Wellness and sleep quality in Korean nursing students: A cross-sectional study

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ABSTRACT

Background: Nursing students often experience stress and related sleep disturbances in striving to meet their academic needs. Wellness is the optimal state of health required to perform their roles successfully.
Aim: This study aimed to examine the relationship between wellness and sleep quality among nursing students in South Korea.
Methods: We conducted a descriptive and correlational study, using standardized tools assessing sleep quality and wellness. Participants were recruited through convenience sampling. We surveyed 237 nursing students from two Korean universities, who agreed to participate in this study and completed a self-reported questionnaire between June 2017 and March 2018. The online questionnaire collected data on general information about the participants, their wellness, and their sleep quality. Data were analyzed using descriptive statistics, Mann-Whitney U test, chi-square test and correlation analyses.
Results: We found a significant difference in wellness between the good-quality and poor-quality sleep groups and a positive correlation between nursing students' wellness and sleep quality.
Conclusions: The findings suggest that improving sleep quality is important for enhancing wellness among nursing students. Therefore, academic efforts are needed to improve nursing students' sleep quality and maximize their overall wellness and positively impact patient care.

1. Introduction

According to the World Health Organization's definition, wellness is the optimal state of physical, mental, emotional, intellectual, and social harmony in individuals (Smith, Tang, & Nutbeam, 2006). In other words, wellness refers to the ideal state of health to perform one's role with maximal functional capacity (Dunn, 1977; Van Lingen, van Douman, & Van Wannenburg, 2011; Yang, 2012). In Korea, wellness expresses the combined meanings of health, happiness, and wellbeing, and is defined as the process in which individuals pursue harmony in life in order to live healthily and perform their social roles successfully. Wellness is influenced by various factors such as individual health status, lifestyle, job satisfaction, and socioeconomic level (Dunn, 1977; Hermon & Davis, 2004; van Lingen et al., 2011). Particularly, sleep habits, which are related to personal lifestyle, are reported to affect

health status closely, which is an important indicator of wellness (Buysse, 2014; Chae et al., 2017; Steptoe, Peacey, & Wardle, 2006).

Shortly after graduating from high school, young adults attending college are faced with new life challenges, such as living in dormitories, managing their class and social schedules on their own, and preparing for employment (Dietch et al., 2016). Among these challenges, students strive to meet their academic and social needs, and often experience stress with related sleep disturbances (Valerio, Kim, & Sexton-Radek, 2016). Steptoe et al. (2006) found that 21% of college students were short sleepers (sleeping less than the globally recommended duration of 7 h) and Taylor et al. (2011) found that 9.4% of American college students reported difficulty falling or staying asleep on at least three nights per week. Additionally, excessive smartphone use among college students has been identified as a factor disturbing sleep (Ahn & Kim, 2015). Sleep problems increase the risk of developing physical illnesses,

including hypertension, heart disease, neurological diseases, digestive problems, and cancer, as well as mental disorders such as depression and anxiety (Bonvanie, Oldehinkel, Rosmalen, & Janssens, 2016; Vedaa et al., 2016). Therefore, assessing the wellness of college students should be preceded by an examination of their quality of sleep as the first step.

Nursing college students will ultimately be responsible as nurses for the wellness of their patients. To cope effectively with these demands, they need to know how to take care of their own wellness. Nursing college students are in the early stages of becoming nurses, and work in shifts. As they will experience in their future career, irregular lifecycles and work patterns are key obstacles to sleep (Park, Lee, & Park, 2018), especially in the nursing profession. For example, individuals with irregular schedules and shift work have a higher degree of fatigue due to insomnia and insufficient sleep, which impacts their self-esteem and job stress. Therefore, nursing college is an important period for students to form the habit of properly managing their sleep (Jung & Lee, 2015). Sleep management among nursing students has long-term implications for their wellness and can be an essential component of self-management as future nurses, which enables them to work for long periods (Park et al., 2018).

