

Effects of Daily Activities on Academic Performance of Applied Science University Students

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Abstract Sleeping is a herbal repetitive nation of relaxation for the thoughts and frame that's important to life. Sufficient sleep is extraordinarily crucial for one's intellectual and bodily fitness. But sleep loss is a tremendous trouble in present day society Our major cause of this study is to evaluate the consequences of numerous each day sports in particular sleep styles and the frequency of day-time sleepiness on the educational overall performance of the scholars of Applied Science Private University (ASU). A questionnaire became administered to the scholars of ASU from the primary first year to the 5th yr. The Most Effective Factor On The GPA of ASU Student Is the Mental Factor. This have a look at became designed to inspire college students to searching for healthier sleep habits, through the use of instructional fulfillment as indicator. So we want to recognize the function of sleep and ought to take good enough sleep of 6-eight hours consistent with day for fitness and wellbeing.

Keywords: *sleep, academic performance, ASU, GPA*

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1. Introduction

The questionnaires were finished through 154 faculties the vicinity we make our examine in ASU (Private), that 79% of them replied with inside the modern-day and 93 % cooperate. extra than of students obtained decrease than 7 hours of sleep at night time with inside the direction of a popular college a length of seven days and almost they all spend a lot that that series of sleep hours at the night time in advance of an exam, approximately 81.7%. Nearly, 47% of ASU university felt sunlight hours' sleepiness almost every day. Longer sleep length the night time earlier than an exam is stated to the higher lofty grades and semester grade mountaintop averages (GPAs). A majority of students had suboptimal periods of sleep, mentioned as fewer than 7 hours. A sufficient sleep at the night time earlier than an exam is definitely related to the student's steep grades and the semester GPAs. sufficient sleep optimally affects mental functioning and in the end affects students' performance in his examinations and in a roundabout manner grades he received. [1,2,3,4,5] The pattern of sleep in a 24-hours period immediately is correlated to the physical health, mood, and mental functioning. [6,7] Suboptimal sleep is a local problem, the vicinity extra than a 25% of the USA grownups attempt now no longer to obtaining the useful 7 hours of sleep each night. For growing humans' facts of the extremely good consequences of top sufficient sleep and extending the proportion of grownups who accumulate sufficient

portions of sleep to beautify health, wellness, productivity, excessive of life, and population safety. Cognitive performance is affected by inadequate sleep durations, mentioned as fewer than 7 hours an afternoon for adults. [1,8] inadequate sleep decreases general alertness and impairs attention, main to slowed cognitive processing. Lack of sufficient sleep except affects the cause of thoughts systems intellectual processes. basically specifically impacted creation is the prefrontal cortex, which executes higher thoughts functions collectively with language, running memory, logical reasoning, and creativity [1]. Yoo et al confirmed that an unmarried night time of shortened sleep length reasons bargain in memory encoding, which led to a great deal data retention. Three studies assessing the effect of sleep on academic performance focal factor mostly on younger human beings and undergraduate college students. Few studies personal explored sleep behavior of students got here upon that sleep court cases are stylish of clinical university and bad sleep behavior had been correlated with changes in instructional performance. [9,10] However, studies that deliver data more or less sleep behavior of pupil of college students maintain but to be achieved with United States. take a look at is needed to provide of students with tangible evidence they'll be capable of use to construct each unmarried day choices regarding their sleep as it relates to their academic success. Ours become an exploratory study of sleep styles and their corporation with academic performance at ASU. unique study dreams had been to name sleep styles ASU university and the frequency of daylight hours' sleepiness all through the

university a length of seven days and to assess the corporation among sleep length and academic performance of those college students.

2. Methods

An anonymous, voluntary, self-administered questionnaire turned into administered to ASU students. This private university that is positioned approximately 225 miles from the Amman. The take a look at pattern blanketed all present day first-year (P1), second-year (P2), and third-year (P3) pupil, fourth, and 5th year- students. The questionnaire composed of three sections: pupil traits sleep styles for the duration of a standard college week and the night time earlier than an exam, and frequency of sunlight hours' sleepiness. Student traits pertained to pupil demographic variables and measures of instructional overall performance. Student demographics blanketed age, sex, race, present day expert year (P1, P2, or P3), and campus location. Academic overall performance turned into measured with the aid of using the self-suggested grade acquired for the duration of fall semester 2013 for one particular direction for every corresponding expert year and with the aid of using the self-suggested GPA for the autumn 2013 semester. Both have been measured as express facts with five reaction classes for the direction grade degree and four reaction classes for the GPA degree

(Table 1). Questionnaire, a device that investigates sleep behavior and sleep issues in clinical students.¹⁰ The questionnaire isn't a established device, however turned into tailored from the established Basic Nordic Sleep Questionnaire.¹⁰ In our take a look at, ten questions have been tailored from the Sleep and Daytime Habits Questionnaire. Sleep styles for the duration of a standard college week of the autumn 2018 and spring 2019 semesters have been measured with the aid of using the subsequent participant-suggested factors: (1) time to visit mattress; (2) quantity of hours slept at night time; (three) time to awaken; and (four) prevalence of naps. Participants additionally suggested on sleep styles the night time earlier than an exam with barely distinct factors: (1) time to visit mattress; (2) quantity of hours slept at night time; (three) awaken time in advance than regular nights; and (four) visit mattress time later than regular nights. Lastly, frequency of sunlight hours' sleepiness turned into measured with the aid of using self-suggested sleepiness while waking, in the course of the day, for the duration of take a look at time, and for the duration of elegance time. Data associated with sleep styles and frequency of sunlight hours' sleepiness have been gathered as express facts, besides for the sleep period which turned into gathered as non-stop facts. This cross-sectional take a look at acquired approval with the aid of using the authors' institutional evaluation board (IRB).

