Survey on Sleep Quality of Undergraduate College Students in Shiyan City and Analysis of Influencing Factors

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Abstract: This study focused on the current situation of sleep quality and influencing factors of undergraduate college students in Shiyan. Stratified sampling was used to select 420 students enrolled in five colleges and universities with different majors to conduct a cross-sectional study. Sleep quality was assessed by online and offline questionnaires using the Pittsburgh Sleep Quality Index Scale, and demographic, psychobehavioral, and environmental adaptation factors were analyzed. There were 396 valid questionnaires with a validity rate of 94.3%. The results showed that the detection rate of sleep disorders was 76.8%. Univariate analysis showed that those who exercised ≥3 times per week had shorter sleep duration and less daytime dysfunction; those with high anxiety, who went to sleep after 23:00, and who rated their health as "not good" had higher PSQI scores; and women's scores on sleep disorder dimensions were higher than those of men. In conclusion, the high prevalence of sleep disorders among undergraduate college students in Shiyan City is attributed to the independent risk factors of anxiety, late-night behaviors, lack of exercise, and health conditions. Therefore, it is necessary to target mental health education and health behavior interventions, as well as optimize work and rest management to improve students' sleep quality.

Keywords: Sleep Quality; Sleep Disorders; Influencing Factors; Pittsburgh Sleepiness Quotient Index (PSQI)

1. Introduction

With the change of modern life rhythm and lifestyle, the harm caused by sleep problems has become more and more prominent. Some studies have shown that sleep problems have become a threat to the health and quality of life of more than 45% of the world's population and an important public health problem [1]. College students, as a special group, face pressure from various aspects such as study, life, employment, etc., and the good or bad sleep condition directly affects their physical and mental health and learning efficiency. In domestic studies, Ma et al [2] findings indicate that the sleep quality of college students is unsatisfactory. Wang et al. [3] found that, the sleep quality of college students was generally poor, and the risk of sleep disorders increased among undergraduates in their fourth and fifth years of college and graduate students of all grades. A study by Zhang and Wu [4] of students at three universities in Suzhou showed that the prevalence of sleep disorders was as high as 44.8%. Research data from 26 countries showed that 10.2% of male college students had sleep problems, and 10.5% of females had sleep problems [5].

It should be noted that the factors affecting the sleep quality of college students are multifaceted, including socio-demographic factors, mental anxiety state, personal health factors, study pressure, economic pressure, and the sleep environment, etc., and there are more studies related to this. Yang et al. [6] found that study stress, health status, and sleep environment are factors that affect the sleep quality of university students. Pan et al. [7] showed that gender, grade, major, source of birth, sexual masturbation, time spent on the Internet, noisy sleep environment, emotional instability, anxiety, excessive fatigue, no one to talk to about their personal worries, poor relationship with classmates, and high economic pressure are factors that affect the sleep quality of college students. Foreign scholars have shown that sleep disorders have a predictive efficacy for physical activity, and negative physical activity is often associated with severe sleep disorders [8]. Studies have found [9] that anxiety and depression mood states of college

students are related to sleep disorders, and sleep disorders also lead to changes in mood states. Shuai et al, in a survey of students in an institution, found that those who used cell phones during long daytime hours were more likely to have poor sleep quality, and that prolonged cell phone use could reflect the severity of poor sleep quality [10]. A related study by Xu et al. [11] found that college students' dietary behaviors can affect sleep quality, and irregular dinners and ≥4 off-campus meals per week were associated with a higher likelihood of poor sleep quality.

The deterioration of sleep quality among college students has become a public health problem that requires urgent attention. Good sleep is not only the physiological basis for maintaining energetic and positive emotional states, but also a key element for ensuring cognitive performance and promoting positive social interactions. It is of great practical significance to optimize the effectiveness of higher education for this group by conducting research on the multidimensional influence mechanism of sleep quality and proposing evidence-based intervention strategies.

Current studies at home and abroad are mostly limited to cross-sectional surveys of a single institution or specialty, which generally have the methodological limitations of underrepresentation of samples (e.g., small sample bias) and incomplete coverage of variables. In this study, we adopted a random sampling method to assess sleep quality through a standardized scale, and integrated multidimensional datasets of demographic and sociological characteristics, physical and mental health indicators, academic stressors, and environmental adaptation factors to comprehensively analyze the epidemiological characteristics of sleep disorders in college students and their predictors. The research results will provide a methodological basis for the construction of a targeted sleep health promotion system.

