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Lifestyle and Job-Related Factors Associated with Sleep Quality: Gender-Specific Insights from Taiwanese Hospital Physicians

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Background: Poor sleep in physicians is a major concern, affecting their physical and psychological well-being and increasing the risk of medical errors. In this cross-sectional study, we explored gender-specific differences in factors associated with sleep quality in physicians.

Participants and Methods: Self-report questionnaires were distributed to 401 hospital physicians in Taiwan. Statistical analyses—Student's *t* test, Pearson's correlation test, and multivariate linear regression—were conducted to identify factors associated with sleep quality. Subgroup analyses were also conducted to analyze gender-specific differences in sleep quality and its related factors.

Results: Of a total of 189 physicians, approximately 40% reported poor sleep quality, with no significant gender-specific differences. Multivariate analysis revealed that unhealthy dietary habits ($\beta = 0.39$, $p = 0.02$) and a lack of regular exercise ($\beta = -0.52$, $p = 0.04$) were significantly associated with poor sleep quality in the female physicians. By contrast, higher job demands were significantly associated with poorer sleep quality in the male physicians ($\beta = 0.16$, $p = 0.03$).

Conclusion: In physicians, sleep quality is influenced by gender-specific factors. To enhance sleep quality, male physicians should focus on reducing their workload, and female physicians should prioritize improving their dietary and exercise habits. To achieve these goals, we recommend implementing gender-sensitive strategies involving flexible scheduling and workload management to reduce job demands for male physicians. We also recommend providing on-site healthy meal options and establishing exercise facilities to promote healthier lifestyle habits for female physicians. In addition, we recommend developing sleep hygiene education and mentorship programs to support work–life balance and aid stress management tailored to gender-specific needs. These strategies could help enhance the sleep quality of physicians, potentially improving their well-being and patient care quality.

Keywords: diet, exercise, health-care worker, job demands, Pittsburgh Sleep Quality Index

Introduction

Sleep quality is defined as an individual's satisfaction with their sleep experience, which includes aspects such as sleep initiation, sleep maintenance, sleep quality, and feeling of being refreshed upon awakening. Epidemiological evidence indicates that sleep disturbances are widespread in the general population, with the estimated prevalence of poor sleep quality ranging between 8% and 48% worldwide.[1] Poor sleep quality, which not only negatively affects quality of life but also leads to various adverse health outcomes, is regarded as a global health concern. In terms of physical health, poor sleep quality is associated with weight gain, inflammation, and inadequate control of comorbidities such as diabetes mellitus and hypertension.[2] In terms of psychological health, low sleep quality increases the risks of depression, anxiety,

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neuroticism, irritability, stress, and cognitive impairment.[3] It also increases the frequency of suicidal ideation.[4] In addition to its effects on health, poor sleep quality influences neurocognitive function, impairing working memory, executive functioning, processing speed, and cognitive throughput.[2] These effects may explain the association between poor sleep quality and the risks of traffic and occupational accidents.[5]

Health-care workers (HCWs) typically work in a highly stressful environment characterized by long working hours, frequent night duties, and rotating work shifts. These factors can disrupt their circadian rhythm and compromise their sleep quality, and poor sleep in HCWs is regarded as a global concern.[1,6,7] A systematic review conducted in 2020 reported that the pooled prevalence of sleep disturbances was approximately 39% (range: 13%–78%) among HCWs in China and Taiwan.[1] A different systematic review of 39 observational studies indicated that the pooled prevalence of sleep disturbances among nursing professionals was approximately 61%.[7] In addition to compromising the health of HCWs, poor sleep can impair the cognitive function of HCWs and influence their daily practice and clinical training.[6,8] Sleep deprivation can reduce the concentration of HCWs during their daily work and leisure hours, thereby increasing the risk of accidents at work or during commutes.[5,9] Cognitive impairment resulting from sleep deprivation can influence the daily performance and training progress of HCWs. Clinical trainees tend to have decreased ability to acquire clinical knowledge and skills while they are working in a hospital.[9] In addition, HCWs with poor sleep are prone to making medical errors, which may compromise patient safety. Sleep deprivation not only affects the psychomotor performance, surgical skills, and anesthesia skills of physicians but also increases the rate at which they make medical errors.[6,8] Moreover, low sleep quality adversely affects the well-being of HCWs and poses a risk to the safety of both HCWs and their patients, thereby reducing the operational efficiency of the entire health-care system.

