Evaluation of the correlation between job stress and sleep quality in community nurses

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Abstract

Chronic sleep deprivation may worsen many medical and mental health conditions, causing difficulty in the ability to function at work. Job stress may be a factor that directly correlates with the poorer sleep quality of nurses from different departments in a general hospital. However, epidemiological evaluations of sleep problems among community nurses in China are scarce, and an association between sleep problems and occupational stress has not been investigated. This study investigated the association between nurses' job stress and sleep quality in a community hospital in China. This cross-sectional study was conducted from September to November 2017 and involved 180 nurses who had worked for more than 1 year in 12 community hospitals. The Job Stress Questionnaire was administered to evaluate occupational stress. The Pittsburgh Sleep Quality Index was used to evaluate sleep disorder status. Logistic regression was performed to investigate the association between job stress and sleep disorder among these community nurses in China. For the 155 nurses who completed the study, the job stress score was 58 ± 18, and 72 nurses (46%) had a Pittsburgh Sleep Quality Index (PSQI > 7). The type of nurse contract and total job stress scores were related to sleep disturbances within the previous month. The job stress scores were negatively associated with sleep quality; in other words, the higher the job stress scores were, the worse the quality of sleep. The logistic regression analysis showed that the type of nurse contract and self-reported job stress were significant factors affecting sleep quality. Sleep disturbances in nurses were highly associated with job difficulty factor, doctor-patient relationships, psychosomatic state, environment or events, promotion or competition and total pressure scores. Sleep problems were prevalent among clinical nurses in community hospitals in China. Occupational stress negatively affects sleep quality in Chinese community nurses; the higher the stress is, the worse the sleep quality.

Abbreviations: JSQ = job stress questionnaire, PSQI = Pittsburgh sleep quality index.

Keywords: community nurses, correlation, occupational stress, sleep quality

1. Introduction

The topic of sleep has been given considerable attention as an important reference guide of psychological health.[1,2] Chronic sleep deprivation may worsen many medical and mental health conditions, causing difficulty in the ability to function at work. The American Academy of Sleep Medicine has declared that 30% to 35% of the general adult population in the United States have brief symptoms of insomnia. Insomnia is also common in nurses due to long work shifts. It has been reported that 35.5% of Chinese nurses suffer from sleep disorders.[3,4] Nurses may be required to maintain all-night vigils and work several consecutive 12 hour shifts. Nocturnal shift work is a primary cause of sleep disorders, and 57% of night shift nurses reportedly have a sleep disorder.[5] Long-term sleep deprivation may lead to serious thought retardation, memory loss, slow response, fatigue, irritability, and even potential depression and suicidal ideation.[6,7] Furthermore, night shift work can affect not only nurses' personal health but also the quality of their work and their patients' psychological health and treatment, even result in errors and accidents.[8,9] Previous studies suggest that job stress may be a factor that directly correlates with the poorer sleep quality of nurses from different departments in a general hospital.[10,11] The pressures of the nursing occupation include heavy responsibility and high risk, with constant encounters with disease, trauma, and even death.[12] A chronic state of job stress can lead to lassitude, anxiety, depression, and other psychological problems that affect sleep quality.[13,14]

Preventing and controlling occupational injuries are concerns in the field of public health.[15] In recent years, the occupational health and safety committees at medical institutions have emphasized that it is important for all medical staff should comply with legal and company requirements.[16] Due to the uncertainty and particularity of their work, the expectations of medical workers, the profession, and society can result in unhealthy behaviors and lifestyles, including lack of sleep, standing for long periods of time, lack of exercise, and excessive

work pressure. [17] It has been reported that sleep disorders are prevalent among Chinese clinical nurses in general hospitals, and occupational stress can lead to clinical sleep problems.[18] However, epidemiological evaluations of sleep problems among community nurses in mainland China are scarce, and an association between sleep problems and occupational stress has not been investigated. Types of nurse contracts in public hospitals (including community hospitals) in China are divided into two types: authorized strength nurses and contract nurses. Furthermore, contract nurses are divided into those with fixed contracts and those without fixed contracts. Authorized strength nurses' personal monthly income and job stability are usually higher than contract nurses' personal monthly income and job stability. Compared with nurses in first level, second level, and third level hospitals, community nurses have lower career incentives, insufficient labor, tedious tasks, and low wages.[19] Compared with the income of doctors of the same age, the personal monthly income of nurses is generally much lower; personal monthly income is also a factor influencing the sleep quality of nurses.[10,19]

