# Relationship between job satisfaction and sleep quality of female shift-working nurses: using shift type as moderator variable

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**Abstract: This study was to investigate the impact of job satisfaction as the independent variable and the type of shift as the moderator variable on the sleep quality of female shift-working nurses. The Minnesota Satisfaction Questionnaire (MSQ) short form and the Pittsburgh Sleep Quality Index (PSQI) were used as evaluation tools. The subjects in the study were female shift-working nurses from teaching hospitals in northern Taiwan. A total of 178 valid questionnaires were recovered. A hierarchical multiple regression (HMR) was used to test for the moderating effect of shift type. The results demonstrated that there was a negative correlation between the total score for general job satisfaction and the Global PSQI scores. The Global PSQI scores were higher for nurses working night shifts than for those working day and evening shifts. HMR showed significant variances in the interaction between general job satisfaction of female shift-working nurses and the day/night shift as well as the evening/night shift. The type of shift had a moderating effect on the ways in which general job satisfaction impacts sleep quality. Furthermore, the moderating effect of night shift on the impact of job satisfaction on sleep quality was weaker in nurses working the night shift.**

**Key words: Female nurses, Shift-working, Nurses, Job satisfaction, Sleep quality, Shift schedule**

## Introduction

Sleep is imperative for recovering physical strength and alleviating mental and physical exhaustion. Previous studies have shown that emotions and attitudes impact sleep quality[1]. For shift-working nurses, sleep deprivation is one of the most frustrating issues, with over half of shift work-working nurses suffering from poor sleep quality[2, 3]. Due to constant disruptions in the biological clocks of shift-working nurses from having to work irregular shifts between nighttime and daytime, their physiological functions and the varying rates at which they can adapt to these irregularities make shift-working nurses more susceptible to circadian disruptions.

Sleep quality is a complex health issue that is related to an individual's heredity, physiological traits, physical health, emotional and cognitive factors, and social-environmental factors; therefore, it is imperative to further research this issue[4, 5]. Moreover, in contrast to male nurses, female shift-working nurses tend to be more susceptible to psychological issues, possibly due to female biological characteristics and hormones or heavier pressures from their own families[6].

Sleep quality in most recent studies has been measured by analyzing qualitative and quantitative data from sub-

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jects' subjective accounts, which are usually obtained by using the Pittsburg Sleep Quality Index (PSQI). Apart from being able to obtain data on the subject's overall sleep quality, the index also takes into account various other factors, such as the subject's level of satisfaction with their sleep quality for the past month, sleep latency (i.e., the amount of time it takes for subjects to fall asleep after lying down), average hours of sleep per night in the past month, the ratio of actual hours slept to time spent lying in bed awake (or time spent getting out of bed after waking), snoring, hotness or coldness of the environment at the time of falling asleep, effect of pain-related factors on sleep quality, usage of medication, and the impact of poor sleep quality on daily activities, among other factors[7]. Karagozoglu and Bingöl used the PSQI to measure the sleep quality of 418 nurses in their study of the relationship between job satisfaction and sleep quality[8]. The results of their study showed that the scores for job satisfaction and sleep quality were indeed related. In another study conducted by Scott and Judge, the PSQI was utilized to measure the sleep quality of day shift workers[9]. Their data suggested that higher job satisfaction tended to coincide with better sleep quality. In addition, their study found that job satisfaction among female workers were more susceptible to the effects of sleep deprivation.

Job satisfaction is a multifaceted concept that involves various dimensions of one's emotions and attitudes towards their work as well as the expression of those sentiments[10]. The Minnesota Satisfaction Questionnaire (MSQ) short form is predominantly utilized in studies on job satisfaction among shift-working nurses[11, 12]. The MSQ short form is able to measure the attitudes of workers towards intrinsic satisfaction with various factors, such as a work-related system of values, a sense of responsibility, social status, office or position, autonomy, and self-esteem. It can also measure a worker's attitudes towards extrinsic satisfaction with their salary, promotions, appreciation from managers as well as their interactions with their colleagues and subordinates. Lastly, the MSQ can measure the general satisfaction with the internal, external, and overall work environment.