Poor sleep quality is associated with various sociodemographic characteristics (eg, age, gender, and marital status), lifestyle habits (eg, dietary and exercise habits), and job-related environmental factors (eg, job demands and social support).[10,11] Major gender-specific differences have been discovered in sleep quality, with female physicians reporting poorer sleep quality compared with their male counterparts. This disparity has been clearly observed in various populations, including health-care professionals.[12,13] A study on HCWs in Taiwan revealed that female physicians were more likely to report insomnia (61.7%) compared with their male counterparts (52.7%), which may largely be attributable to variations in their work characteristics and family responsibilities.[13] Because of hormonal fluctuations, societal roles, and stressors unique to their experiences, women are more likely than men to experience insomnia and sleep disorders, indicating the importance of considering gender-specific factors in sleep health.[12] Despite these findings, no studies have yet explored gender-specific factors associated with physicians' sleep quality.

Lifestyle habits such as diet and exercise significantly affect sleep quality. Both dietary habits and physical activity are closely linked to the human biological rhythm, with research suggesting that a regular eating pattern and consistent exercise routine significantly enhance sleep quality.[14,15] Individuals who have a balanced diet, characterized by regular meal times and nutrient-rich foods, tend to have higher sleep quality.[10,16] Poor sleep is more strongly associated with unhealthy dietary habits (eg, irregular meal timing, meal skipping, and late-night snacking) than with specific dietary components. Exercise is a major lifestyle factor that influences sleep quality.[17] A systematic review of randomized controlled trials revealed that both regular physical exercise and mind–body exercises improve sleep quality and reduce insomnia in adults, as indicated by subjective sleep measurements.[11] Furthermore, exercise was found to prevent sleep deprivation–induced cognitive impairment and anxiety-like behaviors in animal models.[18]

In addition to lifestyle habits, job-related factors influence sleep quality for HCWs. Multiple studies have examined the associations between low sleep quality and job-related factors such as long working hours, a heavy workload, task content, and high job demands.[19] Social support in the workplace serves as a protective factor against poor sleep quality.[20,21] Despite these findings, few studies have explored the effects of lifestyle and job-related factors on the sleep quality of HCWs. Physicians play a crucial role in healthcare teams, bearing significant responsibility for patient safety and treatment outcomes. As such, understanding the factors within male and female physicians that influence their sleep quality is very important. Insights into these factors may aid in the tailoring of recommendations for improving the well-being of physicians. In this study, we evaluated the sleep quality of hospital physicians in Taiwan and attempted to identify lifestyle and job-related factors affecting this sleep quality. We also analyzed potential gender-specific factors associated with physicians' sleep quality.

Materials and Methods

Study Cohort and Procedure

In this cross-sectional study, we analyzed data obtained in our previous survey, which addressed both occupational safety and health promotion programs for HCWs.[22] Data for licensed physicians from four regional teaching hospitals in northern Taiwan were included in the study. The four hospitals were two each in Taipei City and New Taipei City. These two cities have a total population of approximately 6.5 million individuals, accounting for 27.6% of the total population of Taiwan. Physicians older than 20 years who had been working for at least 6 months in a hospital were included, and retired physicians and part-time physicians were excluded. A total of 401 physicians were finally included in the study. The number of physicians recruited from each hospital ranged between 76 and 113. The data were collected in anonymous questionnaires emailed to the physicians, and written informed consent was obtained. This study was conducted in accordance with the Declaration of Helsinki. The study protocol was approved by the Institutional Review Board of Fu Jen Catholic University (approval no. C9809).

Measures

The study questionnaire comprised items evaluating sleep quality, demographic characteristics, and lifestyle and job-related factors. The Chinese version of the Pittsburgh Sleep Quality Index (PSQI), known for its ease of use, reliability, and validity, was employed to evaluate sleep quality.[23] The PSQI comprises 19 items evaluating seven components—sleep duration, sleep disturbances, sleep latency, daytime dysfunction, sleep efficiency, subjective sleep quality, and sleep medication use—over the preceding month. Each component is scored from 0 to 3, with a higher score indicating lower subjective sleep quality. The total score ranges from 0 to 21, with a total score greater than 5 indicating low sleep quality that is clinically significant.[23]