There are several studies about the relationship between sleep and wellbeing (Nair, 2018; van Lingen et al., 2011), but few have reported on the concept of wellness among nursing students who are currently in the early stage of training. Few studies on the sleep quality of Korean nursing students have focused on identifying factors that affect sleep, rather than differences in health status related to sleep quality (Ahn & Kim, 2015). Therefore, we investigated the association between sleep quality and wellness in nursing students with the aim of building efficient health management strategies for this population. In this study, the specific objectives were as follows: first, to assess levels of wellness and sleep quality among nursing students; second, to determine the relationship between their wellness level and sleep quality; and third, to examine differences in wellness, general health, and demographic characteristics according to sleep quality.

2. Methods

2.1. Study design and participants

This study is a descriptive correlational study, using first-year data of the Compassion Cohort Project, a longitudinal study. The purpose of this project was to explore nursing students' and registered nurses' changes in compassion competence, and their effects on the nursing profession and quality of care.

The participants were recruited from two universities (K University = 166 students, A University = 73 students) in South Korea through convenience sampling. The sample size was calculated using G*Power 3.1.9. For correlation analysis, we used significance level = 0.05, effect size = 0.3 (Chae et al., 2017), and 95% power. Considering a 20% dropout rate, we needed > 162 questionnaires. In total, 260 nursing students were enrolled, who demonstrated sufficient understanding of the study's purpose and methods, and voluntarily agreed to participate. The inclusion criteria for the participants were as follows: (1) being a college student attending nursing department in Korea, (2) being able to speak and read Korean, and (3) agreeing to participate in this study. We excluded individuals who reported acute conditions affecting their daily lives, psychiatric illnesses, or taking medication or being treated for sleep problems.

2.2. Data collection procedures

Data were collected through online self-report questionnaires on wellness and sleep quality, created using Survey Monkey, from June 14, 2017 to March 10, 2018. After they signed written informed consent forms, a text message including a URL for the online survey was sent to all students. At the start of the online survey, we verified our participants by asking them for the name of their university and major. Each participant completed the online questionnaire independently and received a $5 gift card. Of the 260 survey links sent, 250 (96.2%) questionnaires were completed. The study excluded two questionnaires for duplicate responses and 11 containing responses to fewer than two scales; thus, 237 (94.8%) questionnaires were included in the final analysis. Participant information was coded electronically for data storage, and the investigator's computer was password-protected to prevent unauthorized access.

2.3. Instruments

2.3.1. General characteristics

Details of age, sex, and academic level were collected with the self-report questionnaire. The grade point average was divided into five categories, from < 2.5 to > 4.0. Data on hobbies and religion were collected with the following questions: "Do you currently have a hobby that you enjoy more than once a week?" and "Do you have a religion?" respectively. Participants' most recently measured body weight and height were reported, and their body mass index (BMI) was calculated as weight (kg)/height squared (m^2).

2.3.2. Wellness Index

Wellness was measured using the Wellness Index (WI) scale, developed and validated in Korean by Choi, Son, Kim, and Ha (2016). This self-report questionnaire consists of 18 items, with five wellness dimensions: physical (4 items), emotional (5 items), social (3 items), cognitive (3 items), and occupational (3 items). Each item was rated on a five-point scale ranging from 1 (not at all) to 5 (extremely true). Total and subscale scores were calculated by taking the average across all items within each dimension; a higher score indicated a higher level of wellness. The Cronbach's alpha coefficients were 0.91 in the original WI scale and 0.90 in this study.

2.3.3. Sleep quality

Sleep quality and sleep patterns were assessed using the Korean version of the Pittsburgh Sleep Quality Index (PSQI-K), translated and validated by Sohn, Kim, Lee, and Cho (2012), which was based on the original PSQI of Buysse, Reynolds, Monk, Berman, and Kupfer (1989). This questionnaire consists of 18 self-report items and measures seven components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. Each item was rated on a four-point scale, ranging from 0 (never) to 3 (> 3 times a week). The global score of PSQI-K ranges from 0 to 21, with a higher score indicating worse sleep quality. Based on the criteria set by Buysse et al. (1989), we categorized participants with PSQI scores of ≤5 as having good sleep quality, and those with a score of > 5 as having poor sleep quality. Cronbach's alpha coefficient values were 0.84 in the original PSQI-K (Sohn et al., 2012) and 0.67 in this study.

