

# Relationship between Lifestyle, Quality of Sleep, and Daytime Drowsiness of Nursing Students of University A

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## Abstract

The harmful effects of technological devices, including smart phones have been increasingly suspected among university students; bedtimes have become increasingly later at night, and leisure activities often extend through the night. Likewise, availability and need of increasing part-time job hours have been considered. The purpose of this research was to determine the relationship among lifestyles, quality of sleep, and daytime drowsiness of nursing students of University A. The research was conducted in June 2015, when student life rhythms were considered stable after two months of lectures. Responses with missing values or with inappropriate answers were excluded. Of the data collected from 96 respondents, only 71 were acceptable. The survey focused on lifestyle, daytime sleepiness (using ESS: Epworth Sleepiness Scale) and quality of subjective sleep (using the PSQI: Pittsburgh Sleep Quality Index). Approval was obtained from the Research Ethics Committee of Shikoku University. While in this study, more than half (63.4%) of the students had poor quality of sleep, however, there was no relationship between their quality of sleep and daytime drowsiness, or between their lifestyles and the quality of sleep. These findings suggest that while university students' use of technological devices is suspected to influence on sleep deprivation and consequent daytime drowsiness, the findings did not provide the evidence.

## Keywords

University Students, Lifestyle, Quality of Sleep, Drowsiness at Daytime

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## 1. Introduction

A longstanding unsound lifestyle is thought to be involved in the onset and develop-

ment of diseases, including diabetes, hypertension and depression [1] [2] [3]. Lifestyle diseases are not only the biggest factor obstructing a healthy life-span, but they also adversely affect the national health expenditure [4]. It is said that lifestyle diseases can be prevented by maintaining a well-balanced diet, moderate exercise and sleep, and abstaining from smoking [5] [6] [7].

Recent studies report that sleeping disorders can cause the decrease of glucose tolerance and the increase of appetite [8]. Recent studies report that sleeping disorders can cause the decrease of glucose tolerance and the increase of appetite [8]. Also, it suggests that combinations involving physical inactivity, prolonged sitting, and/or long sleep duration, and smoking and high alcohol intake had the strongest associations with all-cause mortality and increase in the risk of various lifestyle diseases [9]. Approximately 20% of adults are said to have sleeping disorders [10]. Early diagnosis and treatment of sleep disorder is important in obesity prevention [11]. Sleep deprivation increases insulin resistance and may increase the risk of the onset of Type 2 diabetes [12]. Moreover, many patients with Type 2 diabetes have insomnia [13]. Analyzing the quality of sleep of hospitalized patients with Type 2 diabetes using electroencephalograph [14], has indicated that if HbA1c increased or worsened, poor glycemic control was independently associated with poor quality of sleep as represented by decrease of REM sleep latency.

Sleep should be evaluated not only by the length of time but also by the patients' subjective evaluation, leading to the screening of sleep problems [12] [15], the risk factors of lifestyle diseases, and autonomic nervous disorder.

The Pittsburgh Sleep Quality Index (PSQI) [16] is valued as a reliable index that can easily and qualitatively measure sleep disorders, and assess sleep quality and disturbances over a one-month time interval. The PSQI is often used because the questions to assess the qualitative sleeping condition are prepared in a simplified manner [17] [18] [19].

Generally, sleep disturbance results interfere with daily life activities due to inability to sustain sleep quality and daytime wakefulness [20]. However, the Epworth Sleepiness Scale (ESS) [21] measures subjective transient drowsiness during the daytime. The ESS is used globally and can be used not only for the measurement of drowsiness among patients having sleeping problems, but also for ordinary people [22]. Using the PSQI and ESS questionnaires to evaluate sleep quality and daytime sleepiness provides a reliable and valid measure for subjective sleep quality [23].

Sleep disturbances in adolescence have received significant attention because of their high prevalence and the negative health outcomes [24]. The sleep of university students can be disruptive because of leisure activities and part-time jobs at night, and as a result they go to bed late at night [25]. In addition, the use of electronic devices, including smart phones, has been increasingly identified as harmful [26]. The evidence indicates that lifestyle affects diabetes and quality of sleep, and in order to prevent lifestyle diseases during the early years, it is necessary to acquire a healthy lifestyle. Thus, it is important to grasp the relationship between daily lifestyle and sleep.