The questionnaire collected data on the respondents' demographic characteristics such as gender (male or female), age (years), and relationship status (single or partnered). Respondents' dietary and exercise habits were also evaluated. This part of the questionnaire was developed by a panel of experts—two occupational health professionals, two health promotion professionals, and three senior physicians. The items were subsequently reviewed by three hospital clinicians and two occupational health professionals. To validate the psychometric properties of the lifestyle questionnaire, a pilot study was conducted with a convenience sample of physicians from a hospital in Taipei City. Dietary and exercise habits were evaluated using four and two items, respectively. The items evaluating whether the respondents had unhealthy dietary habits were as follows: "I consume fewer than three meals per day", "I have irregular meal times", "I eat varying amounts of food", and I eat within the 2 hours before bedtime. The items evaluating whether the respondents had regular exercise habits were as follows: "I regularly engage in physical activity (at least three times a week)" and "I do physical activity lasting at least 30 minutes". The items were rated on a 5-point Likert scale with endpoints ranging from 0 (*never*) to 4 (*always*). A lower score for unhealthy dietary habits indicated healthier dietary habits, whereas a higher score for regular exercise habits indicated more frequent regular physical activity. Our results for unhealthy dietary habits and regular exercise habits revealed satisfactory reliability, with Cronbach's α values of 0.73 and 0.86, respectively.

Job-related factors were evaluated using Karasek's Job Content Questionnaire (JCQ), which covers three dimensions: job demands, job control, and social support in the workplace. In this study, only job demands and social support were measured because all the respondents were hospital physicians with limited differences in the amount of job control they had. After conducting consensus meetings with our expert panel, we modified the items of the original Chinese JCQ to be more suitable for HCWs; for example, the assessment of social support focused specifically on workplace support within the medical team. The job demands questionnaire comprised five items rated on a 5-point Likert-type scale with endpoints ranging from 0 (*strongly disagree*) to 4 (*strongly agree*).[24] The items were as follows: "I exert considerable effort to care for my patients", "My job requires substantial effort", "I have insufficient time to complete my work tasks", "My job is characterized by tight deadlines and a fast pace", and "My job has conflicting demands, such as impolite requests from patients' family members". The items were adjusted as necessary to be suitable for the context of health care.[24] The social support questionnaire comprised three items rated on a 5-point Likert scale with endpoints ranging from 0 (*strongly disagree*) to 4 (*strongly agree*). Its items were as follows: "My colleagues or medical team members are

friendly", "My colleagues or medical team members care about me", and "My colleagues or medical team members help me perform my medical duties". Higher scores on these three items indicated greater social support in the workplace. The results for job demands and social support revealed high reliability and internal consistency, with the Cronbach's α values being 0.85 and 0.93, respectively.

Statistical Analysis

All statistical analyses were conducted using PASW Statistics version 18.0 (SPSS, Chicago, IL, USA). Categorical variables—such as gender, relationship status, and sleep quality over the preceding month—are presented as numbers and percentages. Continuous variables—such as age, total sleep time, PSQI score, and scores for unhealthy dietary habits, regular exercise habits, job demands, and social support—are presented as means ± standard deviations. Chi-square and two-sample *t* tests were conducted to compare categorical and continuous variables, respectively, for male versus female physicians. Gender subgroup analyses were conducted to determine the differences between male and female physicians in the effects of demographic characteristics, lifestyle factors, and job-related factors on sleep quality. A two-sample *t* test was used to compare the mean total PSQI score of single and partnered physicians. Pearson's correlation test was employed to identify the correlations of demographic characteristics, lifestyle factors, and job-related factors with PSQI score.

Multivariate linear regression was performed to identify the factors influencing sleep quality. Respondents with missing data for any covariate were excluded from the multivariate analysis. A p value less than 0.05 was considered statistically significant. To achieve an effect size (f^2) of 0.03, an alpha value of 0.1, and a power value ($1 - \beta$) of 0.8, the necessary sample size was calculated as 152.[25]

