Original Article

Poor sleep quality and its related risk factors among university students

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Background: Poor sleep quality is a major health problem worldwide. In universities, poor sleep quality can effect student's ability to study and have a serious impact on their psychological and physical well-being. The aim of this study was to explore the quality of sleep among university students and identify risk factors associated with poor sleep quality.

Methods: A cross-sectional study was conducted and the Pittsburgh sleep quality index scale was used to measure sleep quality. The overall score of the PSQI ranges from 0 to 21, with a score of 4 or less indicating good sleep quality, a score of 5–10 indicating fairly good sleep quality, 11–15 indicating fairly bad sleep quality, and a score of 16–21 indicating poor sleep quality.

Results: A total of 1,317 subjects were enrolled in the study. Most subjects were female (64.6%) and rural based (69.2%). Low intensity sports activity more than once per week was reported by 81.9% of subjects and 59.8% reported they participated in high-intensity sports more than once a week. In addition, 72.8% of subjects took a nap more than three times per week.

Conclusions: We found that physical activity and taking a nap may be important factors in improving sleep quality and preventing sleep disorders among university students.

Keywords: Exercise; risk factors; sleep; students; universities

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Introduction

Poor sleep quality is a major health problem worldwide (1-3). In universities, poor sleep quality can effect student's ability to study and have a serious impact on their psychological and physical well-being (4-8). The physical and mental health problems of university students caused by poor sleep quality have been the subject of several research studies (9,10).

One study found that many university students sleep less than 6 hours every day, which is less than the 8–10 hours recommended by the National Sleep Foundation (11). Approximately one-third of students suffer from insomnia, with about 40% reporting they wanted to sleep during the daytime (11,12). Some studies have found that elite sport is associated with sleep quality (13). The Pittsburgh sleep quality index (PSQI) was adopted to measure sleep quality.

The PSQI scale consists of seven factors: subjective sleep quality, sleep duration, sleep latency, sleep efficiency, sleep disturbances, use of sleep drugs, and daytime dysfunction. However, little is known on the relationship between different degrees of physical activity intensity and sleep quality among university students.

This objective of this study was to evaluate sleep quality and identify risk factors associated with poor sleep quality among university students. We results revealed that physical activity and nap may be important factors in improving sleep quality and preventing sleep disorders in this group. The results should attract public attention towards the promotion of sleep quality through physical activities and encourage more research on the relationship between nap and sleep quality.

We present the following article in accordance with the STROBE reporting checklist (available at http://dx.doi.org/10.21037/apm-21-472).

Methods

Study design

A cross-sectional study was conducted involving 1,317 subjects (466 males and 851 females), aged 16–24 years. All procedures performed in studies involving human participants were in accordance with the Declaration of Helsinki (as revised in 2013). Informed consent was obtained from all individual participants included in the study. The study was approved by institutional ethics board of Wannan Medical College. All subjects provided written informed consent to participate in the study. The study was approved by institutional ethics board of Wannan medical college.

Measurement

General demographics

Self-administered questionnaires consisting of general demographics (age, gender, parents' education, family income, nap habits, and physical activity) were used.

Sleep quality

The Pittsburgh sleep quality index (PSQI) was adopted to measure sleep quality. The PSQI scale consists of seven factors: subjective sleep quality, sleep duration, sleep latency, sleep efficiency, sleep disturbances, use of sleep drugs, and daytime dysfunction. The overall score of the PSQI ranges from 0 to 21, with a score of 4 or less indicating good sleep quality, a score of 5–10 indicating fairly good sleep quality, 11–15 indicating fairly bad sleep quality, and a score of 16–21 indicating poor sleep quality. In this study, a total score of PSQI over 5 was defined as poor sleep quality.

Physical activity

Low-intensity sports were considered activities such as walking or tai-chi, which lasted 20 minutes or more, and high-intensity sports as those such as playing ball or running, lasting 20 minutes or more.

Data analysis

SPSS20 (Inc., Chicago, IL, USA) was used for data processing and statistical analysis. Independent sample *t*-test was used for continuous variables, while chi-square test was used for categorical variables such as gender, parents' education, family income, and physical activity intensity. $P<0.05$ was defined as statistical significance.

