	0	5
3-5 pm	0	0	0	0	0	0	0
6-8 pm	0	0	3	1	0	3	7
9-11 pm	18	9	25	10	11	2	75
Missing	2	3	0	1	5	1	12
Grand total	119	62	66	40	59	32	378

When the model was reversed, general mental health (GHQ) scores were found to significantly affect quality of sleep (odds ratio = 0.301, $P < 0.001$) while academic performance in terms of GPA was not found to significantly

affect sleep quality ($P = 0.734$). Difficulty in initiating sleep and requiring more than 30 min to fall asleep (i.e., sleep latency) as well as waking up throughout the night or very early in the morning were found to be the most common factors that affected sleep quality among the students.

Table 2: Correlation between student GPA, sleep quality score, and health quality (prediction power)

	GPA	Sleep quality	Health quality
GPA	1		
Sleep quality	0.033	1	
Health quality	0.055	0.302**	1

GPA: Grade-point average

Table 3: Regression model summary

Model	R	R ²	Adjusted R ²	Standard error of the estimate
1	0.302 ^a	0.091	0.087	2.83742

Table 4: Regression model: ANOVA table

Model	Sum of squares	df	Mean square	F	Significant
1					
Regression	346.265	2	173.132	21.505	0.000 ^b
Residual	3445.814	428	8.051		
Total	3792.079	430			

Table 5: Regression model result

Model	Unstandardized coefficients		Standardized coefficients	<i>t</i>	Significant
	B	Standard error	Beta		
1					
(Constant)	7.210	1.864		3.867	0.000
Health quality	0.135	0.021	0.301	6.520	0.000
GPA	0.152	0.447	0.016	0.340	0.734

GPA: Grade-point average

Table 6: Descriptive statistics of the student sleep quality scale items

Sleep quality item	Count (%)				Mean±SD	Rank
	Less than once a week	Not during the past month	Once or twice a week	Three or more times a week		
Cannot get to sleep within 30 min	105 (24.40)	147 (34.20)	92 (21.40)	86 (20.00)	1.37±1.06	1
Wake up in the middle of the night or early morning	102 (23.70)	174 (40.50)	85 (19.80)	69 (16.00)	1.281±1	2
Have to get up to use the bathroom	96 (22.30)	224 (52.10)	58 (13.50)	52 (12.10)	1.153±0.906	3
Cannot breath comfortably	48 (11.20)	349 (81.40)	17 (4.00)	15 (3.50)	0.998±0.54	6
Cough or snore loudly	34 (7.90)	369 (85.80)	11 (2.60)	16 (3.70)	1.021±0.504	5
Feel too cold	95 (22.10)	235 (54.80)	71 (16.60)	28 (6.50)	1.075±0.802	4
Feel too hot	115 (26.90)	229 (53.50)	63 (14.70)	21 (4.90)	0.977±0.783	7
Had bad dreams	153 (35.70)	203 (47.30)	55 (12.80)	18 (4.20)	0.855±0.796	9
Have pain	77 (17.90)	314 (73.20)	25 (5.80)	13 (3.00)	0.939±0.597	8

DISCUSSION

This study shows that significant proportion of students sampled experience sleep deprivation on a regular basis during their studies and do not acquire enough nocturnal hours of sleep per night (Table 1).

We have also shown that reduced sleep quality did not affect student performance in terms of GPA, however that does not rule out the role sleep plays in learning and processing of information. Since we had only measured academic performance in terms of GPA, sleep may play an important role in how student’s perform in settings where maximum in information must be retained. We therefore conclude that the effect of sleep quality and general mental well-being on academic achievement is inconclusive since achieving educational goals may be quantified with more indices than formative testing on which GPA is mainly dependent as shown in Tables 2-5.

Our results have also confirmed that a higher level of distress (and thus a higher risk for developing mental illness) as reported by the GHQ scores plays a role in reducing the quality of sleep. This is expected since studies report that a high level of stress frequently causes inability to fall or stay asleep (Table 6).

CONCLUSION

We concluded that the effect of sleep quality and general mental well-being on academic achievement is inconclusive.

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