Results

A total of 401 questionnaires were distributed, of which 189 were returned, indicating a response rate of 47.1%. After incomplete questionnaires were excluded, the responses of 174 physicians (mean age: 42.9 ± 8.9 years, 74.1% men) were finally included in the analysis. Table 1 presents the descriptive data of the respondents' demographic characteristics, sleep quality over the preceding month, PSQI score, and sleep quality–related factors. Of all respondents, 77.0% were partnered, whereas 21.3% were single (these percentages do not sum to 100% because of missing data). The results indicated that the male physicians exercised more regularly than the female physicians did (3.4 vs 2.1, $p < 0.01$). However, no significant gender-specific difference was discovered in the scores for unhealthy dietary habits. The male physicians reported greater job demands during working hours than the female physicians did (13.9 vs 12.6, $p = 0.02$). The mean total PSQI score for the entire cohort was 5.1 ± 2.5, and the mean total sleep time was 386.8 ± 54.2 minutes. Of the respondents, 40.0% had poor sleep quality, indicated by a total PSQI score greater than 5. Although no gender-specific differences were found in sleep quality, the average total sleep time and total PSQI score were greater for the female physicians than for their male counterparts (sleep time: 400.7 vs 382.0 minutes, $p = 0.09$; PSQI score: 5.5 vs 5.0, $p = 0.26$). Furthermore, the mean sleep latency score was significantly higher for the female physicians than for the male physicians (1.0 vs 0.8, $p = 0.03$).

Pearson's correlation test was used to examine the correlations between the continuous variables (ie, age, lifestyle factors, and job-related factors) and PSQI score. A two-sample *t* test was used to examine the correlation between the categorical variable (ie, relationship status) and PSQI score (Table 2). The results indicated that the single physicians had a significantly higher average total PSQI score compared with their partnered counterparts (5.8 vs 4.9, $p = 0.04$). Total PSQI score was positively correlated with the score for unhealthy dietary habits ($r = 0.23$, $p < 0.01$) but negatively correlated with the scores for regular exercise habits ($r = -0.16$, $p = 0.04$) and social support ($r = -0.16$, $p = 0.04$). Subgroup analysis revealed that lifestyle factors (unhealthy dietary habits and regular exercise habits) were significantly associated with sleep quality in the female physicians ($r = 0.43$, $p < 0.01$ and $r = -0.34$, $p = 0.02$, respectively), whereas job-related factors (job demands and social support) were significantly associated with sleep quality in the male physicians ($r = 0.18$, $p = 0.04$ and $r = -0.19$, $p < 0.03$, respectively).

Multivariate linear regression was used to identify factors associated with the sleep quality of the physicians. The results indicated that, for the entire cohort, none of the factors was significantly associated with sleep quality (Table 3).

Table 1 Descriptive Data of Physicians' Demographic Characteristics and Sleep Quality–Related Factors

	Total (N = 174)	Female (n = 45)	Male (n = 129)	*p*
	n (%) or Mean ± SD	n (%) or Mean ± SD	n (%) or Mean ± SD	
Demographic characteristics				
Gender				
Female	45 (25.9%)	—	—	
Male	129 (74.1%)	—	—	
Age (years)	42.9 ± 8.9	39.1 ± 8.0	44.3 ± 8.9	<0.01
Relationship status[a]				
Single	37 (21.3%)	14 (31.1%)	23 (17.8%)	0.06
Partnered	134 (77.0%)	30 (66.7%)	104 (80.6%)	
Lifestyle factors				
Unhealthy dietary habits (0–16)	7.4 ± 3.0	7.0 ± 3.0	7.6 ± 3.0	0.28
Regular exercise habits (0–8)	3.1 ± 2.2	2.1 ± 1.7	3.4 ± 2.3	<0.01
Job-related factors				
Job demands (0–20)	13.6 ± 3.2	12.6 ± 3.3	13.9 ± 3.1	0.02
Social support (0–12)	8.6 ± 1.8	8.2 ± 1.9	8.7 ± 1.8	0.11
PSQI scores				
Total (0–21)	5.1 ± 2.5	5.5 ± 2.9	5.0 ± 2.3	0.26
Sleep duration (0–3)	0.8 ± 0.7	0.7 ± 0.8	0.9 ± 0.7	0.14
Sleep disturbances (0–3)	1.1 ± 0.4	1.1 ± 0.4	1.0 ± 0.4	0.24
Sleep latency (0–3)	0.8 ± 0.6	1.0 ± 0.7	0.8 ± 0.6	0.03
Daytime dysfunction (0–3)	1.0 ± 0.8	1.0 ± 0.9	0.9 ± 0.8	0.43
Sleep efficiency (0–3)	0.3 ± 0.7	0.4 ± 0.8	0.2 ± 0.6	0.09
Overall sleep quality (0–3)	0.9 ± 0.8	0.9 ± 0.7	0.9 ± 0.8	0.94
Sleep medication use (0–3)	0.3 ± 0.6	0.3 ± 0.6	0.3 ± 0.6	0.71
Sleep quality				
Poor (total PSQI score > 5)	69 (39.7%)	18 (40.0%)	51 (39.5%)	0.96
Good (total PSQI score ≤ 5)	105 (60.3%)	27 (60.0%)	78 (60.5%)	
Total sleep time (min)	386.8 ± 54.2	400.7 ± 66.1	382.0 ± 48.7	0.09