Table 1. Characteristic of sleep pattern of ASU-Students

No	Term	always	often	sometimes	rarely	never	No answer
1	I do ablution before going to sleep.	33	38	33	28	22	3
2	I browse websites until late at night.	50	48	33	15	13	11
3	Make sure my dinner is light	47	65	23	5	11	3
4	I wake up on weekends	82	28	18	7	15	5
5	I Remember my lessons before going to bed.	28	26	43	30	28	0
6	I do the bed three times before bedtime	23	53	36	17	25	1
7	I Watch TV before sleeping	48	26	15	23	36	7
8	I sleep in my own bed	77	29	28	22	1	-
9	I sleep on my right nipple	45	20	36	25	28	1
10	Take stimulants at night	20	30	32	10	60	3
11	I Take a bath before going to bed.	39	34	44	10	15	13
12	I Write my duties and my research at night	20	22	29	11	14	3
13	My sleep dates change on weekends	33	32	20	7	6	1
14	I go to sleep at a specific time.	16	46	15	12	11	0
15	Drink plenty of fluids before bedtime	20	26	33	14	4	1
16	Attend the lectures from the beginning of the semester	17	32	32	12	5	0
17	Change the dates of my sleep with changing daily and night events	25	36	26	6	6	0
18	Read before bedtime (book - newspaper - magazine).	11	14	22	24	27	1
19	Read some of the admonitions of sleep	29	17	24	15	12	2
20	I remember my lessons early in the morning.	24	24	20	14	15	2
21	My sleep dates change during the quarterly leave	52	29	11	45	20	0
22	Drink a cup of milk before bedtime.	35	21	33	19	45	2
23	I occupy myself with any work I cannot sleep	45	24	16	43	23	4
24	Take my lectures in the bedroom	71	36	16	11	21	0
25	I call the old prayer when waking up from sleep	54	23	39	19	20	0
26	Wake up without using the alarm clock	73	19	18	14	30	1
27	I go to hypnotics to help me sleep.	38	26	13	15	62	1
28	I exercise regularly	45	28	29	37	14	2
29	Read Dua Insomnia when I cannot sleep.	62	13	21	34	22	3
30	I sleep in a dark room.	62	16	22	22	31	2
31	Original tendon before bedtime.	33	23	42	26	29	3
32	I wake up several times during sleep	45	35	25	24	23	3
33	Write my duties and my research after dawn	34	39	24	27	30	1
34	If you decide to sleep I sleep immediately	46	38	26	17	28	0
35	I tend to study continuously without taking breaks	45	37	22	26	25	1

Table 2. Students Distribution on Academic level, Ages, GPA, Bed time

		Frequency	%
Academic Level	First Year	43	27.9
	Second Year	38	24.7
	Third Year	39	25.3
	Fourth Year	26	16.9
	Fifth Year	8	5.2
Ages	17-19	27	17.5
	19-21	60	39
	21-23	34	22.1
	23-25	15	9.7
	27-29	16	10.4
	29-31	2	1.3
GPA	More or equal 84	37	24
	From 76-83.9	34	22
	From 68-75.9	43	28
	From 60-67.9	40	26
Sleeping hours	Less than 4	17	11
	From 4-6	96	62.4
	From 7-9	47	30.5
	More than 9	21	13.6
Bed time	after the evening prayer	25	16.2
	after midnight "after 12 o'clock"	56	36.5
	near sunshine	25	16.2
	Morning	14	9.1
	Noon	15	9.7
	Afternoon	19	12.3

A pilot test of the questionnaire was administered to a group of 16 P1-P3 students. Students' responses and feedbacks were used to assess the clarity of questions, format, and length of the questionnaire. In addition, students were polled for their thoughts on peer willingness to complete the questionnaire. Feedbacks which were collected from the pilot group assessed and adjustments on question wording and response choices were incorporated into a revision of the questionnaire. The pilot study was conducted to ensure validity, however no further steps to validate the questionnaire were performed. Students who participated in the pilot test were not excluded from the main study, as participants in the pilot were anonymous, as were those in the main study. The questionnaire was self-administered in class during a 1-hour weekly professional seminar in February 2014. On the day of survey administration, the seminar topic was related to the importance of sleep on cognitive functions; however, students were not informed of the seminar topic or that a study would be conducted prior the seminar. At the beginning of the seminar, packets were distributed to all students in attendance. Each packet contained the questionnaire, an IRB approval letter, and an opaque envelope. The study's benefits, potential risks, and participant rights were then explained. Students were given 15 minutes to complete the survey, and the number of attendance was taken to assess the response and cooperation rate. The results were returned in the opaque envelopes in order to maintain anonymity. All envelopes were collected immediately before the speaker began the seminar session. Exclusion criteria consisted of students

who were repeating coursework for any reason and/or taking at least one prescription medication for a sleep disorder (e.g., insomnia or narcolepsy). The rationale for such exclusion was to eliminate confounders that could potentially impact academic success and/or sleep patterns. Data quality control strategies were also implemented to ensure data accuracy. Multiple, related questions, such as duration of sleep, time students went to bed and woke up, allowed researchers to validate data accuracy. Data was analyzed using SPSS for Mac, v21 (SPSS Inc., Cary, NC) and SAS 9.3 (SAS Institute, Inc., Cary, NC). Using the 2011 Standard Definitions published by the American Association for Public Opinion Research as guidance, the overall response rate (the number of complete surveys divided by the number of complete surveys (eligible cases) plus the number of no surveys--those who refused to participate plus those who were not present at the seminar) and cooperation rate (the number of complete surveys divided by the number of complete surveys (eligible cases) plus the number of nonparticipating eligible students who were present in the seminar) were calculated. Descriptive statistics were used to describe participant characteristics, sleep patterns during a typical school week and the night before an examination, and frequency of daytime sleepiness. Chi-square tests were conducted to assess unadjusted associations between student demographics and academic performance (course grades and semester GPA), as well as unadjusted associations between frequency of daytime sleepiness and hours of sleep (6 hours or less vs 7 hours or more). Next, unadjusted associations between sleep duration and academic

performance were assessed using analysis of variance (ANOVA). If a significant unadjusted association was found between a demographic variable and academic performance, analysis of covariance was used to assess the adjusted association between sleep duration and academic performance while controlling for the effect of the demographic variable(s) (covariates). An a priori alpha value was set at 0.05. From 447 participants among P1-P3 students, 385 attended the professional seminar at both the main and the satellite campuses on the day the survey was conducted. A total of 364 students returned completed questionnaires with minimal data missing. We found that 44 students of pharmacy met the above-exclusion criteria and were excluded from response and cooperation rates calculation and subsequent data analyses.

2.1. Sample Description

Typically, 154 ASU students were recruited to the study. We found that 60(39.0%) students aged between 19 and 21 years. GPA is distributed to the four categories. 43(27.9%) are in their first year. Nearly half (44.8%) of the sample sleep 4-6 hours and two third of them (66.2%) sleep after midnight.

Table 3. Socio-demographic characteristics of the study sample

Variable	count	%
Age		
17-19 years	27	17.5
19-21 years	60	39.0
21-23 years	34	22.1
23-25 years	15	9.7
25-27 years	16	10.4
29-31 years	2	1.3
GPA		
>=84	37	24.0
76-83.9	34	22.1
68-75.9	43	27.9
60-67.9	40	26.0
Education Level		
first year	43	27.9
second year	38	24.7
third year	39	25.3
fourth year	26	16.9
fifth year	8	5.2
Sleeping hours		
<4 hours	17	11.0
4-6 hours	69	44.8
7-9 hours	47	30.5
>9 hours	21	13.6
Sleeping time		
night after the evening prayer	27	17.5
night after midnight "after 12 o'clock"	102	66.2
near dawn	25	16.2