The purpose of this research was to clarify the relationship among lifestyle, quality of sleep, and daytime drowsiness of nursing students in University A.

## 2. Materials and Methods

### 2.1. Subjects

There were 96 subjects in this study comprised of students in their third year in University A. The inclusion criterion was that subjects must be university students. Any students who were unable to answer the questionnaire and had physical/psychiatric disorders were excluded.

### 2.2. Study Period

The research was conducted in June 2015, two months after the beginning of the school year and the student's life rhythms were considered more stable.

### 2.3. Measures

The lifestyle measures were based on previous research studies [27]. Students were asked to provide the following data: gender, age, whether they live alone or not, whether they have breakfast or not, the time from evening meals to bedtime, whether or not they take naps, have a part-time job or not, do regular exercise or not, their bathing schedule, whether they listen to music and watch TV, use smart phones before bedtime or not, whether they are awakened by a smart phone alarm, body height and weight (BMI: Body Mass Index), changes of body weight within the past year, drinking, and the existence or none existence of diabetes and hypertension within their family members.

The student's quality of sleep was evaluated using the PSQI and, at the same time, the degree of their drowsiness during the daytime was evaluated using the Japanese version of the Epworth Sleepiness Scale (ESS).

In this research, the cut-off score of  $>6$  would mean poor sleep quality in the PSQI [28], and the cut-off score of  $>11$  points indicated the possibility of daytime sleepiness based on the ESS [29], respectively.

For the quantitative variables, Spearman's rank correlation coefficient was calculated. For measuring the lifestyles, the data were divided into present or not present. For the PSQI data was divided into good or poor, and for ESS was divided into present not or present groups, respectively. For the qualitative variables, a cross-tabulation analysis was conducted and the related data were analyzed by Person's  $\chi^2$  test, Fisher's exact test and  $\Phi$ -coefficient.

### 2.4. Ethical Consideration

This research was conducted with the approval of the Ethics Committee of the Shikoku University in Tokushima, Japan. Researchers explained the purpose, content and method of the research study to prospective subjects, both verbally and in writing. Consent to participate was assumed when the questionnaire forms were returned by the subjects. Furthermore, it was also explained to prospective subjects that non-participation would not disadvantage them in any way. Anonymity was assured. No names or other identifying marks were required to participate in the study and the subjects were assured that publication of the results would only be made as aggregate data.

### 3. Results

The responses with missing values or inappropriate answers were excluded from the responses collected from 96 respondents. With this exclusion, the number of valid responses were 71 (74%), of which there were 12 men (16.9%) and 59 women (83.1%). Their average age was  $20.4 \pm 1.9$ , BMI was  $20.92 \pm 2.55$  kg/m<sup>2</sup>, PSQI was  $7.56 \pm 3.90$  points and ESS was  $8.51 \pm 3.81$  (see **Table 1**).

There was no significant relationship among the following: a) Time from evening meals to bedtime, b). BMI, c). PSQI and d). ESS scores (**Table 2**).

Regarding the relationship among lifestyles, PSQI and ESS scores, those subjects whose family members did not have Type 2 diabetes, had significantly higher scores in the PSQI ( $\phi$ -coefficient = 0.25,  $p < 0.05$ ). Forty-five subjects (63.4%) among 71 subjects had 6 points or more in PSQI. However, no significant relationships were found among the other items (see **Table 3**).

### 4. Discussion

The findings of this study yielded no significant relationship among the time from evening meals to bedtime, BMI, PSQI score and ESS score. However, PSQI score was  $7.56 \pm 3.9$  points, more than 60% of students were more than six points that indicating poor quality of sleep.

In previous research studies of more than 1,000 university students using PSQI [30], it was reported that 79.2% exceeded the cutoff point indicating poor sleep quality, and showed problems of chronic sleep deprivation, rhythmic irregularity between sleep and wakefulness, and that their bedtime became later as they advanced in their grade levels.