In summary, the previous studies suggest that there is a high possibility that the sleep quality of female shift-working nurses is affected by the type of shift worked. We also demonstrate a correlation between job satisfaction and sleep; however, the question of whether the type of shift has a moderating effect on the correlation between job satisfaction and sleep quality remains unclear. In contrast to previous studies which focused on compar-
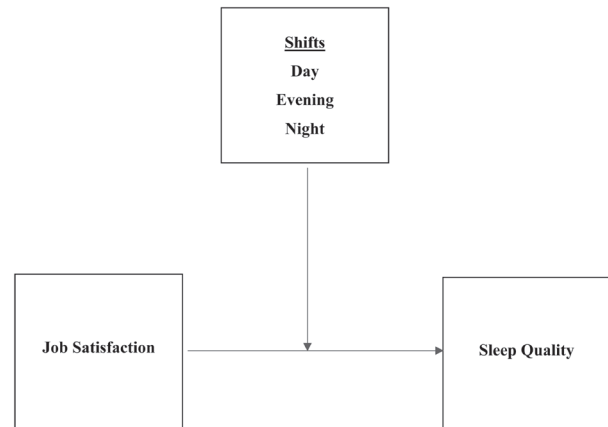


Fig. 1. Research framework.

ing sleep quality among shift-working nurses, this study aimed not only to investigate the types of shifts and sleep quality among shift-working nurses but also to investigate the variances between job satisfaction levels in different situations and sleep quality depending on the type of shift worked. The ultimate objective of this study was to determine the interaction between job satisfaction and type of shift and to ascertain the impact of this interaction on sleep quality as well as the correlations between all three factors. Figure 1 presents a graphical representation of the conceptual framework in this study.

## Subjects and Methods

### Study design, sample, and setting

This was a cross-sectional study that forms part of a larger research project. Data collection commenced after the proposal for this study passed a review by the Human Subject Research Ethics Committee and received the approval number N201703064 from the Office of Human Research from Taipei Medical University. All participants provided informed consent in writing prior to inclusion in the investigation. All the shift-working nurses in this study worked monthly rotating shifts; they only worked one type of shift a month and switched to another type of shift on the first day of the following month. For example, a nurse may have worked the day shift this month, the evening shift next month, and then the night shift the month after that. Therefore, each nurse worked a different shift each month according to this schedule. In order to eliminate disruptions from changing shift schedules, data were collected two weeks after a change in shift schedule each month[13]. The software G*Power was used to determine the statistical power of the sample size. Based on the pa-

rameters α=0.05, test power=0.8, and an effect size set at 0.25, the necessary number of research subjects was estimated to be 176. With an attrition rate estimated at 5%, the total number of research subjects needed was set at 185. The research subjects in this study comprised nurses with at least six years of working experience in intensive care units, surgical wards, medical wards, or gynecology wards on a monthly-rotating shift schedule (i.e., day shift was from 8:00 a.m. to 4:00 p.m.; evening shift was from 4:00 p.m. to 12:00 a.m.; and night shift was from 12:00 a.m. to 8 a.m.) at teaching hospitals in northern Taiwan. Data on the research subjects were collected between January 2017 and April 2018. Questionnaires were completed anonymously by the subjects themselves, and after completion, the subjects placed the questionnaires into provided resealable envelopes and returned them for analysis.