2.4. Data analysis

Data analysis was performed using PASW Statistics software version 24.0 (IBM; Armonk, NY, USA). Descriptive statistics were conducted to summarize sample characteristics and study variables (e.g., sleep quality, WI). Continuous variables were summarized with means and standard deviations (SD), and categorical variables with frequencies and percentages. The association between sleep quality and WI was assessed using Pearson's correlation analysis. Bivariate analyses were conducted to examine differences in general characteristics and WI between the two groups by sleep quality, using Mann-Whitney U test for continuous variables (e.g., age, grade point average, BMI, and WI) and chi-square test for categorical variables (e.g., sex, academic level, hobbies, and religion). The internal reliability of the instruments was

Table 1
General characteristics of participants (N = 237).

Characteristics	Categories	Mean (SD) or N (%)	Max	Min
Sex	Male	42 (17.7)		
	Female	195 (82.3)		
Age (years)	Average	20.30 (1.50)	27	18
Academic level	Freshman (1st year)	32 (13.5)		
	Sophomore (2nd year)	119 (50.2)		
	Junior (3rd year)	38 (16.0)		
	Senior (4th year)	48 (20.3)		
Grade point average	≥4.0	25 (10.5)		
	3.5–3.9	76 (32.1)		
	3.0–3.4	75 (31.6)		
	2.5–2.9	15 (6.3)		
	< 2.5	5 (2.1)		
	Unknown	41 (17.4)		
Hobby	Yes	123 (51.3)		
	No	116 (48.7)		
Religion	Yes	233 (98.3)		
	No	4 (1.7)		
Body mass index (kg/m²)	Average	21.66 (3.25)	37.0	16.0
	Low (≤18.4)	24 (10.3)		
	Normal (18.5–22.9)	189 (79.7)		
	Overweight (23.0–27.4)	16 (6.7)		
	Obesity (≥27.5)	8 (3.3)		

Note. SD = standard deviation.

examined using Cronbach's alpha.

2.5. Ethical considerations

This study was approved by the institutional review board (IRB No. KNUTIRB 2017-50, AJIRB-SBR-SUR-17-386) of the institute to which the researchers are affiliated, and conducted in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki). To protect the rights of the participants, a joint investigator, unrelated to the participants, provided information about the study and took the informed consent form from students who had voluntarily agreed to participate.

3. Results

3.1. General characteristics

The general health and demographic characteristics of the participants are presented in Table 1. A total of 237 nursing students participated in the study; 82.3% (n = 119) were women, with an average age of 20.3 years (SD = 1.50). About half the participants (n = 119, 50.2%) were second-year students, and 32.1% (n = 76) had a grade point average of 3.5–3.9 up until the previous semester. The majority of respondents (n = 233, 98.3%) reported having no religion. The average BMI of the participants was 21.66 kg/m² (SD = 3.25); 79.7% (n = 189) had a normal BMI; 10.2% (n = 24) were underweight; and 9.7% (n = 24) were overweight or obese, based on the World Health Organization's Expert Consultation (2004) guidelines.

3.2. WI and sleep quality

The mean score of overall wellness was 3.44 (SD = 0.61), ranging from 1 to 5. Among the five subscales of wellness, social wellness had the highest mean score with 4.16 (SD = 0.67), followed by emotional (mean = 3.46, SD = 0.72), intellectual (mean = 3.46, SD = 0.75), occupational (mean = 3.32, SD = 0.86), and physical wellness (mean = 2.93, SD = 0.82).

The mean sleep duration of the nursing students was 6.13 h

Table 2
Descriptions of wellness and sleep quality (N = 237).

Variable	Mean	SD	Min.	Max.	Possible range
Sleep duration (hours)	6.13	1.80	0.00	11.75	0–24
PSQI-K global	7.41	3.03	1.00	16.00	0–21
1. Perceived sleep quality	0.04	0.25	0.00	2.00	0–3
2. Sleep latency	2.27	0.81	0.00	3.00	0–3
3. Sleep duration	1.22	1.20	0.00	3.00	0–3
4. Sleep efficiency	1.08	0.95	0.00	3.00	0–3
5. Sleep disturbance	1.07	0.43	0.00	3.00	0–3
6. Sleep medication	0.54	0.84	0.00	3.00	0–3
7. Daytime dysfunction	1.17	0.63	0.00	3.00	0–3
Wellness Index	3.44	0.61	1.50	5.00	1–5
1. Physical	2.93	0.82	1.00	5.00	1–5
2. Emotional	3.46	0.72	1.60	5.00	1–5
3. Social	4.16	0.67	1.00	5.00	1–5
4. Intellectual	3.46	0.75	1.00	5.00	1–5
5. Occupational	3.32	0.86	1.00	5.00	1–5

