ORIGINAL ARTICLE

Association of Physical Activity and Dietary Behaviour on Sleep Quality among Students of Faculty of Architecture, Planning, and Surveying in Universiti Teknologi MARA (UiTM) Selangor

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ABSTRACT

Introduction: Inadequate sleep among undergraduate students might have an impact on their bodies and everyday activities. This study aims to investigate the association of physical activity and dietary behaviour on sleep quality among students of Faculty of Architecture, Planning, and Surveying in UiTM Selangor. **Method:** This research was conducted using a cross-sectional research and convenience sampling. The data were collected through the use of self-administered questionnaires from May to June 2022. Data analysis was done using Statistical Analysis Package for Social Sciences (SPSS) version 20.0. **Results:** A total of 321 students responded the questionnaire. The prevalence of poor sleep quality among undergraduate students of Faculty of Architecture, Planning and Surveying was 93.5%. It was found that physical activity was not associated ($p>0.05$) with sleep quality using Pearson's Chi-square test. Pearson's Chi-square test revealed that sleep quality was associated ($p<0.05$) with dietary behaviour which is Western fast food, sweets, water and breakfast skipping, gender, years of study and residential. **Conclusion:** This study revealed a high prevalence of poor sleep quality among students of Faculty of Architecture, Planning and Surveying. This information may be helpful in creating programs to treat and promote good sleep hygiene practices that may improve students' physical and mental health.
Malaysian Journal of Medicine and Health Sciences (2023) 19(6):171-177. doi:10.47836/mjmhs.19.6.23

Keywords: Sleep quality, Prevalence, Dietary behaviour, Physical activity, University students

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INTRODUCTION

Sleep is a physiological, psychological, and social term that affects people's health. As a result, it is considered one of the most essential variables determining people's quality of life. While sleep prepares an individual for a new day by allowing the body to relax, strengthening, regulating, and recuperating cognitive processes, variations in sleep patterns and sleep quality have an impact on everyday life (1). Poor sleep has been linked to chronic disorders such as obesity, hypertension, and diabetes (2). After waking up, a person's physical fitness and readiness for the new day is defined as sleep quality. The quantitative characteristics of sleep, such as sleep latency, sleep length, and the number of awakings in a single night, as well as the subjective features of sleep, such as deep sleep and relaxing sleep, are all considered when determining sleep quality (1).

These days, university students frequently experience sleep-related issues (3). There is a widespread perception that university students do not get enough sleep (1). Previous research in Malaysia reported that more than half of the students from medicine (4)(5) and health science (6)(7), suffered poor quality of sleep. However, students from architecture students were excluded. As a result, the goal of this study is to determine the impact of physical activity and food patterns on sleep quality among students of Faculty of Architecture, Planning, and Surveying from UiTM Puncak Alam which included architecture, town planning, landscape architecture and interior design students. Students' workload, excessive sleep deprivation, poor food, reduced exercise, and social inactivity are all prevalent elements of architecture students' life (8).

Other than that, students from this faculty were chosen to control bias because generally, students studying health sciences or medicine appear to have more knowledge

of health behaviour risk awareness. For example, one study found that those who studied health science were more aware of the health behaviour risks than students who did not study health science and in 13 out of the 14 health habits, health science students acknowledged the benefits of positive health behaviours much more frequently than non-health science students did (9).

Based on several research conducted, they found that low physical activity and poor nutritional intake have been associated with poor sleep quality among students. There is a statistically significant link between early falling asleep, waking up in the middle of the night or before dawn, and intense or moderate physical activity (2). Healthy food patterns and longer sleep duration have been linked in recent research in Australia and the United Kingdom (10). In Malaysia, there has been little research on the relationship between physical activity and nutritional consumption on sleep quality among undergraduate students. Therefore, the proposed study will help in understanding the causes of poor sleep, and its relationship with diet and physical activity among students.

MATERIALS AND METHODS

Subject
This research was conducted using a cross-sectional research approach. The sampling method that had been used in this study is convenience sampling. This study focused on undergraduate students of Faculty of Architecture, Planning, and Surveying that consists of 4 courses which is Architecture, Landscape Architecture, Interior Design and Town Planning in UiTM Selangor. The population of the students was approximately 1758. The sample size was calculated using Raosoft Software (CI 95% and p=0.05) (Sample Size Calculator by Raosoft, Inc.,2004). A total of 321 students were required in this study.