*Measures*

The basic information section of the questionnaire included items such as place of work, marital status, religion, level of education, age, years of working, and the types of shifts worked that month (i.e., day shift, evening, and/or night shift). The MSQ short form was used to measure job satisfaction; the form had a total of 20 items covering three dimensions of job satisfaction: intrinsic satisfaction (i.e., work-related questions, such as independence and sense of accomplishment), extrinsic satisfaction (i.e., questions unrelated to the work itself, such as salary and interaction with colleagues), and general satisfaction (i.e., work environment, equipment, and a combination of both intrinsic and extrinsic satisfaction). A five-point Likert scale was used with "1" being "very dissatisfied" and "5" being "very satisfied". The range of scores was 20 to 100; the higher the score, the higher the level of job satisfaction. The Cronbach's α for internal consistency of the scale was between 0.86 to 0.91[14], for the use of the questionnaire with nurses was between 0.83 and 0.84[15], and for the Taiwanese version of the scale was between 0.80 and 0.91[16]. Our reliability analysis of the constructs in this scale produced Cronbach's α values ranging from 0.85 to 0.92.

The PSQI was used to measure the sleep quality of the research subjects within a one-month period. To obtain a holistic understanding of the subject's experiences and sleep quality, the index had a total of 19 items that covered the following seven dimensions of sleep quality: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, sleeping medication, and daytime dysfunction. Scores ranged from 0 to 21; the higher the score, the lower the quality of sleep. Scores that exceeded 5 on the PSQI were deemed as indicative of poor sleep quality. Scores falling below 5 were deemed as indicative of good quality of sleep[7]. Polysomnography (PSG) was used to test for the validity of the PSQI. With the cut-off point set at 5, the PSQI had a sensitivity of 89.6% and a specificity of 86.5%[7].

*Statistical analyses*

The IBM SPSS Statistics 20.0 software package was used to conduct data filing and statistical analyses. Descriptive statistics were used to describe the basic features of the sample. ANOVAs or $\chi^2$ tests were used to conduct tests of homogeneity for the basic features of nurses in different shifts. The Pearson correlation coefficient was calculated to determine the correlation between the dimensions of job satisfaction and the dimensions of sleep quality. ANOVAs and post-hoc tests were used to determine the variances between different shifts and the dimensions of sleep quality. Lastly, three hierarchical multiple regression (HMR) models were used to verify the moderating effect of the different shifts. The first model tested whether the independent variable job satisfaction had a significant impact on the dependent variable sleep quality. The second model used $\Delta R^2$ for the moderator variable to determine whether the moderator variable had a significant impact on the dependent variable sleep quality, after controlling for the independent variable. The third model dealt with the interaction between the independent variable and moderator variable as well as used $\Delta R^2$ and the regression coefficient of the interaction term to determine whether the moderator variable (i.e., different shifts) was significant. Considering the possibility of a multicollinearity issue between the interaction and the independent and moderator variables, the independent and moderator variables were first mean-centered in the regression model before computing the interaction. In other words, all variables in the regression model were first mean-centered. Subsequently, using procedures by Aiken and West, an interaction plot was constructed to check for the type of interaction[17].

## Results

*Demographic data on nurses*

The subjects of this study comprised female shift-working nurses. Categorizing by type of shift, there were 60 d shift nurses, 71 evening shift nurses, and 47 night shift nurses. There were 77 nurses (43.3%) who worked in medical wards. The majority of nurses were unmarried (163