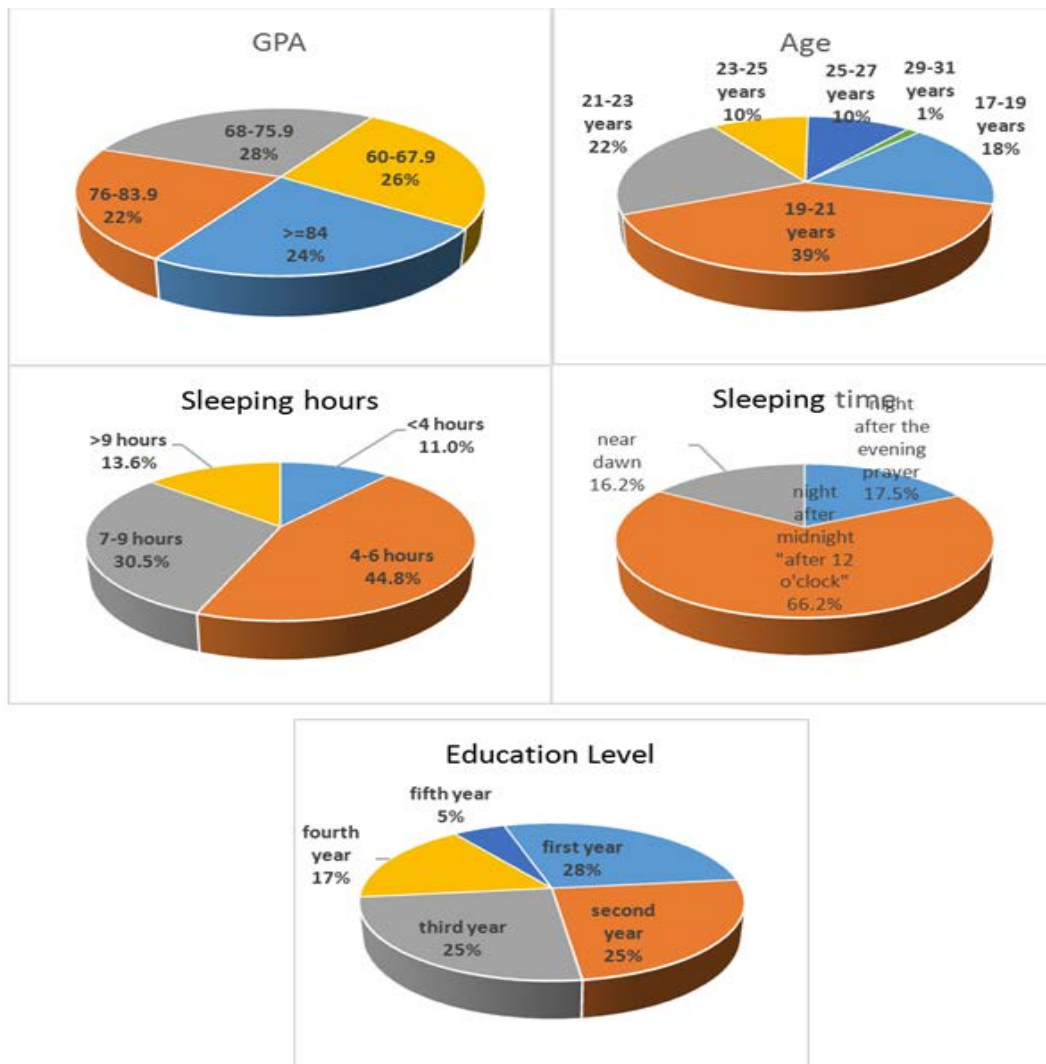


Figure 1. Pie chart of GPA, age, sleeping hours and time and educational level of students

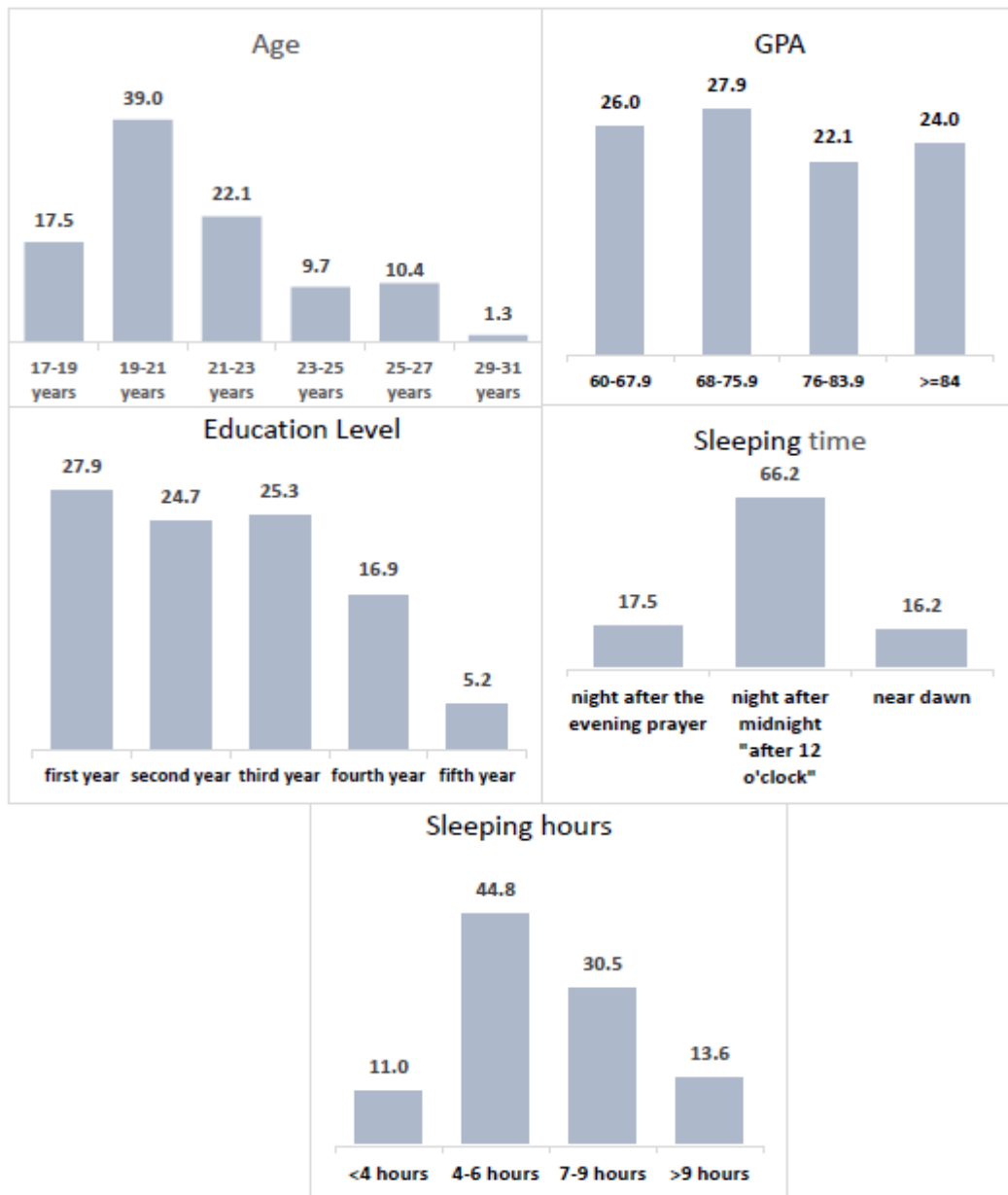


Figure 2. Bar chart of GPA, age, sleeping hours and time and educational level of students

2.2. Reliability of Analysis

The reliability coefficient (Cronbach's Alpha) of the study is 0.762, which is considered to be a good value reflecting a reliable measure of the study tool.