2. Subjects and Methods

2.1 Subjects
This study takes students enrolled in undergraduate colleges and universities in Shiyan City as the research object, and 110, 117, 98 and 95 participants were selected from medical, management, liberal arts and science

and technology majors, respectively, and a total of 420 participants were included. The questionnaires were distributed through a combination of online and offline methods, with the paper version of the questionnaires placed at fixed points in public classrooms offline, and the electronic links generated online with the help of the questionnaire platform were pushed in a targeted manner.

After data quality control, 24 invalid samples were excluded from the 420 questionnaires: 12 of them had omissions on the whole page or more than 30% of the questions were not answered, 7 of them had contradictory choices in the logic checking questions (e.g., choosing "totally disagree" and "totally agree" at the same time), and 5 of them were not recognizable due to blurred handwriting or irregular checkmarks, and 396 valid questionnaires were retained, with an effective recovery rate of 94.3%. 94.3%. Among the valid samples, 27.8% (110) were from the medical category, 29.5% (117) from the management category, 24.7% (98) from the liberal arts category, and 24.0% (95) from the science and technology category, with a balanced distribution among the four categories of majors. All data were anonymized and stored using encryption, and the whole process was managed in strict compliance with the Personal Information Protection Law of the People's Republic of China.

2.2 Survey Methods
The Study on the Assessment of Sleep Status and Related Factors of Undergraduates in Shiyan Area Colleges and Universities adopts a multidimensional research framework, covering three core modules: demographic characteristics (gender, institution, level of study, and subject category), psycho-behavioral characteristics (tendency to loneliness, level of anxiety, and ability to emotionally regulate), and environmental adaptive characteristics (degree of academic engagement, perceived coursework load, time management efficacy, pattern of healthy behaviors, and level of family support). support level). The study was conducted in five full-time undergraduate colleges and universities in Shiyan City through a hybrid data collection method, and the electronic/paper version of the scale was completed by the subjects and submitted only after two-person verification.

The Pittsburgh Sleep Quality Index (PSQI) was

used as the assessment tool, which quantifies the sleep characteristics of the last 30 days through 18 self-assessment entries, and the scoring system deconstructs the sleep performance into 7 dimensions: sleep persistence, sleep onset latency, effective sleep duration, sleep efficacy, nocturnal awakening frequency, the use of sleep aids, and the degree of impaired daytime functioning, with each dimension being scored by a 0-3-point scale, and the total score thresholds being The higher the score, the worse the sleep quality. a total PSQI score of ≥8 was defined as a sleep disorder.

The study implemented a strict quality control system: in the questionnaire design phase, the final measurement tool was formed through multi-stage validation (literature analysis, Delphi expert consultation, pre-test); a double-blind verification mechanism was established in the data collection phase, with paper questionnaires entered back-to-back and electronic questionnaires entered back-to-back on site.

A double-blind verification mechanism was set up in the data collection stage, with the paper questionnaire being entered back-to-back on site, and the electronic data being set up with logical checking rules (e.g., option exclusion detection, mandatory filling of key variables). All recovered questionnaires were subjected to three levels of review: the first level screened out invalid data with a missing rate of >15%, the second level eliminated contradictory responses to reverse questions, and the third level randomly selected 10% of the samples for telephone review to ensure the credibility of the questionnaires.

3. Results

3.1 Basic Information of Survey Respondents
A total of 396 undergraduate college students in Shiyan City were surveyed in this study, and their general information is shown in Table 1.

3.2 Comparison of Sleep Quality of Survey Respondents
3.2.1 Physical exercise behavior of university students
The results of the comparison of university sleep quality in the same week exercise status show that the score of the number of times per week exercise > 5 times on the sleep time is higher than the other groups (P=0.049<0.05)

Sleep time on the number of times per week exercise >5 times the score is higher than other groups (P<0.01), daytime dysfunction on the number of times per week exercise 0 times scores were higher than other groups (P<0.01) Comparison of PSQI total scores and other quality factor scores on weekly exercise, the difference was not statistically significant.

3.2.2 Health status of university students
Comparison of the sleep quality of students with different health conditions showed that the score of students with bad health conditions on sleep quality was higher than the other three groups (p<0.001).

The score of poor health on sleep duration is higher than the other three groups (P=0.02<0.05), the score of poor health on hypnotic drugs is higher than the other three groups (P<0.001), the score of poor health on daytime dysfunction is higher than the other three groups (P<0.001), the difference of the total score of the PSQI is statistically significant, and the scores of other scores of the quality factor, the difference was not statistically significant.