**Table 1. Results of test of homogeneity of nurses' basic information and different shifts**

| Item | N=178 | Day shift n=60 | Evening shift n=71 | Night shift n=47 | p |
|---|---|---|---|---|---|
| | | Frequency (%) | | | |
| Type of ward/Unit | | | | | 0.203 |
| Medical ward | 77 (43.3) | 25 (41.7) | 33 (46.5) | 19 (40.4) | |
| Surgical ward | 63 (35.4) | 22 (36.7) | 23 (32.4) | 18 (38.3) | |
| Intensive care unit | 32 (18.0) | 8 (13.3) | 14 (19.7) | 10 (21.3) | |
| Gynecological ward | 6 (3.4) | 5 (8.3) | 1 (1.4) | 0 (0.0) | |
| Marital Status | | | | | 0.073 |
| Married | 15 (8.4) | 9 (15.0) | 3 (4.2) | 3 (6.4) | |
| Unmarried | 163 (91.6) | 51 (85.0) | 68 (95.8) | 44 (93.6) | |
| Religious | | | | | 0.065 |
| No | 93 (52.2) | 24 (40.0) | 42 (59.2) | 27 (57.4) | |
| Yes | 85 (47.8) | 36 (60.0) | 29 (40.8) | 20 (42.6) | |
| Level of education | | | | | 0.993 |
| Vocational | 66 (37.1) | 22 (36.7) | 26 (36.6) | 18 (38.3) | |
| College | 108 (60.7) | 37 (61.7) | 43 (60.6) | 28 (59.6) | |
| Graduate | 4 (2.2) | 1 (1.7) | 2 (2.8) | 1 (2.1) | |
| | | Mean (SD) | | | |
| Age (yr) | 26.35 (4.26) | 26.48 (4.16) | 25.99 (4.42) | 26.74 (4.26) | 0.922 |
| Years of working (yr) | 3.91 (2.77) | 4.55 (3.11) | 3.67 (2.82) | 3.43 (2.01) | 0.124 |

nurses, 91.6%), non-religious (93 nurses, 52.2%), and holders of bachelor's degrees (108 nurses, 60.7%). The average age was 26.35 (*SD*: 4.26) and the average years of working experience was 3.91 (*SD*: 2.77). Following tests for homogeneity for female shift-working nurses in all three shifts in terms of the type of ward in which they worked, their marital status, religion, level of education, age, or years of work experience did not yield any significant variances (Table 1).

*Correlations between dimensions of job satisfaction and sleep quality*

A significant negative correlation was found between the total scores for general job satisfaction and global PSQI score ($r=-0.34$, $p<0.001$), subjective sleep quality ($r=-0.27$, $p<0.001$), sleep disturbances ($r=-0.25$, $p=0.001$), and daytime dysfunction ($r=-0.43$, $p<0.001$). A high positive correlation was found between scores for general job satisfaction and intrinsic job satisfaction ($r=0.92$, $p<0.001$) as well as extrinsic job satisfaction ($r=0.69$, $p<0.001$).

*Variances between scores for dimensions of sleep quality and shift types*

As presented in Table 2, a significant variance was found between subjective sleep quality, sleep latency, sleep duration, daytime dysfunction, and global sleep quality. Subjective sleep quality scores for night shifts were higher than those for day and evening shifts ($F=12.21$, $p<0.001$). Sleep latency scores for night shifts were higher than those for day shifts ($F=5.99$, $p=0.003$). Sleep duration scores for night shifts were higher than those for evening shifts ($F=5.11$, $p=0.007$). Daytime dysfunction scores for night shifts were higher than those for day and evening shifts ($F=5.22$, $p=0.006$). Global PSQI score for night shifts were higher than those for day and evening shifts ($F=8.93$, $p<0.001$).

*Moderating effect of shift type on impact of job satisfaction on sleep quality scores*

As presented in Table 3, the first model showed that the impact of general job satisfaction on sleep quality scores reached a level of significance ($F=22.99$, $p<0.001$) with an explanatory power of 11.6% and the impact having a negative effect (standardized regression coefficient $\beta=-0.34$, $p<0.001$). After the addition of the moderator variable into the second model, the altered $R^2$ reached a level of significance ($\Delta F=9.05$, $p<0.001$), raising the explanatory power by 8.3%. The regression coefficients for the night/day shift ($\beta=0.33$, $p<0.001$) and night/evening shift ($\beta=0.22$, $p=0.005$) were significantly positive. Following the addition of shift type and the general job satisfaction interac-