Note: [a]Total percentage is not 100% because of missing data.
Abbreviations: PSQI, Pittsburgh Sleep Quality Index; SD, standard deviation.

Table 2 Results of Univariate Analysis Conducted to Identify Factors Associated with Physicians' Sleep Quality

Variable	Total (N = 174)		Female (n = 45)		Male (n = 129)	
	Pearson's *r* or Mean ± SD	*p*	Pearson's *r* or Mean ± SD	*p*	Pearson's *r* or Mean ± SD	*p*
Demographic characteristics						
Age	−0.07	0.34	0.06	0.72	−0.10	0.29
Relationship status						
Single	5.8 ± 2.6	0.04	6.1 ± 3.3	0.23	5.6 ± 2.1	0.17
Partnered	4.9 ± 2.4		5.0 ± 2.6		4.8 ± 2.3	
Lifestyle factors						
Unhealthy dietary habits	0.23	<0.01	0.43	<0.01	0.16	0.07
Regular exercise habits	−0.16	0.04	−0.34	0.02	−0.08	0.40
Job-related factors						
Job demands	0.10	0.21	−0.02	0.91	0.18	0.04
Social support	−0.16	0.04	−0.06	0.68	−0.19	0.03

Abbreviation: SD, standard deviation.

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Table 3 Results of Multivariate Analysis Conducted to Identify Factors Associated with Physicians' Sleep Quality

Variable	Total (N = 163)			Female (n = 41)			Male (n = 122)		
	β	95% CI	*p*	β	95% CI	*p*	β	95% CI	*p*
Constant	5.93			3.54			5.60		
Demographic characteristics									
Age (years)	−0.01	−0.05 to 0.04	0.67	0.05	−0.07 to 0.17	0.39	−0.02	−0.06 to 0.03	0.55
Relationship status (reference: single)	−0.72	−1.70 to 0.27	0.15	−0.68	−2.61 to 1.25	0.48	−0.78	−1.94 to 0.38	0.18
Lifestyle factors									
Unhealthy dietary habits	0.13	−0.00 to 0.26	0.06	0.39	0.07 to 0.70	0.02	0.04	−0.11 to 0.19	0.59
Regular exercise habits	−0.11	−0.27 to 0.06	0.20	−0.52	−1.01 to −0.02	0.04	−0.03	−0.20 to 0.15	0.76
Job-related factors									
Job demands	0.08	−0.05 to 0.20	0.23	−0.10	−0.36 to 0.16	0.44	0.16	0.01 to 0.31	0.03
Social support	−0.19	−0.40 to 0.03	0.08	0.00	−0.48 to 0.49	0.99	−0.21	−0.45 to 0.04	0.09
F	3.001			2.435			1.993		
p	0.008			0.046			0.072		
R	0.322			0.548			0.307		
R^2	0.103			0.301			0.094		
Adjusted R^2	0.069			0.177			0.047		

Abbreviation: CI, confidence interval.

Subgroup analysis revealed that both unhealthy dietary habits (β = 0.39, 95% confidence interval = 0.07 to 0.70) and regular exercise habits (β = −0.52, 95% confidence interval = −1.01 to −0.02) were significantly associated with sleep quality in the female physicians. By contrast, only job demands (β = 0.16, 95% confidence interval = 0.01 to 0.31) were significantly associated with sleep quality in the male physicians (Table 3).