Most research on the sleep quality of nurses comes from tertiary level hospitals in China. The order of departments that may lead to nurses' sleep disturbance most easily is as follows: ICU, emergency department, and department of gynecology and obstetrics.[10] A relation was observed between the levels of stress and the sleep quality of nurses who work in different departments; the ICU and the emergency department are generally connected with higher job stress and poor sleep quality than the internal medicine wards are.[20,21] Nurses working at community hospitals are therefore more likely to experience lower wages for their efforts, leading to increased stress and sleep disorders. The present study investigated an association between sleep quality and job stress in community hospitals in mainland China.

2. Subjects and methods

2.1. Study design

A cross-sectional study design was used.

2.2. Participant demographic

All nurses who worked in community hospitals in Chengdu, China, between September and November 2017 were initially considered for inclusion in this study. Twelve community hospitals in the city of Chengdu with inpatient departments were randomly selected. During the pre-investigation, there were 17 to 25 nurses engaged in clinical nursing in each community hospital, 15 nurses were selected from each community hospital as participants, and a total of 180 nurses were invited to participate in the survey.

To be included in the study, each nurse had a signed labor contract with a community hospital, a nurse's license, current practice in clinical care, and one or more years of work experience in their current job position. Nurses were excluded if they were on leave for illness, marriage, maternity, or other personal affairs; had sleep affected by disease, alcohol, or pharmacotherapy; had a family history of sleep disorders; or were not willing to participate in the survey.

Members of the research team interviewed each participant at their respective work location. The investigator explained the purpose, significance, and relevant instructions before administering the questionnaire, and then the respondents completed the questionnaires by themselves.

2.3. Data collection

For data collection, three questionnaires were given to each participant: a demographic survey, the Job Stress Questionnaire, and the Pittsburgh Sleep Quality Index (PSQI). For the demographic data, each participant provided a self-report of his or her formal education history, marital status, health status, years of work experience, work shift, job title, manager position, type of nurse contract, monthly personal income and monthly family income.

The database was built using EpiData3.1 software (EpiData–Comprehensive Data Management and Basic Statistical Analysis System, EpiData Association, Odense, Denmark). The data entry was checked by two people, and incomplete questionnaires (>20% missing data) were eliminated.

2.3.1. Demographic data. The demographic data collected were self-designed after a literature review. According to the results of the survey, the demographic data were classified into the following categories: formal education history (polytechnic school, college, undergraduate), marital status (unmarried, married, divorced, widowed), health status (healthy, ill), work shift (day, night), job title (registered nurse, primary nurse, intermediate nurse, deputy senior), manager position (no, nurse group leader, head nurse), type of nurse contract (no fixed contract, fixed contract, authorized strength contract), years of work experience, monthly personal income and monthly family income.

2.3.2. Job stress questionnaire. The Job Stress Questionnaire (JSQ) was designed to measure the perceptions of job-related stress and the sources of stress in the workplace, as proposed by previous studies.[22] Briefly, this questionnaire comprises 7 parts (23 items) as follows: job strength (5 items); job difficulty factor (4 items); doctor-patient relationships (3 items); psychosomatic state (4 items); disgusting environment or events (3 items); interpersonal relationships (2 items); and promotion or competition (items). The items were measured using a five-point Likert-type scale (1 through 5), with higher values indicating greater distress. The scores of the seven parts were summed to obtain a total score of stress. The coefficient of internal consistency was Cronbach's $\alpha = 0.778$. [22]

2.3.3. Pittsburgh sleep quality index (PSQI). The Chinese version of the Pittsburgh Sleep Quality Index (PSQI) was used to assess subjective sleep quality. The PSQI was prepared by Liu et al,[23] who translated and verified its reliability and validity. The coefficient of internal consistency was Cronbach's $\alpha = 0.845$.[23] The PSQI is a scored 18-item self-reported questionnaire with commentary items to characterize sleep patterns and quantify sleep quality over the previous month. The 18 items were grouped into seven clinically derived component scores: sleep quality; sleep latency; sleep duration; habitual sleep efficiency; sleep disturbance; usage of sleep medication; and daytime dysfunction. Each component was scored on a four-point Likert-type scale (0 to 3), weighted equally with higher scores indicating worse sleep quality. The seven component scores were summed to obtain a total score ranging from 0 to 21. Chinese scholars have confirmed that a PSQI ≤ 7 as the reference

threshold for sleep quality problems is more suitable for Chinese individuals.[23] Because the subjects of this study were Chinese, we used a PSQI ≤ 7 instead of PSQI < 5. Thus, in the present study, normal sleep quality was defined as a PSQI ≤ 7, and poor sleep quality was defined as a PSQI > 7.