**Table 2. Analysis of differences between shift types in sleep quality**

| Item | Shift type | M | SD | F | p | Post hoc |
|---|---|---|---|---|---|---|
| Subjective sleep quality | (1) Day | 1.27 | 0.69 | 12.21 | <0.001*** | 3>1, 2 |
| | (2) Evening | 1.44 | 0.71 | | | |
| | (3) Night | 1.89 | 0.56 | | | |
| Sleep latency | (1) Day | 1.22 | 0.76 | 5.99 | 0.003** | 3>1 |
| | (2) Evening | 1.46 | 0.75 | | | |
| | (3) Night | 1.72 | 0.74 | | | |
| Sleep duration | (1) Day | 1.03 | 0.74 | 5.11 | 0.007** | 3>2 |
| | (2) Evening | 0.75 | 0.77 | | | |
| | (3) Night | 1.15 | 0.59 | | | |
| Habitual sleep efficiency | (1) Day | 0.38 | 0.56 | 0.72 | 0.488 | |
| | (2) Evening | 0.44 | 0.71 | | | |
| | (3) Night | 0.53 | 0.62 | | | |
| Sleep disturbances | (1) Day | 1.08 | 0.56 | 1.91 | 0.151 | |
| | (2) Evening | 1.18 | 0.46 | | | |
| | (3) Night | 1.02 | 0.25 | | | |
| Use of sleeping medication | (1) Day | 0.07 | 0.25 | 2.28 | 0.105 | |
| | (2) Evening | 0.21 | 0.53 | | | |
| | (3) Night | 0.11 | 0.31 | | | |
| Daytime dysfunction | (1) Day | 0.98 | 0.54 | 5.22 | 0.006** | 3>1, 2 |
| | (2) Evening | 1.06 | 0.56 | | | |
| | (3) Night | 1.34 | 0.70 | | | |
| Global PSQI score | (1) Day | 6.03 | 2.19 | 8.93 | <0.001*** | 3>1, 2 |
| | (2) Evening | 6.52 | 2.37 | | | |
| | (3) Night | 7.72 | 1.38 | | | |

$N=178$ *$p<0.05$, **$p<0.01$, ***$p<0.001$.
M: mean; SD: standard deviation; PSQI: Pittsburg Sleep Quality Index.

**Table 3. Analysis of moderating effect of type of shift on impact of job satisfaction on sleep quality**

| Variable | First model | Second model | Third model |
|---|---|---|---|
| | β value | β value | β value |
| Independent variable (X: General Job Satisfaction) | −0.34*** | −0.33*** | −0.47*** |
| Moderator variable (M: Shift Type) | | | |
| Day/Evening shift (M1) | | 0.13 | 0.13 |
| Night/Day shift (M2) | | 0.33*** | 0.35*** |
| Evening/Night shift (M3) | | 0.22** | 0.23** |
| Interaction term (X × M) | | | |
| X × M1 | | | −0.06 |
| X × M2 | | | 0.22* |
| X × M3 | | | 0.17* |
| $\Delta R^2$ | 0.116 | 0.083 | 0.031 |
| $\Delta F$ | 22.99*** | 9.05*** | 3.46* |
| $\Delta p$ | <0.001 | <0.001 | 0.034 |
| $R^2$ | 0.116 | 0.199 | 0.230 |
| F (Final) | 22.99*** | 14.40*** | 10.27*** |
| p | <0.001 | <0.001 | <0.001 |