Results

General characteristic of the subjects included

A total of 1317 subjects were enrolled. Most subjects were female (64.6%) and rural (69.2%) (*Table 1*). Almost 82% of female subjects engaged in low-intensity sports more than once per week and 59.8% of rural subjects engaged in high-intensity sports more than once per week. In addition, 72.8% of all subjects took a nap more than three times per week. The family income was less than ¥10,000 in 25.1% of respondents.

Descriptive statistics of the components of the PSQI

Table 2 shows descriptive statistics of the components of the PSQI, revealing 31.5% of students considered their subjective sleep quality to be very good, and 34.4% obtained a score of 0 for sleep latency. The distribution of the PSOI score was showed in *Figure 1*. The sleep duration factor shows that 74.7% of students slept more than 7 hours every day, and 87.5% obtained a sleep efficiency rating of more than 85% using the formula actual sleep time/actual time in bed. Only 0.7% of students scored 19 or more for sleep disorders, and 10.3% used sleep medicines. In the last category of daytime dysfunction scores, 7.5% of students scored more than 5 meaning they were unable to study

Table 1 Subject characteristics

Variable	N (%) or mean ± standard deviation
Age (years)	19.5±1.3
Gender, n (%)	
Male	466 (35.4)
Female	851 (64.6)
Father education, n (%)	
Primary school and below	245 (18.6)
Middle school	904 (68.6)
College and above	167 (12.7)
Missing data	1 (0.1)
Mother education, n (%)	
Primary school and below	586 (44.5)
Middle school	628 (47.7)
College and above	103 (7.7)
Missing data	2 (0.2)
Location, n (%)	
Rural	912 (69.2)
Urban	404 (30.7)
Missing data	1 (0.1)
Income (RMB), n (%)	
<10,000	331 (25.1)
10,000–30,000	430 (32.6)
30,000–60,000	395 (30.0)
>60,000	156(11.8)
Missing data	5 (0.4)
Low-intensity sports, n (%)	
Never	239 (18.1)
1 to 2 times per week	722 (54.8)
3 to 4 times per week	271 (20.6)
More than 5 times per week	85 (6.5)
High-intensity sports, n (%)	
Never	529 (40.2)
1 to 2 times per week	609 (46.2)
3 to 4 times per week	127 (9.6)
More than 5 times per week	52 (3.9)
Nap, n (%)	
Never	62 (4.7)
Almost no (< once a week)	83 (6.3)
Sometimes (1 to 2 times per week)	213 (16.2)
Often (3 to 4 times per week)	416 (31.6)
Everyday	542 (41.2)
Missing data	1 (0.1)
Pittsburgh sleep quality index (PSQI) score, n (%)	
<5	904 (68.6)
≥5	397 (30.1)
Missing data	16 (1.2)

during the daytime (*Table 3*).

Correlation of sleep quality with characteristics of subjects

The correlation of sleep quality with characteristics of subjects was analyzed by chi-square test. The results showed that sleep quality was associated with high-intensity sports, low-intensity sports, and naps. No association was found between sleep quality and gender, parental education, location, or income (*Table 3*).

Discussion

The purpose of this study was to assess the risk factors affecting the sleep quality of university students in a cross-sectional study and to speculate the correlation between these factors and sleep quality. It was found that physical activities and nap were associated with sleep quality among university students. While most studies have paid attention to the relationship between competitive physical activity and sleep quality, this study found that both high-intensity and low-intensity physical activity may improve sleep quality. We speculate that physical activities to different degrees may consume university students' physical strength inducing fatigue reducing stress, both of which may improve sleep quality.

In our study, the rate of poor sleep quality among university students was 30.1%, in comparison to 54.7% found in the study by Cheng *et al.* (14). Whilst this

Table 2 Description statistics of the components of Pittsburgh sleep quality index (PSQI)

Item	Frequency	Percentage
Subjective sleep quality		
Very good	415	31.5
Fairly good	713	54.1
Fairly bad	167	12.7
Very bad	17	1.3
Sleep latency		
0	453	34.4
1–2	576	43.7
3–4	248	18.8
5–6	33	2.5
Sleep duration (hours)		
>7	984	74.7
6–7	290	22.0
5–6	27	2.1
<5	12	0.9
Sleep efficiency (%)		
>85	1,152	87.5
75–84	121	9.2
65–74	23	1.7
<65	15	1.1
Sleep disturbances score		
0	245	18.6
1–9	911	69.2
10–18	143	10.9
19–27	9	0.7
Use of sleep medication		
Not during the past month	1177	89.4
Less than once a week	92	7.0
Once or twice a week	34	2.6
Three or more times a week	9	0.7
Daytime dysfunction score		
0	260	19.7
1–2	507	38.5
3–4	445	33.8
5–6	99	7.5