**Table 1.** Basic characteristics of this subject.

Age		$20.37 \pm 1.91$	(Yrs.)
Sex	Men	12	
	Women	59	
Time from Evening Meals to Bedtime		$5.26 \pm 1.26$	(Hours)
Body Height		$1.60 \pm 0.68$	(M)
Body Weight		$53.93 \pm 8.07$	(Kg)
BMI: Body Mass Index		$20.92 \pm 2.55$	(Kg/m <sup>2</sup> )
PSQI: Pittsburgh Sleep Quality Index		$7.56 \pm 3.90$	(Points)
ESS: Epworth Sleepiness Scale		$8.51 \pm 3.81$	(Points)

**Table 2.** Relationship among the time from evening meals to bedtime, BMI, PSQI and ESS scores.

	n = 71					
	BMI		PSQI scores		ESS scores	
Time from Evening Meals to Bedtime	-0.176	n.s.	-0.129	n.s.	-0.003	n.s.
BMI: Body Mass Index			0.135	n.s.	-0.094	n.s.
PSQI: Pittsburgh Sleep Quality Index					0.135	n.s.

\*Spearman's rank correlation coefficient, n.s.: not significant.

**Table 3.** Relationship among lifestyle, disease history of family, PSQI and ESS scores.

		PSQI						ESS									
		Low (less than 6)		High (6 or more)		$\chi^2$	P	$\varphi$	Low (less than 11)		High (11 or more)		$\chi^2$	P	$\varphi$		
		n	(%)	n	(%)				n	(%)	n	(%)					
LT (Living Together)	Live alone	15	(21.1)	21	(29.6)	0.80	0.37	n.s.	0.11	23	(32.4)	13	(18.3)	1.50	0.22	n.s.	-0.15
	Live with parents	11	(15.5)	24	(33.8)					27	(38.0)	8	(11.3)				
Breakfast	Take every day	21	(29.6)	39	(54.9)	0.44	0.37 <sup>a)</sup>	n.s.	-0.08	44	(62.0)	16	(22.5)	1.58	0.18 <sup>a)</sup>	n.s.	0.15
	Do not take every day	5	(7.0)	6	(8.5)					6	(8.5)	5	(7.0)				
Naps	Do	6	(8.5)	9	(12.7)	0.09	0.76	n.s.	0.04	9	(12.7)	6	(8.5)	0.99	0.32	n.s.	-0.12
	Do not	20	(28.2)	36	(50.7)					41	(57.7)	15	(21.1)				
Part-time jobs	Do	18	(25.4)	35	(49.3)	0.64	0.43	n.s.	-0.10	35	(49.3)	18	(25.4)	1.93	0.14 <sup>a)</sup>	n.s.	-0.17
	Do not	8	(11.3)	10	(14.1)					15	(21.1)	3	(4.2)				
Regularly exercise	Do	16	(22.5)	28	(39.4)	0.00	0.95	n.s.	-0.01	31	(43.7)	13	(18.3)	0.00	0.99	n.s.	0.00
	Do not	10	(14.1)	17	(23.9)					19	(26.8)	8	(11.3)				
Way of bath	Shower	15	(21.1)	24	(33.8)	0.13	0.72	n.s.	0.04	26	(36.6)	13	(18.3)	0.59	0.44	n.s.	-0.09
	Bathtub	11	(15.5)	21	(29.6)					24	(33.8)	8	(11.3)				
Listen to music and to watch TV	Do	13	(18.3)	22	(31.0)	0.01	0.93	n.s.	0.01	26	(36.6)	9	(12.7)	0.50	0.48	n.s.	0.08
	Do not	13	(18.3)	23	(32.4)					24	(33.8)	12	(16.9)				
Use of smart phone before bedtime	Do	20	(28.2)	41	(57.7)	2.74	0.10 <sup>a)</sup>	n.s.	-0.20	41	(57.7)	20	(28.2)	2.14	0.14 <sup>a)</sup>	n.s.	-0.17
	Do not	6	(8.5)	4	(5.6)					9	(12.7)	1	(1.4)				
Awakening by smart phone during bedtime	Every day	2	(2.8)	9	(12.7)	1.91	0.15 <sup>a)</sup>	n.s.	-0.16	7	(9.9)	4	(5.6)	0.29	0.42 <sup>a)</sup>	n.s.	-0.06
	Not every day	24	(33.8)	36	(50.7)					43	(60.6)	17	(23.9)				
Changes of body weight within the past year	Existence	16	(22.5)	23	(32.4)	0.72	0.40	n.s.	0.10	27	(38.0)	12	(16.9)	0.06	0.81	n.s.	-0.03
	None existence	10	(14.1)	22	(31.0)					23	(32.4)	9	(12.7)				
Drinking	Do	18	(25.4)	33	(46.5)	0.14	0.71	n.s.	-0.04	33	(46.5)	18	(25.4)	2.84	0.08 <sup>a)</sup>	n.s.	-0.20
	Do not	8	(11.3)	12	(16.9)					17	(23.9)	3	(4.2)				
Existence of diabetes within their family members	Existence	12	(16.9)	10	(14.1)	4.41	0.04	*	0.25	18	(25.4)	4	(5.6)	1.99	0.13 <sup>a)</sup>	n.s.	0.17
	None existence	14	(19.7)	35	(49.3)					32	(45.1)	17	(23.9)				
Existence of hypertension within their family members	Existence	20	(28.2)	26	(36.6)	2.65	0.10	n.s.	0.19	33	(46.5)	13	(18.3)	0.11	0.74	n.s.	0.04
	None existence	6	(8.5)	19	(26.8)					17	(23.9)	8	(11.3)				