2.3. Levels of the Constructs

In this part responses of the respondents to the items of the construct are recorded. Mean and standard deviation for each item is calculated and is ranked in descending order according to the mean. Higher mean values indicate more frequency on that item.

2.3.1. Sleep patterns

From Table 4, item 21 " My sleep dates (time) change during the quarterly leave " is the most frequent habit in sleep patterns with mean 3.89(SD=1.249) and frequency of 'often'. Secondly, item 13 "My sleep dates change on weekends" with mean 3.66(SD=1.257) and frequency of

'often'. Oppositely, item 26 " I wake up without using the alarm clock" is the least frequent with mean 2.91 (SD=1.457) and frequency of 'sometimes'. The overall mean of sleep patterns is 3.44(SD=0.640) and 'often' practiced.

2.3.2. Sleeping Early

This construct consists of only item 14 " I go to sleep at a specific time". The mean for this item is 3.07(SD=1.363) with frequency of 'sometimes'.

2.3.3. Healthy Preparation for Sleeping

From Table 5, item 8 " I sleep in my own bed " is the most frequent in healthy preparation for sleep and is 'often' practiced with mean 4.15(SD=1.267). Item 30 " I sleep in a dark room " is practiced 'sometimes' with mean 3.93(SD=1.295). The least practice in this construct is "I go to hypnotics to help me sleep" which is 'rarely' done with mean 2.39(SD=1.505). The overall mean of healthy preparation for sleep is 3.23(SD=0.565) and is 'sometimes' done.

Table 4. Means, standard deviations and frequency of sleep patterns

Rank	No.	Item	Mean	SD	Frequency
1	21	My sleep dates (time) change during the quarterly leave	3.89	1.249	often
2	13	My sleep dates change on weekends	3.66	1.257	often
3	4	I wake up on weekends	3.62	1.339	often
4	17	Change the dates of my sleep with changing daily and night events	3.48	1.310	often
5	24	Take my lectures in the bedroom	3.47	1.451	often
6	34	If you decide to sleep I sleep immediately	3.30	1.330	sometimes
7	32	I wake up several times during sleep	3.18	1.391	sometimes
8	26	Wake up without using the alarm clock	2.91	1.457	sometimes
Sleep patterns			3.44	0.640	often

Table 5. Means, standard deviations and frequency of healthy preparation for sleeping

Rank	No.	Item	Mean	SD	Frequency
1	8	I sleep in my own bed	4.15	1.267	often
2	30	I sleep in a dark room.	3.93	1.295	often
3	3	Make sure my dinner is light	3.46	1.435	often
4	11	I take a bath before going to bed.	3.37	1.256	often
5	15	Drink plenty of fluids before bedtime	3.36	1.221	sometimes
6	28	I exercise regularly	2.95	1.304	sometimes
7	10	I take stimulants at night	2.77	1.481	sometimes
8	22	Drink a cup of milk before bedtime.	2.64	1.516	sometimes
9	27	I go to hypnotics to help me sleep.	2.39	1.505	rarely
Healthy preparation for sleep			3.23	0.565	sometimes

Table 6. Means, standard deviations and frequency of mental preparation for sleep

Rank	No.	Item	Mean	SD	Frequency
1	2	I browse websites until late at night.	3.96	1.206	often
2	23	I occupy myself with any work I cannot sleep	3.62	1.295	often
3	19	Read some of the admonitions of sleep	3.36	1.378	sometimes
4	7	I watch TV before sleeping	2.99	1.573	sometimes
5	18	Read before bedtime (book - newspaper - magazine)	2.82	1.383	sometimes
Mental preparation			3.35	0.670	sometimes

2.3.4. Mental Preparation for Sleep

From Table 6, item 2 "I browse websites until late at night" is the most frequent in mental preparation for sleep and is practiced 'often' with mean 3.96(SD=1.206). The second frequent practice is "I occupy myself with any work I cannot sleep" with mean 3.62(SD=1.295) and is 'often' practiced. On the other hand, item 18 "Read before bedtime (book - newspaper - magazine)" is the least frequent practice with mean 2.82(SD=1.383) and is being 'sometimes' practiced. The overall mean for mental preparation is 3.35(SD=0.670) and is 'sometimes' done.

2.3.5. Spiritual Preparation for Sleep

From Table 7, the most frequent habit is "I sleep on my right nipple" which is 'often' done with mean 3.79(SD=1.235). In the second rank is item 25 "I call the old prayer when waking up from sleep"

old prayer when waking up from sleep" with mean 3.32 (SD=1.337). Item 1 "I do ablution before going to sleep" is last with mean 2.91(SD=1.392) and is "sometimes" done. The overall mean for spiritual preparation is 3.18(SD=0.854) and is being practiced 'sometimes'.

2.3.6. Study Behaviors

From Table 8, all items in this construct is of 'sometimes' occurrence. "Attend the lectures from the beginning of the semester" is the most frequent practice with mean 3.34 (SD=1.248). "I Write my duties and my research at night" is the second frequent practice with mean 3.28 (SD=1.342). The least frequent practice in study behaviors is "Write my duties and my research after dawn" with mean 2.75 (SD=1.437). The overall mean for study behaviors is 3.14(SD=0.768).

Table 7. Means, standard deviations and frequency of spiritual preparation for sleep

Rank	No.	Item	Mean	SD	Frequency
1	9	I sleep on my right nipple	3.79	1.235	often
2	25	I call the old prayer when waking up from sleep	3.32	1.337	sometimes
3	29	Read Dua' Insomnia when I cannot sleep.	3.03	1.435	sometimes
4	31	Original tendon before bedtime.	3.03	1.453	sometimes
5	6	I tidy the bed three times before sleep	3.01	1.522	sometimes
6	1	I do ablution before going to sleep.	2.91	1.392	sometimes
Spiritual preparation			3.18	0.854	sometimes

Table 8. Means, standard deviations and frequency of study behaviors

Rank	No.	Item	Mean	SD	Frequency
1	16	Attend the lectures from the beginning of the semester	3.34	1.248	sometimes
2	12	I Write my duties and my research at night	3.28	1.342	sometimes
3	20	I remember my lessons early in the morning.	3.26	1.394	sometimes
4	35	I tend to study continuously without taking breaks	3.17	1.418	sometimes
5	5	I Remember my lessons before going to bed.	2.96	1.332	sometimes
6	33	Write my duties and my research after dawn	2.75	1.437	sometimes
Study behaviors			3.14	0.768	sometimes

2.4. Summary

Rank	Variable	Mean	SD	Practicing
1	Sleep patterns	3.44	0.640	often
2	Mental preparation for sleep	3.35	0.670	sometimes
3	Healthy preparation for sleep	3.23	0.565	sometimes
4	Spiritual preparation for sleep	3.18	0.854	sometimes
5	Study behaviors	3.14	0.768	sometimes
6	Sleeping early	3.07	1.363	sometimes

From the above table, sleep patterns construct has the highest mean with 3.44 and 'often' practice. In the second rank is mental preparation for sleep with mean 3.35 and 'sometimes'. While, sleeping early is the least frequent with mean of only 3.07.