Note. PSQI-K = Pittsburgh Sleep Quality Index-Korean version; SD = standard deviation; Min = minimum; Max = maximum.

(SD = 1.80), and the global mean score of PSQI was 7.41 (SD = 3.03), ranging from 1 to 16. Of the seven components, the mean score of sleep latency was the highest at 2.27 (SD = 0.81), meaning that participants found it hard to fall asleep; perceived sleep quality was the lowest at 0.04 (SD = 0.25), meaning that participants perceived themselves as having good sleep quality. The detailed values for wellness and sleep quality are reported in Table 2.

3.3. Correlations between WI and sleep quality

The results indicate a significant correlation between sleep quality and overall wellness scores in nursing students ($r = -0.19$, $p < 0.001$). Of the five subscales of wellness, three subscales—physical ($r = -0.12$, $p < 0.001$), emotional ($r = -0.23$, $p < 0.001$), and occupational wellness ($r = -0.21$, $p = 0.001$)—showed a significant correlation with the PSQI global score. Among the components of PSQI, subjective sleep quality ($r = -0.19$, $p = 0.001$) and sleep disturbance ($r = -0.16$, $p = 0.02$) had a significant correlation with the total WI. Among the relationships between each component of the variables, there were significant correlations between physical wellness and sleep medication ($r = -0.13$, $p = 0.04$); emotional wellness and sleep efficiency ($r = -0.14$, $p = 0.03$), sleep medication ($r = -0.17$, $p = 0.01$), and daytime dysfunction ($r = -0.24$, $p < 0.001$); and occupational wellness and sleep latency ($r = -0.16$, $p = 0.02$), sleep efficiency ($r = -0.26$, $p < 0.001$), and daytime dysfunction ($r = -0.14$, $p = 0.03$) (Table 3).

3.4. Differences in demographics and wellness by sleep quality

Table 4 shows the frequencies and mean differences in the general characteristics and WI scores of nursing students by sleep quality (good vs. poor sleep quality). About 30.4% (n = 72) of the participants scored ≤5 in the PSQI global score, indicating that they had experienced good-quality sleep, and 69.6% (n = 165) indicated poor-quality sleep with a score > 5. There was a significant difference in age ($z = -4.01$, $p < 0.001$), academic level ($\chi^2 = 30.91$, $p < 0.001$), overall wellness ($z = -2.10$, $p = 0.04$), emotional wellness ($z = -2.94$, $p = 0.002$), and occupational wellness ($z = -3.04$, $p = 0.002$) by sleep quality status. However, sex ($\chi^2 = 0.01$, $p = 0.93$), grade point average ($z = 4.80$, $p = 0.31$), hobbies ($\chi^2 = 3.84$, $p = 0.06$), religion ($\chi^2 = 0.06$, $p = 0.81$), BMI ($z = -1.23$, $p = 0.22$), physical wellness ($z = -0.66$, $p = 0.51$), social wellness ($z = -0.69$, $p = 0.49$), and intellectual wellness ($z = -0.79$, $p = 0.49$) did not significantly differ by sleep quality (Table 4).

Table 3
Correlations between wellness and sleep quality (N = 237).