Table 1. Basic Information of Undergraduate College Students in Shiyan City

Item	Number (n)	Percentage (%)
Sex		
Male	130	32.8
Female	266	67.2
Relationship status		
Not in love	267	67.4
Crisis	8	2
More subdued	38	9.6
Sweeter	83	20
Drinking status		
Frequent Drinker	2	0.5
Social drinking	86.0	21.7
Non-drinking	308	77.8
Health status		
Very good	88	22.2
Very good	167	42.1
Fair	131	33
Not good	10	2.5
Smoking status		
Smoking	14	3.6
Non-smoker	382	96.4
Monthly living expenses		
≤800 yuan	14	3.5
800~1000 Yuan	13	3.3
1000~1200 Yuan	46	11.6

1200~1500 Yuan	92	23.2
1500~2000 Yuan	184	46.5
≥2000RMB	53	13.4
Exercise		
Exercise	298	75.3
No exercise	98	24.7
Anxiety		
Not at all	149	37.7
Some	197	49.7
Some	50	12.6
Loneliness		
Not at all	74	18.7
Not at all	162	41
Some	148	37.3
Some	12	3.0

3.2.3 Anxiety status of college students

Comparison of the results of sleep quality of students with different anxiety conditions showed that: the score of having anxiety conditions on sleep quality was higher than the other three groups (p<0.001), the score of having anxiety conditions on sleep time was higher than the other three groups (p=0.009<0.05), the score of having anxiety conditions on sleep time was higher than the other three groups (p=0.006<0.05), and the score of having some anxiety conditions on sleep disorders was higher than the other three groups (p=0.006<0.05). with some anxiety condition was higher than the other three groups (P<0.001), on daytime dysfunction was higher than the other three groups (P<0.001), and the differences in PSQI total score, sleep quality, time to fall asleep, sleep duration and daytime dysfunction were statistically significant.

Table 2. Weekly Exercise and Influencing Factors among College Students

	0 times	1 time	3 times	≥5 times	F value	P value
Sleep Quality	1.35±0.875	1.23±0.7	1.04±0.885	1.17±0.920	2.336	0.073
Time to Sleep	2.04±1.699	1.97±1.1517	2.03±1.581	2.64±1.597	2.642	0.049*
Sleeping Time	0.57±0.862	0.90±0.743	0.50±0.608	0.9±0.810	6.547	<0.001***
Sleep Disorders	5.41±3.672	5.39±3.184	5.95±3.593	4.91±4.231	1.225	0.300
Hypnotic Drugs	0.27±0.726	0.10±0.420	0.13±0.458	0.12±0.532	1.527	0.207
Daytime Dysfunction	3.24±1.669	2.67±1.491	2.18±1.856	2.31±2.011	7.061	<0.001***
PQSI	12.88±5.814	12.26±5.225	11.83±5.816	12.05±6.276	0.658	0.578

*p<0.05, **p<0.01, ***p<0.001

Table 3. College Students' Health Status and Influencing Factors

	Very good	Good	Fair	Not good	F-value	P-value
Sleep Quality	1.0455±0.90857	0.96±0.77877	1.5496±0.72551	1.800±0.42164	17.632	<0.001***
Time to Sleep	2.0455±1.79340	1.8933±1.41968	2.3740±1.57547	2.4000±1.42984	2.377	0.070
Sleeping time	0.7045±0.81873	0.6±0.61512	0.8397±0.86662	1.2000±0.78881	4,973	0.002**
Sleep Disorders	5.5455±4.11588	5.5067±3.55791	5.2748±3.33986	7.000±2.4037	0.754	0.520
Hypnotic Drugs	0.682±0.33202	0.0667±0.30015	0.1756±0.56133	2.000±1.15470	53.735	<0.001***
Daytime Dysfunction	2.0227±1.9237	2.2800±1.50279	3.4275±1.64565	4.8000±0.42164	25.276	<0.001***
PQSI	11.431±6.29686	11.3067±5.17262	13.6412±5.19181	19.200±2.04396	11.555	<0.001***

*p<0.05, **p<0.01, ***p<0.001

Table 4. Current Status of Anxiety and Factors Affecting Anxiety among College Students