$N=178$ Dependent Variable: PSQI score.
*$p<0.05$, **$p<0.01$, ***$p<0.001$.
β: Standardized Coefficients; $\Delta R^2$: $R$ Square Change value; $\Delta F$: $F$ Change value; $\Delta p$: Significance of $F$ Change;
$R^2$: Overall $R$ Square value; F (Final): Overall $F$ value; p: $F$-test of Overall Significance.
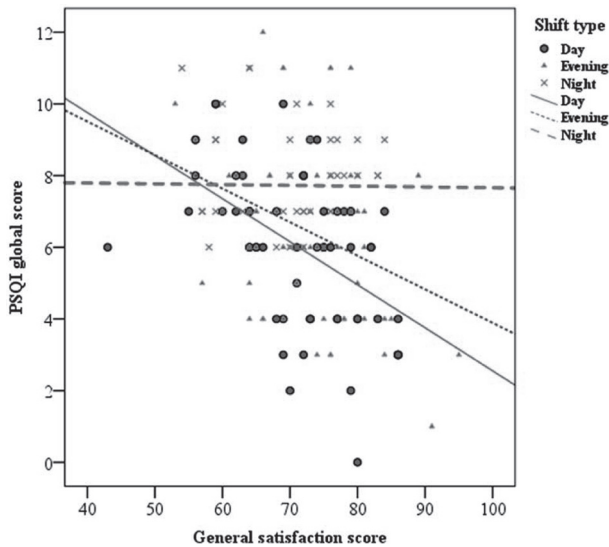
**Fig. 2.** Plot of moderating effect of shift type on impact of job satisfaction on sleep quality.

tion term, the altered $R^2$ reached a level of significance ($\Delta F$=3.46, $p$=0.034). The regression coefficients reached a level of significance for general job satisfaction and night/day shifts ($\beta$=0.22, $p$=0.01) as well as for general job satisfaction *multiplying by* night/evening shifts ($\beta$=0.17, $p$=0.046). The impact of general job satisfaction on sleep quality of those working night shift was significantly lower that of those working in day and evening shifts. As seen in Fig. 2, the impact of general job satisfaction on sleep quality of those working night shift was significantly lower that of those working in day and evening shifts.

## Discussion

Our study identified that the more satisfied shift-working nurses are with their jobs, the higher their sleep quality. Controlling for the effect of general job satisfaction revealed that night shift workers had lower sleep quality than those working in day or evening shifts. With regards to the moderating effect of shift type on the impact of general job satisfaction on sleep quality, a significant variance was found between the impact of general job satisfaction on sleep quality of night shift workers and that of both day shift and evening shift workers.

The job satisfaction of clinical nurses is an issue that warrants attention. Aiken *et al.* conducted multinational research by surveying 40,000 nurses[18]. They found that over 40% of the nurses surveyed were dissatisfied with their jobs. A systematic literature review conducted by Lu *et al.* revealed that interpersonal relationships between

nurses, patient care, and work environments were the main factors that affected job satisfaction[19]. A variety of pressures may all be affecting job satisfaction levels, which include the diversity of nurses' work environments, the uniqueness of each nurse's area of specialization, the need to work with different medical teams, and the range of patient groups that they have to care for. We therefore employed job satisfaction as an independent variable in this study and examined its influence on sleep quality.

The results of this study demonstrate that the job satisfaction of shift-working nurses indeed impacts their sleep quality. The more miserable nurses are at their job, the less they are able to achieve good quality sleep. Wang *et al.* posited that, when faced with frustrating challenges and obstacles in their work, nurses may not only have lower job satisfaction but may also manifest physiological symptoms, such as headaches and insomnia[20]. These circumstances could cause nurses to become tense or agitated, which could trigger their sympathetic nervous system to secrete epinephrine, norepinephrine, as well as cortisol and thus disrupt their biological clocks. Moreover, overactive brain cells may cause suppression of melatonin production in the pineal body and inhibit sleep[21]. In light of this, creating a work environment that can give nurses a certain level of job satisfaction would help improve nurses' sleep quality. In prolonged cases of sleep deprivation or poor sleep quality, long-term health consequences could emerge. When compared to those who were more satisfied with their jobs, those who were less satisfied with their jobs tended to exhibit physiological symptoms, such as back pain or colds, and may succumb to psychological issues, such as depression and anxiety, all of which are detrimental to their health in the long-term[22, 23].