Measurement
The data was collected using a self-administered questionnaire that is divided into four sections. Google Form as an online survey was generated for participants to fill out and enter their responses to the questions presented. Questionnaire was self-administered and take no more than 15– 20 minutes to complete.

Socio-demographic measurement
This questionnaire contained background information such as sex, courses, years of study and residential to assess the subject's socio-demographic situation.

Sleep quality measurement
Pittsburgh Sleep Quality Index (PSQI) has seven component scores, each with a 0–3-point range (11). A score of '0' implies no difficulty, whereas a score of '3' indicates considerable difficulty in all circumstances.

The seven component values are then summed together to provide a single 'global' score that ranges from 0 to 21, with '0' indicating no difficulty and '21' indicating extreme difficulty in all categories. The total summation of the score <5 indicates that the individual experienced good sleep quality while ≥5 indicates poor sleep quality. Subjective sleep quality, sleep latency, sleep length, habitual sleep efficiency, sleep disruption, usage of sleeping medications, and daytime dysfunction are the seven values that make up the quality of sleep.

Physical activity measurement
The surveys are designed to offer universal instruments for obtaining internationally comparable data on health-related physical activity. This metric considers the types of the intensity of physical activity and sitting time that people engage in on a daily basis to calculate total physical activity in MET-min/week and sitting time. The International Physical Activity Surveys (IPAQ) are a series of four questionnaires that measure physical activity (12). The results of the IPAQ were reported by categories which are low physical activity (600MET-minutes/week), moderate physical activity (600–3000MET-minutes/week) and high physical activity (3000 MET-minutes/week).

Dietary behaviour measurement
Youth Risk Behavior Surveillance (YRBS) (13) consisted of 6 questions regarding frequency of food type that consumed from the past 7 days. Food behaviours that available are milk, fruits, vegetables, Western food, plain water, sweets and breakfast skipping. Examples of Western fast foods are hamburgers, hotdogs, or potato chips while sweets are chocolate, ice cream, candy, cakes. Each type of food consumed will be analysed with sleep quality to determine its association.

Ethical Consideration
This study was approved by the Faculty Ethics Review Committee of UiTM (FERC/FSK/MR/2022/0120). Prior to the data collection, an online consent form was obtained from each of the participants. The respondents had been informed they could withdraw at any time before or during the study. All the information answered by the respondents was kept confidential.

Data analysis
All descriptive statistics for categorical variables were demonstrated as frequencies and percentages. A chi-square test and Fisher's exact test was used to evaluate the association between food behaviour, physical activity and socio-demographic with sleep quality. The effect sizes were expressed as adjusted odds ratios (AORs) with 95 percent confidence intervals. Statistical Package for Social Sciences version 20.0 (SPSS) was used to analyse the data. All levels of significance were set at a standard p value of <0.05.

RESULTS

Socio-demographic distribution of respondents

There were 321 participants that completed the questionnaire with 116 male and 205 female students. The distribution of the respondents from four courses was 12.1% (n=39), 17.1% (n=55), 31.2% (n=100) and 39.6% (n=127) from interior design, town planning, architecture and landscape architecture, respectively. Depending on the academic year, there are 26.2% (n=84) first-year students, 34.6% (n=111) second-year students, 24% (n=77) third-year students and 15.3% (n=49) fourth-year students. According to the findings, 27.7% of respondents (n=89) lived off-campus, and more than 70% (n=232) of the respondents stayed on campus, respectively.

Sleep quality

Table I shows the overall sleep quality indicates that only 6.5% of the respondents were good sleepers, while ≥5 indicates that 93.5% (300) were bad sleepers.

Table I: Frequency distribution regarding sleep quality and its sub-dimensions of students (N=321)