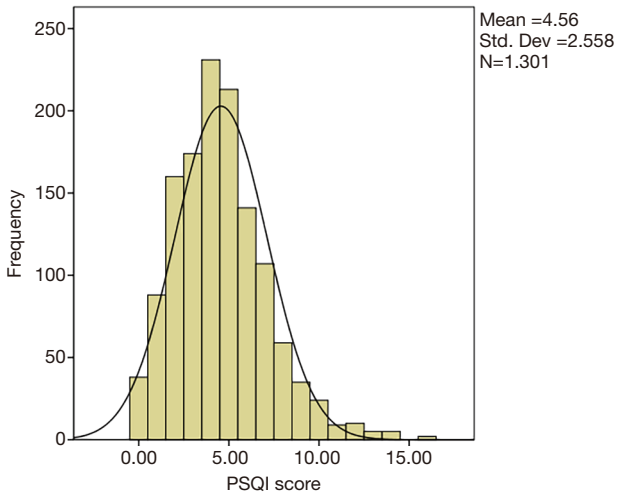

Figure 1 Distribution of the PSQI score

discrepancy may be due to the use of different measurement methods between the two studies, it may also be due to our consideration of naps as a factor influencing sleep quality. While no previous studies have confirmed a relationship between nap and sleep quality, our results indicate that naps allow students to more successfully complete their daytime learning tasks and reduce lethargy, both of which could contribute to improving quality of sleep.

Finally, 43 students reported having used sleep medication, among which nine used sleep medicine more than three times per week, although the reasons for this were not explored. The possible reasons may be that there are too many curriculums need to do for university students.

A potential limitation of this study is that it was conducted in a single location and the results may not be transferable to other contexts. In addition, assessing the relationship between physical activity and sleep quality among university students should include other factors such as caffeine and tobacco intake, body mass index, and major area of study. Finally, as a cross-sectional study, the results only provide correlation and causal relationships cannot be inferred.

In summary, the results suggest that the incidence of poor sleep quality in university students is high, and more attention should be paid to the physical and mental health of this group. Promoting their participation in physical activities and developing effective work-rest programs is encouraged.

Conclusions

This study could pave the way for cohort studies on

Table 3 The relationship between sleep quality and subject characteristics

Variable	PSQI score <5	PSQI score ≥5	Chi-square	P
Gender			0.22	0.64
Male	318	145		
Female	586	252		
Father education			0.31*	0.58
Primary school and below	165	78		
Middle school	622	270		
College and above	116	49		
Mother education			1.04*	0.31
Primary school and below	388	188		
Middle school	446	177		
College and above	68	32		
Location			0.13	0.72
Rural	621	277		
Urban	282	120		
Income			0.55*	0.46
<¥10,000	227	98		
¥10,000–30,000	290	136		
¥30,000–60,000	272	120		
>¥60,000	114	40		
Low-intensity sports			6.51*	0.01
Never	143	88		
1 to 2 times per week	503	215		
3 to 4 times per week	198	71		
More than 5 times per week	60	23		
High-intensity sports			5.67*	0.02
Never	335	187		
1 to 2 times per week	445	159		
3 to 4 times per week	88	36		
More than 5 times per week	36	15		
Nap			12.98*	<0.01
Never	37	25		
Almost no (< once a week)	45	36		
Sometimes (1 to 2 times per week)	142	70		
Often (3 to 4 times per week)	286	122		
Everyday	394	143		

* represents linear-by-linear association.

sleep quality and related factors in the population of university students. We found that physical activity and nap may be important factors in improving sleep quality and preventing sleep disorders in this group. The results should attract public attention towards the promotion of sleep quality through physical activities and encourage more research on the relationship between nap and sleep quality.

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Footnote

Reporting Checklist: The authors have completed the STROBE reporting checklist. Available at http://dx.doi.org/10.21037/apm-21-472

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Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in studies involving human participants were in accordance with the Declaration of Helsinki (as revised in 2013). Informed consent was obtained from all individual participants included in the study. The study was approved by institutional ethics board of Wannan medical college.

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