Variables	Wellness Index					
	Total	Physical	Emotional	Social	Intellectual	Occupational
	r (p)					
PSQI-K global	−0.19	−0.12	−0.23	−0.07	−0.07	−0.21
	(0.001)	(< 0.001)	(< 0.001)	(0.28)	(0.32)	(0.001)
Subjective sleep quality	−0.19	0.05	−0.03	−0.07	0.09	0.06
	(0.001)	(0.45)	(0.68)	(0.29)	(0.18)	(0.41)
Sleep latency	0.02	−0.08	−0.11	−0.02	−0.10	−0.16
	(0.71)	(0.20)	(0.08)	(0.74)	(0.14)	(0.02)
Sleep duration	−0.12	0.04	0.12	−0.05	−0.02	−0.12
	(0.06)	(0.59)	(0.07)	(0.47)	(0.71)	(0.06)
Sleep efficiency	−0.09	−0.06	−0.14	−0.08	−0.09	−0.26
	(0.16)	(0.39)	(0.03)	(0.20)	(0.19)	(< 0.001)
Sleep disturbance	−0.16	−0.07	−0.09	−0.03	0.12	0.09
	(0.02)	(0.27)	(0.19)	(0.66)	(0.08)	(0.15)
Sleep medication	−0.01	−0.13	−0.17	0.01	−0.05	−0.10
	(0.90)	(0.04)	(0.01)	(0.86)	(0.42)	(0.13)
Daytime dysfunction	−0.13	−0.11	−0.24	−0.08	−0.08	−0.14
	(0.05)	(0.08)	(< 0.001)	(0.20)	(0.24)	(0.03)

Note. PSQI-K = Pittsburgh Sleep Quality Index-Korean version.

Table 4
Differences in demographics and wellness by sleep quality (N = 237).

Variables	Good sleep quality (n = 72, 30.4%)		Poor sleep quality (n = 165, 69.6%)		z or χ²	p
	N or mean	% or SD	N or mean	% or SD		
Age (years)	19.75	1.23	20.54	1.54	−4.01	< 0.001
Sex					0.01	0.93
Male	13	18.1	29	17.6		
Female	59	81.9	136	82.4		
Academic level					30.91	< 0.001
Freshman (1st year)	8	11.1	24	14.5		
Sophomore (2nd year)	55	76.4	64	38.8		
Junior (3rd year)	5	6.9	33	20.0		
Senior (4th year)	4	5.6	44	26.7		
Grade point average	2.62	1.03	2.44	0.86	4.80	0.31
Hobbies					3.84	0.06
Yes	43	60.6	76	46.6		
No	28	39.4	87	23.4		
Religion					0.06	0.81
Yes	71	98.6	162	98.2		
No	1	1.4	3	1.8		
Body mass index (kg/m²)	21.0	2.90	21.79	3.30	−1.23	0.22
Wellness Index	3.57	0.57	3.37	0.62	−2.10	0.04
Physical	2.98	0.77	2.91	0.84	−0.66	0.51
Emotional	3.68	0.67	3.36	0.72	−2.94	0.002
Social	4.22	0.61	4.13	0.69	−0.69	0.49
Intellectual	3.51	0.72	3.43	0.77	−0.79	0.49
Occupational	3.57	0.84	3.21	0.84	−3.04	0.002

Note. SD = standard deviation; Poor sleep quality was measured using Pittsburgh Sleep Quality Index-Korean version, with global score > 5.

4. Discussion

This study aimed to examine the relationship between wellness and sleep quality among nursing students in early adulthood. The results showed that the wellness of nursing students was correlated with sleep quality and that the group with good sleep quality had a higher wellness level than those with poor sleep quality. In addition, nursing students indicated the highest scores in social wellness and lowest in physical wellness.

In the study, nursing students reported a mean wellness score of 3.44, which was higher than that reported by hospital shift nurses in a previous study (Chae et al., 2017). Regarding the wellness aspect, among the five domains of wellness, the scores of nursing students were the lowest in the physical domain. This finding is consistent with other studies of wellness, in which nurses and nursing students reported the lowest levels of physical wellness (Chae et al., 2017; van Lingen et al., 2011). It is easy for shift nurses and nursing students, who study and practice irregularly, to experience fatigue, sleep deprivation, and gastrointestinal disorders (Kim, 2011; Kim et al., 2002). Regular lifestyle and exercise are requirements for physical wellness in the WI. Therefore, to improve the wellness of nursing students, it is important to maintain the regularity of life patterns in hours rather than practice time.