2.5. Measure of Association

1. Correlations between components

Construct		Sleeping early	Healthy preparation	Mental preparation	Spiritual preparation	Study behaviors
Sleep patterns	r	0.024	0.453**	0.385**	0.369**	0.296**
	Sig.	0.770	0.000	0.000	0.000	0.000
Sleeping early	r	1	0.161*	0.177*	0.283**	0.268**
	Sig.		0.046	0.028	0.000	0.001
Healthy preparation	r		1	0.415**	0.400**	0.406**
	Sig.			0.000	0.000	0.000
Mental preparation	r			1	0.409**	0.437**
	Sig.				0.000	0.000
Spiritual preparation	r				1	0.422**
	Sig.					0.000
Study behaviors	r					1
	Sig.					

From the above table, all Pearson's correlation coefficients are significant (except for the relation between sleep patterns and sleeping early). Significant values of the correlation coefficients ranges from weak positive 0.161 (between sleeping early and healthy preparation for sleep) to moderate positive 0.453 (between sleep patterns and healthy preparation for sleep).

2. Correlation between GPA and constructs of the study

Construct	R
Sleep patterns	0.429
Sleeping early	0.115
Healthy preparation for sleep	0.440
Mental preparation for sleep	0.308
Spiritual preparation for sleep	0.434
Study behaviors	0.521

From the above table, Eta coefficient of correlation (used for scale variable with categorical variable) measures the strength of association for GPA and the constructs of the study separately. Values ranges from insignificant weak value of 0.115 (with sleeping early) to significant moderate value of 0.521 (with study behaviours).

2.6. ANOVA

Analysis of variance is conducted to test if there are significant differences in means of respondents sleeping practices that can be attributed to personal variables.

1. Age

Table 9. Means and standard deviations of age categories within each construct

Construct	Age	Mean	SD	Std. Error
Sleep patterns	17-19 years	3.39	0.615	0.118
	19-21 years	3.50	0.703	0.091
	21-23 years	3.52	0.647	0.111
	23-25 years	3.40	0.577	0.149
	25-27 years	3.16	0.437	0.109
	29-31 years	3.44	0.795	0.563
Sleeping early	17-19 years	3.07	1.385	0.266
	19-21 years	2.88	1.403	0.181
	21-23 years	3.38	1.349	0.231
	23-25 years	2.47	1.246	0.322
	25-27 years	3.69	1.138	0.285
	29-31 years	3.00	0.000	0.000
Healthy preparation for sleep	17-19 years	3.29	0.567	0.109
	19-21 years	3.29	0.609	0.079
	21-23 years	3.17	0.574	0.098
	23-25 years	3.10	0.438	0.113
	25-27 years	3.17	0.508	0.127
	29-31 years	3.00	0.471	0.333
Mental preparation	17-19 years	3.13	0.624	0.120
	19-21 years	3.36	0.740	0.096
	21-23 years	3.47	0.694	0.119
	23-25 years	3.50	0.533	0.138
	25-27 years	3.33	0.443	0.111
	29-31 years	2.80	0.849	0.600
Spiritual preparation	17-19 years	3.25	0.897	0.173
	19-21 years	3.11	0.896	0.116
	21-23 years	3.34	0.826	0.142
	23-25 years	3.09	0.859	0.222
	25-27 years	3.00	0.677	0.169
	29-31 years	3.83	0.943	0.667
Study behaviors	17-19 years	3.20	0.803	0.155
	19-21 years	3.07	0.764	0.099
	21-23 years	3.16	0.862	0.148
	23-25 years	3.20	0.739	0.191
	25-27 years	3.18	0.654	0.163
	29-31 years	3.00	0.236	0.167

Table 10. Results of ANOVA

Construct	Source of variation	Sum of Squares	df	Mean Square	F	Sig.
Sleep patterns	Between Groups	1.765	5	0.353	0.858	0.511
	Within Groups	60.923	148	0.412		
	Total	62.688	153			
Sleeping early	Between Groups	16.979	5	3.396	1.881	0.101
	Within Groups	267.235	148	1.806		
	Total	284.214	153			
Healthy preparation for sleep	Between Groups	0.851	5	0.170	0.525	0.757
	Within Groups	47.930	148	0.324		
	Total	48.780	153			
Mental preparation	Between Groups	2.764	5	0.553	1.241	0.293
	Within Groups	65.938	148	0.446		
	Total	68.702	153			
Spiritual preparation	Between Groups	2.796	5	0.559	0.760	0.580
	Within Groups	108.871	148	0.736		
	Total	111.668	153			
Study behaviors	Between Groups	0.473	5	0.095	0.156	0.978
	Within Groups	89.841	148	0.607		
	Total	90.314	153			

From Table 10, there are no significant differences in the means of all sleeping practices (constructs) that can be attribute to age ($p\text{-value} > \alpha = 0.05$).

2. GPA

Table 11. Means and standard deviations of GPA categories within each construct

Construct	GPA	Mean	SD	Std. Error
Sleep patterns	≥ 84	3.34	0.505	0.083
	76-83.9	3.58	0.735	0.126
	68-75.9	3.39	0.640	0.098
	60-67.9	3.46	0.666	0.105
Sleeping early	≥ 84	2.78	1.436	0.236
	76-83.9	3.50	1.161	0.199
	68-75.9	3.02	1.282	0.195
	60-67.9	3.03	1.493	0.236
Healthy preparation for sleep	≥ 84	3.21	0.546	0.090
	76-83.9	3.36	0.673	0.115
	68-75.9	3.19	0.533	0.081
	60-67.9	3.17	0.515	0.081
Mental preparation	≥ 84	3.32	0.572	0.094
	76-83.9	3.50	0.778	0.133
	68-75.9	3.23	0.643	0.098
	60-67.9	3.37	0.682	0.108
Spiritual preparation	≥ 84	3.19	0.792	0.130
	76-83.9	3.25	0.854	0.146
	68-75.9	3.15	0.785	0.120
	60-67.9	3.14	0.999	0.158
Study behaviors	≥ 84	3.18	0.602	0.099
	76-83.9	3.49	0.881	0.151
	68-75.9	2.96	0.742	0.113
	60-67.9	2.99	0.750	0.119

Table 12. Results of ANOVA

Construct	Source of variation	Sum of Squares	df	Mean Square	F	Sig.
Sleep patterns	Between Groups	1.148	3	0.383	0.932	0.427
	Within Groups	61.540	150	0.410		
	Total	62.688	153			
Sleeping early	Between Groups	9.492	3	3.164	1.728	0.164
	Within Groups	274.722	150	1.831		
	Total	284.214	153			
Healthy preparation for sleep	Between Groups	0.803	3	0.268	0.837	0.476
	Within Groups	47.977	150	0.320		
	Total	48.780	153			
Mental preparation	Between Groups	1.499	3	0.500	1.115	0.345
	Within Groups	67.203	150	0.448		
	Total	68.702	153			
Spiritual preparation	Between Groups	0.255	3	0.085	0.115	0.951
	Within Groups	111.412	150	0.743		
	Total	111.668	153			
Study behaviors	Between Groups	6.615	3	2.205	3.951	0.010
	Within Groups	83.699	150	0.558		
	Total	90.314	153			

From Table 11 and Table 12:

- There are significant differences in the means (frequency of Practices) of study behaviors that can be attributed to GPA ($F=3.951$, $p\text{-value}=0.010 < \alpha=0.05$). To specify which category is different a post hoc test known as 'Scheffe' test was conducted.