	Not at all	Not at all	Some.	Yes	F-value	P-value
Sleep Quality	0.57±0.810	1.04±0.796	1.3±0.747	1.76±0.716	24.987	<0.001***
Time to Sleep	1.58±1.587	1.90±1.603	2.27±1.589	2.40±1.565	3.928	0.009**
Sleeping Time	0.77±0.673	0.54±0.658	0.68±0.818	1.00±0.756	4.191	0.006**
Sleep Disorders	4.65±3.277	4.39±3.291	6.05±3.761	5.76±3.274	5.679	<0.001***
Hypnotic Drugs	0.12±0.524	0.12±0.422	0.14±0.535	0.36±0.802	2.510	0.058
Daytime Dysfunction	1.83±1.777	2.01±1.696	2.80±1.677	3.88±1.350	18.877	<0.001***
PQSI	9.52±4.764	10.01±5.069	13.23±5.718	15.16±5.164	17.40	<0.001***

*p<0.05, **p<0.01, ***p<0.001

3.2.4 Loneliness Emotional Situation of College Students

Comparison of the sleep quality of different college students' loneliness emotion shows that: the students with some loneliness emotion scored higher than the other three groups in sleep quality (P<0.001), the students with some loneliness emotion scored higher than the other three groups in sleep time (P<0.001), the students with some loneliness emotion scored higher than the other three groups in sleep disorders (P<0.001), on daytime dysfunction

loneliness mood status for some students scored higher than the other three groups (P<0.001), the difference between the total PSQI scores was statistically significant, and other scores of quality factors, the difference was not statistically significant.

3.2.5 Gender differences in health status of college students

Comparison of the results of sleep quality of students of different genders showed that the score of women on sleep quality was higher than the score of men (p=0.027<0.05), the score of men on time to sleep was higher than the score of women (p=0.014<0.05), the score of women on hypnotic drugs was higher than the score of men (p<0.001), and the score of women on daytime dysfunction was higher than the score of men (p= 0.027<0.05), the difference in total PSQI score was statistically significant, and other scores of quality factors, the difference was not statistically significant.

Table 5. Loneliness Feeling Emotion Status and Influencing Factors of College Students

	Not at all	Not at all	Some	Yes	F-value	P-value
Sleep Quality	0.84±0.98	1.03±0.759	1.59±0.648	0.67±0.778	21.929	<0.001***
Time to Sleep	1.82±1.556	1.74±1.526	2.62±1.509	2.67±2.387	8.848	<0.001***
Sleep Time	0.78±0.707	0.60±0.664	0.79±0.875	0.50±0.798	2.124	0.097
Sleep Disorder	4.93±3.797	4.22±3.297	7.05±3.150	4.83±4.282	18.857	<0.001***
Hypnotic Drugs	0.12±0.495	0.22±0.597	0.16±0.603	0.00±0.000	1.100	0.349
Daytime Dysfunction	2.08±1.856	2.33±1.645	3.22±1.624	2.83±2.443	9.239	<0.001***
PQSI	10.58±5.286	10.14±5.277	15.43±4.640	11.50±7.693	28.709	<0.001***

*p<0.05, **p<0.01, ***p<0.001

Table 6. Gender Differences in Health Status of College Students

	Male	Female	F value	P value
Sleep Quality	1.08±0.937	1.24±0.77	4.904	0.027*
Time to Sleep	2.35±1.755	1.98±1.1517	6.090	0.014*
Time to Sleep	0.72±0.817	0.69±0.740	3.426	0.065
Sleep Disorder	4.44±3.469	5.91±3.559	0.077	0.782
Hypnotic Drugs	0.05±0.313	0.21±0.635	31.575	<0.001***
Daytime Dysfunction	2.54±1.950	2.65±1.676	4.922	0.027*
PQSI	11.18±5.979	12.68±5.499	0.177	0.674

*p<0.05, **p<0.01, ***p<0.001

4. Discussion

Among the 420 cases of survey respondents, the number of people with sleep disorders in medicine, management, liberal arts, science and engineering totaled 306, accounting for 72.9%, which is higher than the incidence rate of sleep disorders among college students, which is as high as 55% based on the survey on sleep quality of college students in Shanghai by Ye et al. [12].

College students are in a critical period of maturing physical and mental development, and generally face multiple stressors, such as a continuous burden of professional learning, a competitive environment, and a lack of a sense of control over personal time and space. Against this background, sleep disorders are becoming increasingly prominent, often leading some students to engage in behaviors that actively delay sleep in order to seek psychological compensation. In addition, chronic sleep problems not only weaken body functions and increase potential health risks, but also form a complex bidirectional association with psychological states. Poor sleep can easily induce or exacerbate anxiety, depression and other emotional distress, and these negative emotions in turn can further interfere with sleep, forming a vicious cycle that is difficult to break. The negative effects of sleep disorders will ultimately be reflected in reduced learning efficiency, weakened concentration and impaired memory, which will seriously hinder academic development and personal growth.