Pearson's  $\chi^2$  test, a): Fisher's exact test, n.s.: not significant.

University students declared that because they have relatively enough free time and are in an environment where they control time by themselves, their bedtimes become later by increasing leisure activities and performing part-time jobs at night [31]. Previous studies indicate that lifestyle affects diabetes and quality of sleep [12] [13] [14], and furthermore, it was reported that university students' sleep problems and wakefulness adversely affect their academic achievement [32]. The disturbance of sleep leads to not only mental and physical problems, but also adversely affects academic achievement.

According to McHill *et al.*, eating evening meals late at night increases the risk of obesity and body weight gain [33]. Because the improvement of lifestyle decreases the risk of diabetes [7] [34], it is important for university students to enhance the quality of their sleep which can lead to an improvement of their lifestyle.

For drowsiness, the ESS score of about 30% of students was more than 11 points that indicate daytime sleepiness, but it had no significant relationship with lifestyle. This may be because the PSQI evaluated the students' own sleep for the past month, whereas the ESS only assessed for drowsiness on the day of the survey. Therefore, it is underscored that in order to investigate drowsiness during the daytime, it is necessary to survey the ESS perhaps several times a month, for at least the same period as when PSQI is surveyed.

No significant relationship was found between sleep and media devices such as "Listen to music and to watch TV", "Use of smart phone before bedtime", and "Awakening by smart phone during bedtime" in this study.

But other studies have indicated that people who were reading their iPads secreted less melatonin and took more time to enter the sleep cycle at night and their REM sleep time was shorter than those who were reading paper media [35]. In another study of men and women in the United Kingdom [36], the sleep-onset time of those who often used MP3 players and video games were much later, and their risks of early waking, nightmares and sleepwalking were much higher as well.

A significant finding was the relationship between lifestyle and the decreased scores on the PSQI of subjects whose family members did not have diabetes. It suggested that those subjects had poor sleep quality. However, this result does not represent other studies which indicate that persons with diabetes suffer from sleep deprivation indicating that there is a relationship between diabetes and sleep [37] [38]. When analyzing the results the genetic factor of diabetes must be considered [39]. Another factor to consider is the age of the subjects. In this research, the subjects were university students between the ages of  $20.37 \pm 1.91$ , and diabetes may not yet be a relevant factor.

## 5. Limitations

The small number of subjects in this study was a limitation and may have impacted the results. The relationship among lifestyle, PSQI and ESS, found that the PSQI score of those whose families did not have Type 2 diabetes, was significantly higher. These results indicate a need for a future research study which utilizes objective measurements, by targeting students who were judged to have poor quality of sleep and using an actigraph and heart rate variability analysis, promoting the behavioral transformation for

the improvement of the quality of life particularly of students who use technological devices and decrease the risks of lifestyle diseases. Moreover, this data was based on the sleep status of university third year grade students only. Therefore, it may be necessary to investigate the sleep status of other students. PSQI is for evaluating sleep quality during the past month. Therefore, there is a possibility that completion of school requirements at night may have imposed on students' sleep status.

## 6. Conclusion

In this study, more than half (63.4%) of the students had poor quality of sleep, however, there was no relationship between their quality of sleep and daytime drowsiness, or between their lifestyles and the quality of sleep. These findings suggest that while university students' uses of technological devices are suspected influences to poor quality of sleep and consequent daytime drowsiness, the findings haven't provided the evidence.

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## Conflict of Interest

All of the co-authors declare that they have no direct conflict of interest or grant support that is directly related to the content of the study.

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