It was concluded from Schaffer test that respondents with GPA of 76-83.9 points (means=3.49) have significantly higher means compared to respondents with 60-67.9 points and 68-75.9 points (mean=2.99, 2.96 respectively).

- There are no significant differences in the means of other constructs that can be attributed to GPA ($p\text{-value} > \alpha=0.05$).

3. Education level

Table 13. Means and standard deviations of levels of education within each construct

Construct	Education level	Mean	SD	Std. Error
Sleep patterns	first year	3.50	0.721	0.110
	second year	3.38	0.499	0.081
	third year	3.43	0.590	0.095
	fourth year	3.39	0.716	0.140
	fifth year	3.55	0.863	0.305
Sleeping early	first year	3.02	1.456	0.222
	second year	3.03	1.404	0.228
	third year	2.97	1.267	0.203
	fourth year	3.35	1.384	0.271
	fifth year	3.13	1.246	0.441
Healthy preparation for sleep	first year	3.32	0.626	0.096
	second year	3.13	0.473	0.077
	third year	3.23	0.570	0.091
	fourth year	3.22	0.612	0.120
	fifth year	3.18	0.478	0.169
Mental preparation	first year	3.25	0.689	0.105
	second year	3.24	0.568	0.092
	third year	3.57	0.581	0.093
	fourth year	3.34	0.795	0.156
	fifth year	3.28	0.876	0.310
Spiritual preparation	first year	3.29	0.958	0.146
	second year	3.06	0.872	0.142
	third year	3.12	0.824	0.132
	fourth year	3.34	0.749	0.147
	fifth year	2.94	0.631	0.223
Study behaviors	first year	3.24	0.848	0.129
	second year	3.11	0.755	0.123
	third year	3.16	0.652	0.104
	fourth year	3.03	0.744	0.146
	fifth year	2.95	1.064	0.376

Table 14. Results of ANOVA

Construct	Source of variation	Sum of Squares	df	Mean Square	F	Sig.
Sleep patterns	Between Groups	0.412	4	0.103	0.246	0.912
	Within Groups	62.276	149	0.418		
	Total	62.688	153			
Sleeping early	Between Groups	2.530	4	0.632	0.335	0.854
	Within Groups	281.684	149	1.890		
	Total	284.214	153			
Healthy preparation for sleep	Between Groups	0.719	4	0.180	0.557	0.694
	Within Groups	48.061	149	0.323		
	Total	48.780	153			
Mental preparation	Between Groups	2.854	4	0.713	1.614	0.174
	Within Groups	65.848	149	0.442		
	Total	68.702	153			
Spiritual preparation	Between Groups	2.322	4	0.581	0.791	0.533
	Within Groups	109.345	149	0.734		
	Total	111.668	153			
Study behaviors	Between Groups	1.094	4	0.273	0.457	0.767
	Within Groups	89.220	149	0.599		
	Total	90.314	153			

From Table 14, there are no significant differences in the means of all sleeping practices (constructs) that can be attributed to the levels of education ($p\text{-value} > \alpha = 0.05$).

4. Sleeping hours

Table 15. Means and standard deviations of sleeping hour's categories within each construct

Construct	Sleeping hours	Mean	SD	Std. Error
Sleep patterns	<4 hours	3.10	0.605	0.147
	4-6 hours	3.57	0.663	0.080
	7-9 hours	3.40	0.608	0.089
	>9 hours	3.38	0.574	0.125
Sleeping early	<4 hours	2.71	1.649	0.400
	4-6 hours	3.06	1.381	0.166
	7-9 hours	3.13	1.209	0.176
	>9 hours	3.29	1.419	0.310
Healthy preparation for sleep	<4 hours	3.27	0.578	0.140
	4-6 hours	3.23	0.617	0.074
	7-9 hours	3.20	0.493	0.072
	>9 hours	3.25	0.560	0.122
Mental preparation	<4 hours	3.18	0.667	0.162
	4-6 hours	3.41	0.696	0.084
	7-9 hours	3.32	0.598	0.087
	>9 hours	3.34	0.754	0.165
Spiritual preparation	<4 hours	3.28	0.835	0.202
	4-6 hours	3.16	0.918	0.111
	7-9 hours	3.14	0.843	0.123
	>9 hours	3.25	0.710	0.155
Study behaviors	<4 hours	3.15	0.574	0.139
	4-6 hours	3.15	0.839	0.101
	7-9 hours	3.13	0.777	0.113
	>9 hours	3.12	0.686	0.150

Table 16. Results of ANOVA

Construct	Source of variation	Sum of Squares	df	Mean Square	F	Sig.
Sleep patterns	Between Groups	3.299	3	1.100	2.777	0.043
	Within Groups	59.389	150	0.396		
	Total	62.688	153			
Sleeping early	Between Groups	3.397	3	1.132	0.605	0.613
	Within Groups	280.817	150	1.872		
	Total	284.214	153			
Healthy preparation for sleep	Between Groups	0.082	3	0.027	0.084	0.968
	Within Groups	48.698	150	0.325		
	Total	48.780	153			
Mental preparation	Between Groups	0.803	3	0.268	0.592	0.621
	Within Groups	67.898	150	0.453		
	Total	68.702	153			
Spiritual preparation	Between Groups	0.403	3	0.134	0.181	0.909
	Within Groups	111.264	150	0.742		
	Total	111.668	153			
Study behaviors	Between Groups	0.020	3	0.007	0.011	0.998
	Within Groups	90.294	150	0.602		
	Total	90.314	153			

From Table 15 and Table 16:

- There are significant differences in the means (occurrences) of sleep patterns that can be attributed to sleeping hours ($F=2.777$, $p\text{-value}=0.043 < \alpha=0.05$). To specify which category is different a Scheffe test was conducted.

It was concluded from Schaffer test that respondents with less than 4 hours of sleep have lower mean (mean=3.10) compared to respondents with 4-6 hours (mean=3.57).

- There are no significant differences in the means of other constructs that can be attributed to sleeping hours ($p\text{-value} > \alpha=0.05$).