Discussion

In this study, we explored various factors associated with the sleep quality of male and female physicians in Taiwan. Typically, different measurement techniques, population demographics, and cultural backgrounds contribute to varying results regarding the prevalence of poor sleep. According to the literature, approximately one-third of the adult population worldwide sleeps poorly, including difficulty initiating or maintaining sleep and experiencing nonrestorative sleep.[26] In Taiwan, approximately one-fourth of the adult population has poor sleep quality.[27] A meta-analysis revealed that at least 41.6% of physicians have sleep disturbances,[28] consistent with our findings. Although the female physician respondents tended to have a higher PSQI score than did their male counterparts, this study revealed gender-specific differences only in the sleep latency (the time that an individual takes to fall asleep) domain of the PSQI. This finding is consistent with that of a relevant study.[29] This gender-specific difference in sleep latency may be attributable to female physicians having higher levels of depression and anxiety, factors that increase sleep latency, compared with their male counterparts.[30,31]

To the best of our knowledge, this is the first study to explore gender-specific differences in factors associated with sleep quality in Taiwanese physicians. For female physicians, lifestyle factors such as diet and exercise were found to be significantly associated with sleep quality, whereas for male physicians, job-related factors were found to be significantly associated with sleep quality. These findings suggest the persistence of traditional gender roles in Taiwanese society, in which women may bear responsibilities pertaining to household duties and personal health management alongside their careers. Other studies have indicated that traditional gender roles in Taiwan influence lifestyle factors and occupational stressors, leading to gender-specific effects on sleep quality in physicians and HCWs.[24,32]

Our study revealed a significant correlation between unhealthy dietary habits (meal quantity and timing) and poor sleep quality. Poor sleep is associated with irregular meal timing.[10] In particular, skipping dinner is associated with an increased risk of sleep disturbances.[21] Our findings suggest that unhealthy dietary habits are negatively correlated with

sleep quality in female physicians. This gender difference may be attributable to female physicians being more likely than their male counterparts to overeat, which is associated with poor sleep quality.[33]

Individuals who engage in regular exercise tend to sleep better than do those who do not.[11,20] Various types of exercise—including aerobic exercise, resistance training, and stretching—can enhance sleep quality. Overall, our findings corroborate those of studies indicating that exercise is associated with a greater improvement in the sleep quality of female physicians than in that for male physicians.[34,35] A potential explanation for this finding is that female physicians are more likely than their male counterparts to have a sedentary lifestyle and to engage in low levels of daily exercise.[34] Taken together, these findings suggest that regular exercise has a greater effect on the sleep quality of female physicians than on that of male physicians.

Overall, the correlation between job demands and sleep quality can be examined from psychological, physical, and social perspectives. From a psychological perspective, higher job demands are associated with higher stress, which may indirectly lead to poor sleep quality.[36] According to the World Health Organization, long working hours and an excessive workload have negative effects on mental health and sleep quality. From a physical perspective, high job demands affect the hypothalamic–pituitary–adrenal axis, which directly influences sleep quality.[37] From a social perspective, physicians often choose to sacrifice their sleep when they are on duty to meet their job demands, which in turn results in low sleep quality. As a result of different societal expectations, male physicians typically perceive a greater "breadwinning" burden and heavier workload compared with their female counterparts.[38] In Taiwan, work is typically characterized by a strong work ethic and long working hours, which may affect the sleep patterns of physicians. In this study, we discovered that job demands were significantly associated with poor sleep quality in male physicians. This finding may reflect cultural expectations for men to be the primary breadwinner and to have a heavy workload.[39,40]