Component		Frequency (%)
Subjective sleep quality	Very good (0 point)	13 (4)
	Fairly Good (1 point)	132 (41.1)
	Fairly Bad (2 points)	121 (37.7)
	Very bad (3 points)	55 (17.1)
Sleep latency	Under 15 minutes (0 point)	60 (18.7)
	16-30 minutes (1 point)	134 (41.7)
	31-60 minutes (2 points)	101 (31.5)
	Above 60 minutes (3 points)	26 (8.1)
Sleep duration	7 hours and above (0 point)	23 (7.2)
	6-6.9 hours (1 point)	20 (6.2)
	5-5.9 hours (2 points)	117 (36.4)
	Under 5 hours (3 points)	161 (50.2)
Habitual sleep efficiency	Above 85% (0 point)	131 (40.8)
	75-84% (1 point)	60 (18.7)
	65-74% (2points)	40 (12.5)
	Under 65% (3 points)	90 (28.0)
Sleep disturbances	None (0 point)	12 (3.7)
	Once a week (1 point)	192 (59.8)
	2 times a week (2 points)	109 (34.0)
	3 times a week and above (3 points)	8 (2.5)
Use of sleeping medication	None (0 point)	189 (58.9)
	Once a week (1 point)	61 (19.0)
	2 times a week (2 points)	61 (19.0)
	3 times a week and above (3 points)	10 (3.1)
Daytime dysfunction	Never (0 point)	39 (12.1)
	1-2 times a day (1 point)	118 (36.8)
	1-2 times a week (2 points)	130 (10.6)
	3 times a week and above (3 points)	34 (10.6)
Sleep quality	Global score <5 (good sleepers)	21 (6.5)
	Global score ≥5 (poor sleepers)	300 (93.5)

Physical activity

Results indicated that students were engaged in moderate physical activity (39.3%), followed by high physical activity (31.5%) and low physical activity (29.3%) in a week.

Association between physical activity and sleep quality

According to the findings, there is no association between the severity of physical activity and the quality of sleep (p=0.08) (Table II).

Dietary behaviour

Table III shows that the majority of the students consumed milk (56.7%) and western fast food (86.9%) at least one day or more in a week. In addition, most of the students ate fruits (63.9%), vegetables (84.1%) and sweets (90.3%) once and more times in a day. Other than that, they also drank water (84.1%) at least 4 cups and more in a day. However, only a small percentage of students (16.2%) adopted daily breakfast intake.

Table II: The association between physical activity and sleep quality

	Good sleepers n (%)	Bad sleepers n (%)	P-value
Physical activity[a]			0.080
Low	3 (3.2)	91 (96.8)	
Moderate	7 (5.6)	119 (94.4)	
High	11 (10.9)	90 (89.1)	

[a]Chi-square test
*Significant of P-value (p<0.05)

Table III: Frequency distribution of dietary behaviour of students (N=321)

Variables	n	%
Milk		
<1 day/w k	139	43.3
≥1 day/wk	182	56.7
Fruits		
<1 time/d	116	36.1
≥1 time/d	205	63.9
Vegetables		
<1 time/d	51	15.9
≥1 time/d	270	84.1
Western fast food		
<1 day/wk	42	13.1
≥1 day/wk	279	86.9
Water		
<4 cups/d	51	15.9
≥4 cups/d	270	84.1
Sweet		
<1 time/d	31	9.7
≥1 time/d	290	90.3
Breakfast skipping		
Breakfast consumption ≤6 days/wk	269	83.8
Breakfast consumption >6 days/wk	52	16.2

Association between food behaviour and sleep quality

According to Table IV, western fast food, χ^2 (1, N=321) = 4.739, p=0.042, water, χ^2 (1, N=321) = 4.244, p=0.023, sweets, χ^2 (1, N=321) = 5.158, p=0.040 and breakfast skipping, χ^2 (1, N=321) = 16.340, p=0.001 was positively associate with the sleep quality. Other than that, there was no association between milk χ^2 (1, N=321) = 0.002, p= 0.966, fruits χ^2 (1, N=321) = 0.557, p= 0.455 and vegetables χ^2 (1, N=321) = 2.081, p= 0.123 with the sleep quality.

Association between socio-demographic data and sleep quality

There was a significant association found between gender χ^2 (2, N=321) = 9.075, years of study χ^2 (4, N=321) = 14.049, and residential χ^2 (2, N=321) = 4.438 with sleep quality (p<0.05). However, no association (p>0.05) was found between the courses χ^2 (3, N=321) = 1.640, p with sleep quality (Table V).