5. Sleeping time

Table 17. Means and standard deviations of sleeping time categories within each construct

Construct	Sleeping time	Mean	SD	Std. Error
Sleep patterns	night after the evening prayer	3.29	0.543	0.104
	night after midnight	3.53	0.624	0.062
	near dawn	3.20	0.730	0.146
Sleeping early	night after the evening prayer	3.37	1.149	0.221
	night after midnight	3.15	1.353	0.134
	near dawn	2.44	1.474	0.295
Healthy preparation for sleep	night after the evening prayer	3.21	0.523	0.101
	night after midnight	3.25	0.592	0.059
	near dawn	3.17	0.504	0.101
Mental preparation	night after the evening prayer	3.23	0.426	0.082
	night after midnight	3.42	0.715	0.071
	near dawn	3.16	0.661	0.132
Spiritual preparation	night after the evening prayer	3.31	0.674	0.130
	night after midnight	3.28	0.831	0.082
	near dawn	2.64	0.945	0.189
Study behaviors	night after the evening prayer	3.08	0.554	0.107
	night after midnight	3.19	0.807	0.080
	near dawn	2.96	0.798	0.160

Table 18. Results of ANOVA

Construct	Source of variation	Sum of Squares	df	Mean Square	F	Sig.
Sleep patterns	Between Groups	2.949	2	1.475	3.727	0.026
	Within Groups	59.739	151	0.396		
	Total	62.688	153			
Sleeping early	Between Groups	12.964	2	6.482	3.608	0.029
	Within Groups	271.250	151	1.796		
	Total	284.214	153			
Healthy preparation for sleep	Between Groups	0.122	2	0.061	0.189	0.828
	Within Groups	48.658	151	0.322		
	Total	48.780	153			
Mental preparation	Between Groups	1.834	2	0.917	2.070	0.130
	Within Groups	66.868	151	0.443		
	Total	68.702	153			
Spiritual preparation	Between Groups	8.676	2	4.338	6.360	0.002
	Within Groups	102.992	151	0.682		
	Total	111.668	153			
Study behaviors	Between Groups	1.189	2	0.595	1.007	0.368
	Within Groups	89.125	151	0.590		
	Total	90.314	153			

From Table 17 and Table 18:

- There are significant differences in the means (frequency of Practices) of sleep patterns that can be attributed to sleeping time ($F=3.727$, $p\text{-value}=0.026 < \alpha=0.05$). To specify which category is different a Scheffe test was conducted.

It is concluded from Schaffer test that students sleeping after midnight have higher mean (mean=3.53) compared to students sleeping near dawn (mean=3.20).

- There are significant differences in the frequency of Sleeping early that can be attributed to sleeping time ($F=3.608$, $p\text{-value}=0.029 < \alpha=0.05$). To specify which category is different a Scheffe test was conducted.

It is concluded from Schaffer test that students sleeping near dawn have lower mean (mean=2.44) compared to students sleeping after the evening prayer or after midnight (mean=3.37, 3.15 respectively).

- There are significant differences in the means (frequency of Practices) of Spiritual preparation that can be attributed to sleeping time ($F=6.360$, $p\text{-value}=0.002 < \alpha=0.05$). To specify which category is different a Scheffe test was conducted.

It is concluded from Schaffer test that students sleeping near dawn have less spiritual preparation (mean=2.64) compared to those sleeping after the evening prayer or after midnight (3.31, 3.28 respectively).

2.7. Chi square Tests and Coefficients of Association

Table 19. Chi-square tests with coefficient of association between GPA and other personal variables

Personal variable	GPA								p-value	r
	>=84		76-83.9		68-75.9		60-67.9			
Age	n	%	n	%	n	%	n	%	0.122	0.194*
17-19 years	7	25.9%	7	25.9%	8	29.6%	5	18.5%		
19-21 years	23	38.3%	11	18.3%	14	23.3%	12	20.0%		
21-23 years	3	8.8%	8	23.5%	10	29.4%	13	38.2%		
23-25 years	1	6.7%	3	20.0%	4	26.7%	7	46.7%		
25-27 years	2	12.5%	5	31.3%	6	37.5%	3	18.8%		
29-31 years	1	50.0%	0	0.0%	1	50.0%	0	0.0%		
Education Level									0.001	0.408*
first year	21	48.8%	6	14.0%	9	20.9%	7	16.3%		
second year	7	18.4%	20	52.6%	3	7.9%	8	21.1%		
third year	7	17.9%	5	12.8%	22	56.4%	5	12.8%		
fourth year	2	7.7%	0	0.0%	6	23.1%	18	69.2%		
fifth year	0	0.0%	3	37.5%	3	37.5%	2	25.0%		
Sleeping hours									0.001	0.413*
<4 hours	13	76.5%	0	0.0%	2	11.8%	2	11.8%		
4-6 hours	14	20.3%	28	40.6%	11	15.9%	16	23.2%		
7-9 hours	9	19.1%	5	10.6%	27	57.4%	6	12.8%		
>9 hours	1	4.8%	1	4.8%	3	14.3%	16	76.2%		
Sleeping time									0.193	0.115
night after the evening prayer	6	22.2%	6	22.2%	12	44.4%	3	11.1%		
night after midnight	27	26.5%	24	23.5%	23	22.5%	28	27.5%		
near dawn	4	16.0%	4	16.0%	8	32.0%	9	36.0%		
Total	37	24.0%	34	22.1%	43	27.9%	40	26.0%		

From Table 19:

- GPA is not significantly associated with age ($X^2=21.501$, $p\text{-value}=0.122 > \alpha=0.05$). Pearson coefficient of correlation has a significant weak value of 0.194.
- GPA is significantly associated with levels of education ($X^2=83.662$, $p\text{-value}=0.001 < \alpha=0.05$). GPA is significantly correlated with levels of education with a moderate value ($r=0.408$).
- GPA is significantly associated with sleeping hours ($X^2=89.94$, $p\text{-value}=0.001 < \alpha=0.05$). GPA is significantly correlated with sleeping hours with a moderate value ($r=0.413$) which is the highest value among personal variables.

(Note: GPA is negatively associated with sleeping hours. The best GPA is for students with 4-6 hours of sleep with 14 out of 37 (37.8%). Secondly, for students with less than 4 hours sleep (13 out of 37 which gives 35.1%). This might be due to the fact that they spend more time to study prior to exams, while students who sleeps more have no time for hard and enough study during exams time)

- GPA is not significantly associated with sleeping time ($X^2=8.67$, $p\text{-value}=0.193 > \alpha=0.05$). GPA is not significantly correlated with sleeping time ($r=0.115$).