Limitations

This study has several limitations. First, our respondents were recruited from regional hospitals in northern Taiwan through convenience sampling. However, we could not completely eliminate the potential of selection bias, which may have limited the generalizability of our findings. In addition, the use of self-report questionnaires may have introduced recall bias. However, the fact that data were collected anonymously may have mitigated social desirability bias. Second, this study involved a small sample size and an imbalanced gender distribution, which may undermine the validity of its results. Nevertheless, our sample size and statistical power are sufficient according to the "rule of thumb", which recommends including at least 10 participants per predictor variable. Although our respondents had an uneven gender distribution, their male-to-female ratio (3:1) is similar to that of physicians in Taiwan according to data from the Ministry of Health and Welfare in 2021.[41] Third, the cross-sectional design of this study precluded the establishment of any causal relationships between sleep quality and the factors explored herein. Therefore, further longitudinal studies are warranted. Although our multivariate model was adjusted for demographic characteristics, several potential confounders—such as health-related factors (eg, health conditions and awareness), job-related factors (eg, work experience and specialties), and sleep-related factors (eg, short naps and work shift schedules)—may have been underestimated. Therefore, further research is required to explore the effects of both personal and social factors such as stress management, work–life balance, and sleep hygiene. Finally, to help hospital physicians with tight schedules respond quickly to our questionnaires, our assessments of lifestyle factors and job-related environmental habits focused on a few key items, unlike the approach followed in comprehensive questionnaires. For instance, we did not analyze the detailed contributions of dietary habits (eg, meal quantity and timing) or conduct comprehensive assessments of dietary quality (eg, consumption of processed foods, sugary beverages, and fruits or vegetables). Therefore, further comprehensive assessments of exercise habits—such as intensity, type of activity, and consistency over time, as outlined by the health guidelines of the World Health Organization and the American College of Sports Medicine—are required to capture all dimensions of exercise habits.[42] Future studies on the sleep quality of Taiwanese physicians should include individuals from diverse hospital levels and regions to improve the generalizability of the findings. Long-term gender-specific and behavior-theory-based health promotion interventions targeting lifestyle factors such as diet, exercise, and sleep hygiene can provide deeper insights into the long-term effects of these factors on physicians' health, care quality, and patient outcomes. The insights can inform policies and practices aimed at enhancing the well-being and health-care delivery capabilities of physicians.

Conclusion

Lifestyle and job-related factors exhibit different correlations with sleep quality in Taiwanese hospital physicians. Specifically, the effects of unhealthy dietary habits and regular exercise habits on sleep quality are stronger in female than in male physicians. In addition, the sleep quality of male physicians is more likely to correlate with job demands than with unhealthy dietary habits or regular exercise habits. Taken together, our findings indicate that neither demographic characteristics nor social support is associated with sleep quality in this population. Further research involving other factors is required to improve the sleep quality of hospital physicians.

Practical Implementations

In the following, we outline our practical recommendations for addressing the problem of poor sleep quality in hospital physicians, with an emphasis on gender-specific strategies and systemic improvements of the working environment. These recommendations aim to improve the well-being of physicians and to optimize the efficiency of the health-care system.

For female physicians, hospital administrators should prioritize the promotion of healthy lifestyle habits. These efforts may include organizing workshops focusing on nutrition and the importance of regular physical activity and establishing on-site exercise facilities tailored to physicians' schedules. Additionally, hospital cafeterias should offer healthy meal options to encourage healthier dietary practices. Because lifestyle factors such as diet and exercise have significant influence on sleep quality for female physicians, these measures can help foster healthier routines and improve sleep outcomes.

For male physicians, reducing job demands and managing workload should be a primary focus. Policymakers and hospital administrators should implement effective workload management strategies—such as limiting excessive working hours, redistributing tasks, or hiring additional support staff—to alleviate the burdens placed on physicians. Flexible scheduling options should also be considered to help achieve work–life balance. These interventions are essential because higher job demands are significantly associated with poorer sleep quality in male physicians.

To address the sleep hygiene of physicians, hospitals should provide educational materials on the importance of sleep for overall health and job performance. Dedicated rest areas for short naps during long shifts should be designated to mitigate the effects of sleep deprivation. In addition, policymakers should attempt to address the discrepancy between societal expectations and social responsibility for male and female physicians. Hospital administrators should also regularly evaluate the effectiveness of these strategies through surveys and feedback sessions. Public policies and welfare programs should be adjusted depending on the most recent findings and physician feedback. By following these recommendations, hospitals and policymakers will be able to collaborate to enhance physicians' sleep quality, leading to improved health, job satisfaction, and patient care outcomes.

Data Sharing Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request. All data generated or analyzed during this study are included in this and a previous published article.

Author Contributions

Wen-Hsuan Hou: Investigation, Formal Analysis, Visualization, and Writing - Review & Editing. Tzu-Chin Hsu: Data curation, Visualization, and Writing - Original Draft. Fu-Li Chen: Conceptualization, Funding acquisition, Methodology, Project administration, Resources, Software, and Validation. Jeng-Cheng Wu: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation and Writing - Original Draft. All authors took part in drafting, revising or critically reviewing the article. They have reviewed the manuscript and approved its final version for submission. They have agreed on the journal to which the article will be submitted and agree to take responsibility and be accountable for the article contents.

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Disclosure

The authors declared no conflict of interest.

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