2.4. Statistical analysis

SPSS 20.0 software (IBM, Armonk, NY) was used for the statistical analyses. Quantitative data such as the JSQ score and PSQI score are presented as the arithmetic mean and standard deviations and compared with the t-test, analysis of variance, or nonparametric test among different groups. Qualitative data such as the proportion of PSQI > 7 are represented by percentages. Multiple logistic regression was performed to estimate the association between the sleep quality (poor sleep quality, PSQI > 7) and job stress scores, and the relevant factors (such as age, education, marital status, health status, work shift, years of work experience, job title, manager position, contract and income) that are considered to probably be associated with sleep quality were entered with a forward method that introduced the variables into the model; the variable was deleted if it had been in the model with P > .05 after a new variable was pulled in the model. The odds ratios and 95% confidence intervals (CIs) were calculated by logistic regression. A P value < .05 was considered statistically significant.

3. Results

3.1. Subjects

Of the 180 subjects, 15 were excluded due to missing items on the questionnaire, and 10 were excluded due to inconsistency. Thus, 155 subjects composed the final study group. All 155 subjects were women, ranging in age from 21 to 54 years old. The rate of validity of the questionnaires for this study was 86.1% (Table 1). The average age of the 155 nurses was 31 ± 8 years. There were 66 (43%) nurses aged 25 to 34 years, and 92 (59%) nurses had completed college. One hundred (65%) nurses were married, and 53 (34%) nurses had a shift work schedule.

3.2. Demographic characteristics of participants and total scores for job stress

The basic characteristics of the subjects and the job stress scores are summarized in Table 1. The overall job stress score was 59 ± 9, and 72 nurses (46%) had a PSQI >7 (median, 7). Nurse managers and nurses with a night shift work schedule had greater job pressure scores than non-manager nurses and nurses working a day shift, respectively (manager position, F=3.762, degrees of freedom=154, P=.025; work shift, F=6.948, degrees of freedom=154, P=.009). No significant difference was observed in other variables, as indicated in Table 1.

3.3. The comparison of PSQI scores with different demographic characteristics of participants

Sleep quality was significantly related to shift work (P=.028 of the Wilcoxon rank sum test, Table 2). Other factors, such as age, marital status, educational background, managerial position, and income, were not significantly related to sleep quality with P > .05 for the Wilcoxon rank sum test or the Kruskal-Wallis H rank sum test (Table 2).

Table 1

Demographic characteristics of participants and total scores for job stress.

	n	n (%)*	JSQ score†	F	P
Age range, y				0.554	.646
18–24	40	20 (50)	59 ± 17		
25–34	66	32 (48)	58 ± 20		
35–44	29	11 (38)	61 ± 18		
45–54	20	9 (45)	54 ± 19		
Education				0.702	.497
Polytechnic school	22	11 (50)	62 ± 19		
College	92	44 (49)	57 ± 17		
Undergraduate	41	17 (41)	59 ± 20		
Marital status				0.908	.439
Unmarried	53	29 (55)	60 ± 17		
Married	100	43 (43)	58 ± 19		
Divorced	1	0 (0)	30 ± 0		
Widowed	1	0 (0)	54 ± 0		
Health status				0.264	.608
Healthy	145	68 (47)	58 ± 18		
Ill	10	4 (40)	61 ± 29		
Work shift				6.948	.009
Day	102	41 (40)	55 ± 19		
Night	53	31 (58)	64 ± 17		
Working, y				0.196	.940
<5	59	30 (51)	58 ± 17		
5 up to 10	34	13 (38)	59 ± 21		
10 up to 20	38	18 (47)	59 ± 17		
20 up to 30	16	8 (50)	57 ± 21		
≥30	8	3 (38)	53 ± 18		
Job title				0.080	.971
Registered nurse	16	9 (56)	59 ± 17		
Primary nurse	106	50 (47)	58 ± 19		
Intermediate nurse	24	10 (42)	59 ± 18		
Deputy senior	9	3 (33)	56 ± 18		
Manager position				3.762	.025
No	124	73 (59)	57 ± 18		
Nurse group leader	9	5 (56)	73 ± 21		
Head nurse	22	13 (59)	61 ± 15		
Type of nurse contract				0.236	.790
No fixed contract	23	5 (22)	57 ± 15		
Fixed contract	86	56 (65)	59 ± 18		
Authorized strength	46	11 (24)	57 ± 22		
Personal monthly income, yuan				0.786	.504
<3000	42	23 (55)	57 ± 16		
3000–5000	89	40 (45)	59 ± 20		
5000–8000	20	8 (40)	60 ± 18		
8000–10,000	0	—	—		
≥10,000	4	1 (25)	45 ± 9		
Family monthly income, yuan				0.161	.957
<3000	18	8 (44)	58 ± 17		
3000–5000	62	23 (37)	59 ± 21		
5000–8000	36	23 (64)	59 ± 15		
8000–10,000	25	11 (44)	58 ± 18		
≥10,000	14	7 (50)	55 ± 20		