2.8. Characteristic of Sleep Pattern of ASU-Students

No	Term	always	often	sometimes	rarely	never	No answer
1	I do ablution before going to sleep.	24	36	24	36	31	3
2	I browse websites until late at night.	69	38	23	14	8	2
3	Make sure my dinner is light	49	31	28	17	22	7
4	I wake up on weekends	54	38	27	20	15	0
5	I Remember my lessons before going to bed.	25	30	39	32	27	1
6	I do the bed three times before bedtime	40	23	23	33	34	1
7	I Watch TV before sleeping	38	30	20	22	43	1
8	I sleep in my own bed	94	22	14	15	9	0
9	I sleep on my right nipple	60	33	34	15	9	3
10	Take stimulants at night	26	27	30	22	46	3
11	I Take a bath before going to bed.	33	39	40	20	15	7
12	I Write my duties and my research at night	34	38	37	20	22	3
13	My sleep dates change on weekends	47	49	29	14	14	1
14	I go to sleep at a specific time.	28	37	34	28	27	0
15	Drink plenty of fluids before bedtime	32	41	42	24	13	2
16	Attend the lectures from the beginning of the semester	30	47	39	21	17	0
17	Change the dates of my sleep with changing daily and night events	40	48	30	18	18	0
18	Read before bedtime (book - newspaper - magazine).	23	30	31	34	35	1
19	Read some of the admonitions of sleep	42	34	32	24	20	2
20	I remember my lessons early in the morning.	35	42	28	22	25	2
21	My sleep dates change during the quarterly leave	64	44	20	14	11	1
22	Drink a cup of milk before bedtime.	24	29	22	22	55	2
23	I occupy myself with any work I cannot sleep	49	42	25	23	12	3
24	Take my lectures in the bedroom	52	34	24	20	23	1
25	I call the old prayer when waking up from sleep	35	41	39	16	23	0
26	Wake up without using the alarm clock	26	37	27	23	40	1
27	I go to hypnotics to help me sleep.	20	24	21	18	70	1
28	I exercise regularly	24	29	39	36	24	2
29	Read Prayer Insomnia when I cannot sleep.	32	30	31	27	31	3
30	I sleep in a dark room.	73	33	21	13	12	2
31	Original tendon before bedtime.	33	30	31	25	33	2
32	I wake up several times during sleep	35	32	33	27	24	3
33	Write my duties and my research after dawn	24	28	23	35	39	5
34	If you decide to sleep I sleep immediately	36	35	35	26	18	4
35	I tend to study continuously without taking breaks	36	32	31	26	26	3

Obtaining more than 7 hours of sleep per day for adults is essential for optimum health and well-being. [11] Inadequate sleep is a public health problem, and getting adequate sleep was deemed critical enough to be an objective by Healthy People 2020 to improve national health.⁸ The majority of student pharmacists in this study slept less than the recommended duration for adequate

sleep. Specifically, student pharmacists had an average sleep duration of a little over 6 hours on a typical school night. They had even greater sleep deficits the night prior to an examination, with an average sleep duration of 5 hours. The consequences of sleep inadequacies among the majority of participants included excessive sleepiness almost every day, tiredness upon waking, and excessive

sleepiness during study time and class time. Duration of sleep the night prior to an examination was associated with academic performance as measured by course grades and semester GPA. This finding is consistent with Medeiros et al's research among medical students that found students who reported sleeping for longer durations obtained higher scores on examinations, as well as Veldi et al's study that found sleep behaviors to be associated with academic progression. [9,10] Moreover, congruent findings of decreased sleep duration associated with poor examination performance were found in Gruber et al's study on children's performance on IQ measures and Perez-Lloret et al's study on adolescents' performance on mathematics and literature coursework. [12,13] The causal relationship between sleep duration (cause) and academic performance (outcome) cannot be established because of the nature of the cross-sectional study. One may argue that students who performed well in class slept longer the night prior to an examination because they were more prepared, hence did not feel they needed additional time to study. Even though this speculation is reasonable, we hypothesized that longer sleep duration would lead to better academic performance based on the scientific foundation related to the effect of sleep on cognitive performance. Sleep has an integral role in learning and memory consolidation. Sleep is necessary to form synapses between dendritic branches that allow for memory formation of learned information, thus enabling students to recall information more rapidly and for more prolonged time periods. [14,15] In addition, neurophysiologic and imaging studies show that sleep works to ensure adequate function of the prefrontal cortex, which executes higher brain functions including language, working memory, logical reasoning, and creativity. [1,2,15] Belenky et al's experimental study examining differences in cognitive function following sleep restriction of 3, 7, 5, or 9 hours a night showed decline in speed and accuracy of information proportional to amount of sleep restriction. [2] Thus our findings are consistent with established scientific foundation and would suggest the extra hour of sleep provides an advantage for higher academic performance on examinations among student pharmacists. Sleep deficits among student pharmacists warrant attention from faculty members and school administrators. In addition to daytime fatigue and poor academic performance, previous research showed that sleep deficits led to sleep-related complications including diabetes, cardiovascular disease, and decreased cognitive function and well-being. [16,17,18] Student pharmacists should be educated on the importance of obtaining adequate sleep prior to an examination—especially that even one hour of additional sleep could be beneficial to their course grade and overall GPA than an extra hour of studying. Providing such information to student pharmacists would increase student awareness of the advantages of additional sleep and give them the opportunity to make informed decisions regarding their academic performance and their health. This information could be provided during first-year student pharmacist orientation and could include findings of this study and tips for establishing healthy sleep hygiene, such as refraining from eating large meals near bed time and avoiding reading or watching TV in bed.

[19] In addition, increased awareness of beneficial sleep behaviors could lead students to establish sleep habits that extend into their professional pharmacy careers. This study has several limitations. First, there may have been differences in sleep behaviors, subjective sleepiness, and grades received among questionnaire respondents, students who refused to participate, and students absent from the seminar. There was a potential for recall error as we asked participants to recall sleep behaviors and grades received over the period of 6 months. Furthermore, while piloted among a small sample of the study population, the questionnaire was not validated, thus limiting the applicability of its results. In addition, this study was only conducted at a single institution, which makes it difficult to generalize results to student pharmacists at other institutions. Causality between sleep duration and academic performance could not be established because of the cross-sectional design of this study. Another limitation is lack of thorough analysis of daytime naps; so, it is unknown if students with shorter night-time sleep durations were compensating with daytime naps, which could potentially provide benefits to cognitive function. [20] Lastly, several confounders were not accounted for that could have affected academic performance. For example, sleep quality was not captured in this study. Sleep quality, in addition to sleep quantity, is impactful on academic performance. [21] Other confounders that could impact cognitive function and academic success include students' intellectual ability, achievement motivation, personality, emotional health, presence of stressors, learning style, studying skills, time management strategies, diet, exercise, and caffeine use. [4,5,22] Future research could enhance generalizability and provide further understanding of the effect of student pharmacists' sleep duration and patterns. For example, a similar study could be conducted at other schools in different regions or with different enrolment sizes. An experimental study that investigates the effect of sleep on academic performance would be ideal (e.g. including the use of polysomnography in order to provide a more objective measure of sleep quality), however such a study could not easily be conducted. An observational study with rigorous methods could also be considered. For example, to remove recall bias, students' sleep hours could be recorded using diaries, and students' grades could be obtained with permission from student records.

3. Recommendations

We recommend creating awareness programs about the importance of practicing daily activities in moderation, in the right way, and raising religious awareness, which reflects positively on educational attainment and psychological stability of students.

4. Conclusion

We Conclude That the Most Effective Factor On The GPA of ASU Student Is the Mental Factor.

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