DISCUSSION

The present study pointed out 93.5% rate of poor sleep quality among undergraduate students of the Faculty of Architecture, Planning and Surveying. The learning environment for the teaching of architecture is widely acknowledged to be exceptionally challenging and stressful (4). Meeting deadlines for assessments, more theoretical course work, and long hours spent on projects in studios (4) may be factors that might

Table IV: The association of dietary behaviour with sleep quality

	Good sleepers n (%)	Bad sleepers n (%)	P-value
Milk[a]			0.966
<1 day/w k	9 (6.5)	130 (93.5)	
≥1 day/wk	12 (6.6)	170 (93.4)	
Fruits[a]			0.455
<1 time/d	6 (5.2)	110 (94.8)	
≥1 time/d	15 (7.3)	190 (92.7)	
Vegetables[b]			0.123
<1 time/d	1 (2.0)	50 (98.0)	
≥1 time/d	20 (7.4)	250 (92.6)	
Western fast food[b]			0.042*
<1 day/wk	6 (14.3)	36 (85.7)	
≥1 day/wk	15 (5.4)	264 (94.6)	
Water[b]			0.023*
<4 cups/d	0 (0)	51 (100)	
≥4 cups/d	21 (7.8)	249 (92.23)	
Sweet[b]			0.040*
<1 time/d	5 (16.1)	26 (83.9)	
≥1 time/d	16 (5.5)	274 (94.5)	
Breakfast skipping[b]			0.001*
Breakfast consumption ≤6 days/wk	11 (4.1)	258 (95.9)	
Breakfast consumption >6 days/wk	10 (19.2)	42 (80.8)	

[a]Chi square test
[b]Fisher's exact test
*Significant of P-value (p<0.05)

Table V: The association of socio-demographic data with sleep quality

Variables	Good sleepers, n (%)	Bad sleepers, n (%)	P-value
Gender			0.030*
Male	14 (12.1)	102 (87.9)	
Female	7 (3.4)	198 (96.6)	
Courses			0.650
Architecture	7 (7.0)	93 (93.0)	
Interior Design	1 (2.6)	38 (97.4)	
Landscape Architecture	8 (6.3)	119 (93.7)	
Town Planning	5 (9.1)	50 (90.9)	
Years of Study			0.030*
Year 1	2 (2.4)	82 (97.6)	
Year 2	6 (5.4)	105 (94.6)	
Year 3	4 (5.2)	73 (94.8)	
Year 4	9 (18.4)	40 (81.6)	
Residential			0.035*
On-campus	11 (4.7)	221 (95.3)	
Off-campus	10 (11.2)	79 (88.8)	

*Significant of P-value (p<0.05)

contribute to poor sleep quality. Moreover, most of the students are moderately active (39.3%), followed by highly active (31.5%) and inactive (29.3%). This finding is consistent with a past local study where most of the students were minimally active, followed by Health Enhancing Physical Activity (HEPA) and inactive among health science students (6) (14). Physical activity was negatively associated (p>0.05) with sleep quality. The present finding supported by past local studies among health science students and undergraduate students (6) (15). Ramadhani et al. discussed that endorphins are produced by the pituitary glands as neurotransmitters that influence the ability to relax, feel calm, and sleep after engaging in physical exercise (2). Physical activity, especially vigorous exercise, has been found to shorten the duration of rapid eye movement sleep (16). Few experimental research (2,17) has found an association between physical activity and improved sleep quality and quantity, while observational data (6,14,15,18,19) on habitual physical activity is mixed. The disparity could be attributed to the fact that highly controlled experimental research often assesses the short-term effects of prescribed activity regimens on sleep patterns rather than habitual physical activity in naturalistic settings (18).

The study's findings indicated that more than half of the students consumed fruits (63.9%), vegetables (84.1%), milk (56.7%) more than once a week and water more than 4 cups daily. Findings was at par with other studies (20)(21). Moreover, 83.8% of the students skipped breakfast. Research has found that most students that skipped breakfast, stating "lack of time" as their excuse (22). Current study found that students consume sweets (90.3%) at least once daily and western fast food (86.9%) at least once a week. In contrast, a local study

among student of Universiti Sultan Zainal Abidin found that 14.1% of the dietetics students ate western fast food at least twice a week, fewer than the present study (23). This finding indicates that dietetic students imply good knowledge about western fast food as food educators. It is crucial to encourage them on improving breakfast consumption that enables optimum physical and mental performance in daily life. Other than that, consuming Western fast food and sweets must also be reduced to enhance one's physical health from being obese and at risk of cardiovascular disease.