* The number (percentage) of people with poor sleep quality (PSQI > 7).
† JSQ = Job Stress Questionnaire.

3.4. Associations between job stress parameters and sleep disturbances

According to the seven parts of the job stress scores, we found that the scores for the job difficulty factor, doctor-patient relationships, psychosomatic state, environment or events, and total pressure scores were significantly different (P ≤ .02, Table 3)

Table 2

The comparison of PSQI scores with different demographic characteristics of participants.

	PSQI score			
	Median	Mean rank	Z value or H value[*]	P
Age, y				
18–24	7.3	80.15	1.793	.617
25–34	7.3	81.67		
35–44	6.5	69.21		
45–54	6.9	74.35		
Education				
Polytechnic school	7.8	86.91	1.101	.577
College	6.9	75.78		
Undergraduate	7.1	78.20		
Marital status				
Unmarried	8.7	85.70	3.403	.334
Married	6.9	74.63		
Divorced	—	42.50		
Widowed	—	42.50		
Health status				
Healthy	7.1	77.90	−0.110	.913
Ill	7.2	79.50		
Work shift				
Day shift	6.7	72.33	−2.192	.028
Night shift	7.9	88.92		
Working, y				
<5	7.6	83.70	3.066	.547
5 up to 10	6.5	72.97		
10 up to 20	6.8	74.61		
20 up to 30	7.6	84.19		
≥30	5.6	61.06		
Job title				
Registered nurse	7.8	85.94	1.347	.718
Primary nurse	7.1	78.93		
Intermediate nurse	6.6	71.92		
Deputy senior	6.4	69.17		
Manager position				
No	7.0	77.45	0.094	.954
Nurse group leader	7.5	80.61		
Head nurse	7.3	80.02		
Type of nurse contract				
No fixed contract	6.1	84.82	4.802	.091
Fixed contract	7.6	65.30		
Authorized strength	6.6	71.60		
Personal monthly Income, Yuan				
<3000	7.8	87.23	4.322	.229
3000–5000	6.9	76.04		
5000–8000	6.8	73.95		
8000–10,000	—	—		
≥10,000	5.0	44.88		
Family monthly income, Yuan				
<3000	7.2	79.19	4.350	.361
3000–5000	6.7	73.68		
5000–8000	8.0	90.99		
8000–10,000	6.6	70.72		
≥10,000	7.0	75.21		

[*] Z value and H value indicate the calculations of the Wilcoxon rank sum test and the Kruskal-Wallis H rank sum test.

between the nurses with poor sleep quality (PSQI > 7) and those with normal sleep quality (PSQI ≤ 7).

3.5. Logistic regression analysis of multiple factors related to sleep quality

The independent variables included age, education, marital status, health status, work shift, years of work experience, job title, manager position, contract, and income were also screened

Table 3

Comparison of job stress-related factors by t-test between nurses with poor sleep quality and those with normal sleep quality.