The majority of participants (69.6%) reported poor sleep quality based on the PSQI global score; the mean sleep duration was 6.13 h. Sleep quality in this study was lower than that in previous studies on sleep quality in nursing students (Ahn & Kim, 2015; Buysse, 2014). Additionally, the sleep duration of Korean nursing students may be less in general than the globally recommended duration by at least 1 h (Itani, Jike, Watanabe, & Kaneita, 2017; Steptoe et al., 2006). Nursing students tend to have difficulty in sleeping regularly because of educational environment patterns such as changeable clinical practice time (Demir, 2017). Prominent factors affecting quality were sleep latency, sleep duration, and daytime dysfunction, which were consistent with previous research (Ahn & Kim, 2015). Short sleep may result in long sleep latency, which can lead to daytime dysfunction. This is similar to the results of previous studies, demonstrating that lack of sleep for nursing students is associated with high levels of stress for academic achievement. Students without sleep problems maintain better psychological health (Klainin-Yobas, He, & Lau, 2015; Simonelli-Muñoz et al., 2018). Therefore, it is necessary to help nursing students control their sleep, despite their irregular work patterns.

The wellness of nursing students was correlated with sleep quality. The wellness of the good-quality sleep group was higher than that of the poor-quality sleep group. This result was consistent with the findings of previous studies (Chae et al., 2017; Bonvanie et al., 2016; Valerio et al., 2016;), which found that poor sleep quality among college students and adults is associated with higher stress levels and poorer health. Nursing college students have to attend both classes and clinical practice, and practice time is changeable. Because of these academic characteristics, managing consistent sleep patterns is a new challenge for students. Due

to their irregular work patterns, their quality of sleep is inevitably lower (Demir, 2017). For this reason, attention must be focused on sleep quality and wellness during college. The health habits of college students in early adulthood create wellness in individuals after middle age. Wellness is reflected as harmony in one's life in order to live healthily and perform social roles successfully. To improve wellness, inevitably the sleep quality must be improved. Additionally, there were differences in age and academic level between the good- and poor-quality sleep groups. These findings are consistent with those of a previous study of nursing students (Demir, 2017). However, in terms of grade point average, which represents academic performance, there was no difference between the two groups. This finding is consistent with previous studies, which found that students' grades were related to their circadian sleep cycles, not their sleep time or quality (Jung & Hye Sue, 2007; Onyper, Thacher, Gilbert, & Gradess, 2012). Considering the changeable clinical practice of nursing students, the academic performance of nursing students may be related to their ability to adapt to changes in their sleep cycles. Therefore, further study and comparison of the relationship between nursing students' sleep cycles and academic performance may be needed in the future.

The strengths of this study are the following. It comprehensively identified the level of sleep quality and wellness among nursing students, though there has been inadequate data thus far. We also found that there was a relationship between sleep quality and wellness among Korean nursing students.

Despite these strengths, this study's finding should be considered in light of several limitations. The results of this study are difficult to generalize because we collected data from only two universities. In the future, additional studies will be needed for other college students or other population groups. The reliability of the PSQI, the main variable in this study, was low. When we reviewed the PSQI data of this study, sleep latency scores were much higher than those reported in previous studies (Ahn & Kim, 2015; Bonvanie et al., 2016; Buysse, 2014). This may be influenced by Korean students' use of smartphones in bed. In Korea, 99.2% Koreans in their 20s use smartphones and college students spend 4.9 h a day on smartphones, usually in bed (Korean Internet & Security Agency, 2013; Wood, Loughran, & Stough, 2006). Considering this, we can infer that the participants may have included the time spent using their smartphones in bed when answering the above questions. This may be the reason for the high sleep latency scores, which may have affected the reliability of the PSQI. Finally, while this study revealed the relationship between sleep quality and wellness in a cross-sectional study, this is not the basis for causality. Causality will need to be verified through a longitudinal study.

4.1. Conclusion and suggestions

This study demonstrates that a considerable number of Korean nursing students had poor sleep quality, and that this was important for enhancing wellness among nursing students. Based on the results, we suggest that education on sleep regulation is needed to enhance sleep quality and wellness in nursing students. Subsequent studies should expand their scope to include more diverse variables that affect nursing students' wellness.

Funding source(s)

Declaration of Competing Interest

The authors declare that there is no conflict of interest.

Acknowledgments

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