Dietary habits, which can also impact many other elements of life, may affect sleep, a vital aspect of existence. Present findings revealed a significant difference (p<0.05) between Western fast food and sweets with sleep quality. This finding was consistent with research from China, that reported longer sleep times were associated to a lower propensity to consume Western fast food and sweets among adolescents (24). Another research from Australia also indicated an association between stress-related sleep disturbances and poorer dietary quality, frequent consumption of carbonated soft drinks, and fast food. However, the exact direction of this association is unknown (25). Lack of sleep may change the levels of hormones that control appetite (such as ghrelin and leptin), which can increase hunger and result in more frequent fast-food eating (25). There was also an association found between water (p<0.05) and sleep quality. It was inconsistent with one study from China where sleep quality was negatively significant with water consumption, but the explanation remains unclear (26).

The present study also demonstrated the association between breakfast skipping (p<0.05) with sleep quality. This result was consistent with most of the research findings in Colombia (27), Australia (28) and Brazil (29). Previous study in Japan found that those who skipped breakfast significantly increased their risk of insomnia, short sleep duration, and poor subjective sleep quality (30). Besides, breakfast consumption enhanced reported sleep quality and initiation, while slightly reducing measured sleep quantity (31). However, no associations (p>0.05) were found between better sleep quality and eating habits like milk, fruits and vegetables in the current study. In contrast, a study among adolescents in China found that consumption of milk, water, fruit, and vegetables was associated to a more significant sleep duration (24). A reduced intake of calcium, potassium, selenium, vitamin C, vitamin D, alpha-carotene, and lycopene was linked to sleep symptoms like difficulties falling asleep, difficulty maintaining sleep, non-restorative sleep, and daytime sleepiness (32). Sources of vitamins and minerals include fruits, vegetables, and milk. In the current finding, the food behaviour did not include serving size and thus nutrient analysis cannot be calculated, more reliable and precise assessment techniques may be used in the future. Overall,

relationships between eating and drinking behaviours and sleep in the current study were inconsistent. This could be a measuring error, or it could be a sign of distinct sleep dimensions (33).

This study demonstrated an association (p<0.05) between gender and sleep quality, with women being more likely to have poor sleep habits. This might be due to female students having a more challenging time falling asleep and needing to wake up more frequently during the night than their male counterparts (6). Years of the study were associated (p<0.05) with sleep quality was found in this study. One study found that one of the factors contributing to the higher prevalence of sleep deprivation among Year 5 students was due to full schedule, exams, and grades, psychological stress increased from the first to the fifth year of study (15). Other than that, residential was also found to be significant (p<0.05) with sleep quality, where students who stayed on campus had poor sleep quality. Given that the environment significantly impacts sleep quality, it is reasonable to assume that students living in dormitories have more tight conditions and lower sleep quality than other students (34).

There were several limitations to the findings of this research. Since just seven dietary behaviours were evaluated and did not include serving size, more reliable and precise assessment techniques, such as a 24-hour diet recall or a food frequency questionnaire, may be used in the future. The self-administered questionnaire may have caused the respondents to overestimate or underestimate their physical activity, sleep and dietary behaviour. This study's design was also subject to biases, including recall bias. Undeniably, some students were unable to respond to questions about the frequency and length of physical activity, sleep duration, and diet recall, which may have an impact on the outcomes. Conversely, a strength of this study was represented by the fact that this was the first study to evaluate sleep quality among students of faculty of Architecture, Planning, and Surveying.

Future intervention studies would be helpful to determine whether stressing the value of good sleep hygiene practices on dietary patterns and physical health would have a positive impact on students who currently engage in unhealthy sleeping habits, as well as the most effective method of communicating this information to college students. This information may be helpful to college health and counselling facilities in creating programmes to treat and promote good sleep hygiene practises that may improve students' physical and mental health.

CONCLUSION

This study revealed a high prevalence of poor sleep quality among students of Faculty of Architecture, Planning, and Surveying. It was found that physical

activity was not associated with sleep quality (p>0.05). Physical activity may be a useful approach to improve physical health among students (35). Despite students engaging in less physical activity like 175.95 minutes per week, they were still deemed physically active according to World Health Organization (WHO) (36). Sleep quality was significantly (p<0.05) associated with dietary behaviour which is western fast food, sweets and breakfast skipping, gender, years of study and residential, while other factors may not have a substantial impact on determining the quality of sleep. Therefore, good dietary habits must be encouraged, and unhealthy dietary patterns must be avoided to enhance good sleep quality and physical health.

ACKNOWLEDGMENTS

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