	Non-sufferers[*] (Mean±SD)	Sufferers[†] (Mean±SD)	t[‡]	P
Job strength	15.9±3.8	16.8±4.0	−1.584	.115
Job difficulty factor	9.9±2.9	11.4±3.6	−2.910	.004
Doctor-patient relationships	6.1±3.7	7.4±3.4	−2.475	.014
Psychosomatic state	8.5±4.2	10.0±3.8	−2.496	.014
Environment or events	6.8±3.3	7.9±2.9	−2.324	.020
Interpersonal relationships	3.3±2.8	3.7±2.5	−1.083	.280
Promotion or competition	4.2±2.3	4.9±2.4380	−1.906	.058
Total pressure scores	54.8±18.8	62.3±17.7	−2.687	.008

[*] Non-sufferers are those whose PSQI scores ≤7.
[†] sufferers are those whose PSQI scores >7.
[‡] equal variances were not assumed in the t-test of environment or events, and a corrected t value was used. In the t test of other dependent variables, equal variances were assumed.

by this method. The type of nurse contract and total job stress scores were related to sleep disturbances within the previous month. Specifically, the risk factors for sleep disturbances in community nurses were a fixed contract and a high total job stress score (Table 4).

To further evaluate the effect of stress-related factors on sleep, sleep quality was taken as the dependent variable in the logistic regression, and the following seven relevant factors of job stress were considered as the independent variables in the models: job strength, psychosomatic state, doctor-patient relationships, job difficulty factor, environment or events, interpersonal relationships, and promotion or competition. There were seven logistic regression models in total, and the results that were statistically significant are shown in Table 5. The results showed that the type of nurse contract, job difficulty factor, doctor-patient relationships, psychosomatic state, environment or events, and promotion or competition affected the sleep quality of community nurses.

4. Discussion

The present study showed that sleep problems were prevalent among clinical nurses in community hospitals in China. In addition, we found that nurses with a night shift work schedule were at a much higher risk of sleep disturbance than nurses working a day shift. More importantly, the study indicated that as nurses' job stress scores increased, sleep quality became progressively worse.

In community hospitals, nurses are often subject to public health, basic health, and various other special inspections. This contributes to day-to-day uncertainty and higher occupational stress. It has been recognized that job stress affects the sleep

Table 4

Logistics regression analysis of the total score for stress and relevant factors related to sleep quality.

	β	Wald	P	OR (95% CI)
Type of nurse contract		9.014	.011	
No fixed contract	Reference	—	—	—
Fixed contact	1.001	4.623	.032	2.721 (1.093, 6.777)
Authorized strength	0.035	0.005	.945	1.035 (0.388, 2.764)
Total score of stress	0.024	7.069	.008	1.025 (1.006, 1.043)
Constant	−1.851	7.779	.005	0.157

Table 5

Logistics regression analysis of job stress and relevant factors related to sleep quality.

Model	Independent variable	β	Wald	P	OR (95% CI)
Model 1					
	Type of nurse contract		9.689	.008	
	No fixed contract	Reference	—	—	—
	Fixed contract	1.022	4.760	.029	2.778 (1.109, 6.957)
	Authorized strength	0.002	0.000	.997	1.002 (0.373, 2.693)
	Job difficulty factor	0.151	8.359	.004	1.163 (1.050, 1.288)
	Constant	−2.032	8.856	.003	0.131
Model 2	**Type of nurse contract**		7.940	.019	
	No fixed contract	Reference	—	—	—
	Fixed contract	0.934	4.055	.044	2.543 (1.025, 6.310)
	Authorized strength	0.056	0.013	.909	1.058 (0.404, 2.769)
	Doctor-patient relationships	0.092	4.004	.045	1.097 (1.002, 1.201)
	Constant	−1.024	4.310	.038	0.359
Model 3	**Type of nurse contract**		10.027	.007	
	No fixed contract	Reference	—	—	—
	Fixed contract	1.139	5.929	.015	3.125 (1.249, 7.818)
	Authorized strength	0.177	0.125	.724	1.193 (0.448, 3.175)
	Psychosomatic state	0.105	6.476	.011	1.111 (1.024, 1.204)
	Constant	−1.530	6.788	.009	0.217
Model 4	**Type of nurse contract**		9.539	.008	
	No fixed contract	Reference	—	—	—
	Fixed contract	1.006	4.708	.03	2.736 (1.102, 6.789)
	Authorized strength	0.018	0.001	.97	1.019 (0.384, 2.699)
	Environment or events	0.123	5.286	.021	1.131 (1.018, 1.256)
	Constant	−1.338	5.737	.017	0.262
Model 5	**Type of nurse contract**		10.154	.006	
	No fixed contract	Reference	—	—	—
	Fixed contract	1.151	6.028	.014	3.163 (1.261, 7.929)
	Authorized strength	0.183	0.136	.713	1.201 (0.454, 3.173)
	Promotion or competition	0.150	4.662	.031	1.162 (1.014, 1.331)
	Constant	−1.245	5.222	.022	0.288

quality of nurses[24], especially for those who are on a night shift work schedule.[25]