Therefore, an in-depth understanding of the causes, manifestations and consequences of sleep disorders in college students is crucial. A comprehensive and systematic exploration of the complex mechanisms behind this problem is needed through a combination of qualitative and quantitative research methods. Based on solid research evidence, it is only through multifaceted and comprehensive measures that

the sleep quality of college students can be truly improved, and effective intervention strategies can be developed to safeguard their physical and mental health development and promote their academic success.

5. Conclusion

The results of this study showed that the total sleep quality score of male students was 11.18±5.979, and the total sleep quality score of female students was 12.68±5.499, and there was no statistically significant difference in the comparison of the total sleep quality scores of male and female students, which is in line with the study of Zheng et al. [13].

Comparison of sleep quality among students with different weekly exercise status found that there was no difference in the total sleep quality score and the scores of each component factor. It was found that different weekly exercise frequencies differed in specific dimensions of college students' sleep. For example, students who exercised ≥5 times per week had significantly higher scores on time to sleep and sleep duration than the other groups, suggesting that high-frequency exercise may lengthen the time to sleep and shorten the actual sleep duration due to an increased need for bodily restoration or delayed neural arousal; the group that did not exercise at all (0 times/week) had significantly higher scores on daytime dysfunction , suggesting that lack of exercise predisposes to low daytime energy and reduced attention. However, their corresponding p-values were all less than 0.05, indicating that there was no significant change in the overall total sleep quality score. This lack of difference may be due to the fact that the frequency of exercise mainly affects the temporal dimension of sleep (when to sleep and how long to sleep) and the daytime state, rather than the deep structure of sleep, which has a weaker impact on the "quality" of sleep.

Comparisons of sleep quality among students with different health conditions revealed differences in total sleep quality scores and scores for each component factor. The study showed that students in poor health were at a disadvantage on the Pittsburgh Sleep Quality Index (PSQI) total score and on several key dimensions: they had a higher overall sleep quality total score, and higher scores on subjective sleep quality, actual sleep duration, hypnotic medication use, and daytime dysfunction than the students in good health. One of the reasons for this association may be the interruption of sleep continuity due to certain types of illnesses, such as nighttime coughing or poor breathing, which resulted in difficulties in falling asleep, an increase in the number of nighttime awakenings, and a shortening of actual sleep time. The second reason is that some students used hypnotic drugs to relieve insomnia, but drug dependence disrupted their natural sleep rhythms (e.g, suppressing the deep sleep period), exacerbated daytime sleepiness and cognitive impairment, and further weakened their ability to cope with health problems.

Comparisons of sleep quality among students with different levels of loneliness revealed differences in total sleep quality scores and individual component factor scores. The study showed that students who self-identified as having "some" loneliness had higher scores on the PSQI total score, sleep disturbance and daytime dysfunction (p<0.001), which had a greater impact on sleep quality. The causes of this may stem from three aspects, first, the pressure of environmental adaptation, more activities in the university, interpersonal interaction, interpersonal relationships are not properly handled, it may cause negative psychology, closed self. Secondly, the academic competition squeeze, college students learning more in the teacher's guidance of independent learning, need to self-planning learning time, learning content, learning mode, more emphasis on self-independence. Third, self-identity confusion, conceptual differences triggered active alienation. Psychologically, loneliness induces nighttime rumination, which prolongs sleep time and increases the frequency of awakening; behaviorally, the use of electronic devices late at night delays the sleep phase, and social media exacerbates self-denial. In the end, some college students are in the paradoxical state of "longing for connection and fear of being hurt", and unresolved emotions during the daytime explode at night, leading to sleep fragmentation, followed by daytime fatigue that weakens social motivation, forming a self-reinforcing vicious cycle.

In order to effectively improve the sleep quality of college students, the following interventions are recommended based on the factors affecting sleep quality: (1) Enhance students' physical fitness: Strengthen the guidance and support of

physical exercise to effectively improve the overall physical fitness of students and improve their basic health status. (2) Reduce the health burden: Optimize teaching arrangements, reasonably reduce academic pressure, and avoid damaging bodily functions due to excessive fatigue. (3) Provide psychological support: establish convenient psychological counseling, channel negative emotions such as loneliness and anxiety in a timely manner, and teach effective emotion management methods. (4) Promote interpersonal connection: Actively organize collective activities, encourage communication and cooperation among students, and establish a supportive relationship network to alleviate loneliness.

Acknowledgments

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