Our results support previous studies that show that job stress is associated with work shift and a managerial position. The role of nurse managers is one of the most demanding in hospitals, which contributes to job-related stress. One study in 2014 reported that 72% of nurse managers were planning to leave their positions within five years.[26] Our results also showed that nurse managers had higher job pressure than the rest of the staff in a community hospital, which was not shown in reports from general hospitals.

Currently, the need for medical services is increasing with the development of China's economy, especially in community hospitals, and along with it, the frequency of a monthly night shift is also increasing. This work disturbs the internal body clock of nurses and results in irregular sleep patterns.[27,28] The overall prevalence of sleep disturbances in clinical nurses at community hospitals in Mainland China is reportedly 52.0%, which is higher than that found for the general population (26.4%–39.4%).[3,4,25–28]

Previous studies showed that sleep disturbances were more likely to occur among clinical nurses in general hospitals in Mainland China compared with Hong Kong, where the overall rate of insomnia is 11.9%, with women at higher risk than men.[29,30] By contrast, the insomnia rate of clinical nurses in Mainland China was 27.3%, and that of night shift nurses (63.8% to 70.0%) was significantly higher than that of day shift nurses[31–33]. Another study reported that the prevalence of

shift-work disorder in nurses was 35.5% to 42.9%, specifically 26.1% for day shift nurses and 42.9% for night shift nurses.[34] This is lower than the results of the present study (46%). However, another study found that the prevalence of nurse sleep disorder was 87.7%,[35] which is much higher than the results of this study. We found that day and night shift nurses suffered from job stress scores that were 55 ± 19 and 64 ± 17, respectively, probably because 40% worked the day shift and 58% worked the night shift and had poor sleep quality. This is consistent with the findings of other researchers.[36,37] Therefore, clinical nurses are prone to sleep disturbances, and nurses working in a community hospital are most vulnerable to sleep disorders.

It is generally considered that temporary employees experience more job insecurity than permanent staff. Job insecurity has been identified as an important occupational stress factor that contributes negatively to the psychological and physical health and well-being of employees.[38–40]

Temporary nurses are more likely to be dismissed from work, so they are more likely to be stressed and work harder to keep their job, which may lead to sleep disorders. However, the present research indicates that nurses with fixed contracts have higher job stress scores than temporary nurses and permanent nurses. A possible reason is that they need to continuously learn new knowledge to improve their ability, meet job requirements and maintain work stability. Our study showed that the sleep quality of nurses with a fixed contract was more easily affected than the sleep quality of their counterparts who had permanent employ-

ment. This is inconsistent with other reports.[37–39] This study also showed that a high level of job stress was associated with sleep problems, corroborating previous findings.[19]

This study found that sleep problems were prevalent among clinical nurses in community hospitals in China. Sleep disturbances in nurses were highly associated with job difficulty factor, doctor-patient relationships, psychosomatic state, environment or events, promotion or competition, and total pressure scores. Occupational stress negatively affects sleep quality in Chinese clinical nurses; the higher the stress is, the worse the sleep quality. Sleep disturbance may lead to a lower quality of life and work efficiency of nurses, even leading to errors or medical malpractice. Awareness and interventions are therefore required to reduce job stress in community hospitals. Additional research on this topic is also necessary.

5. Limitations

This study had several limitations that may have affected the outcomes. First, there are no data from different types of hospitals as a control group in the study design to compare the difference in sleep disturbances between different ward/department nurses and community nurses. Second, the recruitment of stratified cluster sampling limits the generalization of the results. Job stress is a subjective experience that can affect sleep quality but it does not affect the professional function of community nurses. It may be important to sample community nurses for serious sleep disorders and determine whether these disorders affect their professional function. Third, the study data were obtained from a single city in southwestern China, and although nurses resided in several different communities, it may not be possible to generalize the findings to other cultures and geographic regions. Fourth, participants were from urban communities, and nurses in rural communities were not included.

Author contributions

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