Not only does job satisfaction promote better sleep quality, but it has also been shown to have a positive effect on work performance[24], especially for nurses[25]. Building off from these findings, the results in our study identified a moderately negative relationship between job satisfaction and the daytime dysfunction dimension of sleep quality. If this dimension is allowed to continue over a long period of time, cognitive function and the ability to make judgements will definitely be adversely affected, leading to poorer work performance.

The findings from this study also established a significant variance between the subjective sleep quality and daytime dysfunction of nurses working night shift and those of nurses working the day or evening shifts. These findings are consistent with the research of Kunert *et al.* who demonstrated that the variance between the subjec-

tive sleep quality of night shift nurses and that of day shift nurses is due to the fact that nurses who work during nighttime hours have lower quality of sleep, which causes exhaustion and lower work performance[26]. Moreover, night shift nurses end their shift in the morning where the body is the most active, which inhibits the ability to fall asleep during the daytime. Thus, night shift nurses have longer sleep latency, i.e., it takes them longer to fall asleep. While evening shift workers finish work around midnight and can go to sleep during normal hours in the best-case scenario (in the worst-case scenario, their sleep time is delayed by only a couple of hours)[27], night shift nurses finish their shift at 8:00 a.m. the following morning, which is 10 h later than when they would normally sleep. This group of nurses suffer from sleep inversion; night shift nurses experiencing sleep-wake inversion are unable to fall asleep easily and/or have shorter sleep durations than do day shift or evening shift nurses[28].

This study also found that the relationship between job satisfaction and sleep quality varies depending on the shift. Interestingly though, nurses working night shift were already used to poor sleep quality. The relationship between job satisfaction and sleep quality was stronger for nurses working day shifts or evening shifts whereas this relationship was comparatively weaker for nurses working night shifts. The circadian rhythm of an individual is regulated by melatonin, which is secreted from the pineal body in the suprachiasmatic nucleus of the normal human brain, and the amounts of melatonin secreted change between the day and night. Significantly larger quantities are secreted at night to facilitate the ease of falling asleep. Exposure of sunlight to the eyes in the morning, for example, suppresses melatonin production which causes one to wake up[29]. Nurses working in the day or evening shifts have increased secretions of melatonin during the night. Nurses working night shifts, however, are exposed to light sources during the time of day where they should be sleeping, suppressing their bodies' melatonin secretion and disrupting their circadian rhythm. Thus, in the case when the shift worked is a night shift, the type of shift has a greater impact on sleep quality than does job satisfaction[30].

Night shift nurses must forcibly disrupt their biological clocks and are thus constantly in a state of sleep deprivation, under which they must also maintain an alertness when working. Attempts to sleep during the day are often difficult as their sleep cycles are more susceptible to being disrupted or broken. Because of this, night shift nurses take longer to fall asleep and are unable to enter deep sleep even if they manage to fall asleep, resulting in insufficient

and a lack of sleep[31], lower sleep quality, and fewer hours of sleep than those of day or evening shift nurses. Amassing sleep debt over time could lead to chronic fatigue, which would ultimately lower one's alertness and make one more prone to mistakes and accidents[32]. Indeed, Lourencao, Moscardini, and Soler pointed out that shift-working nurses suffering from low sleep quality may have lower work performance and even increased incidents of medical errors[33].

The findings in this study demonstrate that there is a positive correlation between job satisfaction among female shift-working nurses and sleep quality with significant variance caused by the type of shift. In other words, the relationship between job satisfaction and sleep quality differs depending on the type of shift. Given that night shift workers are accustomed to poor quality of sleep, their job satisfaction has less of an impact on their quality of sleep. We believe that the results of this study will provide reference for future research on the correlation between the job satisfaction and sleep quality of shift-working nurses. However, this study did not take into account other interfering or mediating variables, such as physical illnesses, pain, drinking, obesity, smoking, or caffeine, all of which may also have an impact on the sleep quality of shift-working nurses. Future studies should include these factors to gain a deeper understanding of the relationship between the job satisfaction and sleep quality of shift-working nurses.

Furthermore, this study used the PSQI and MSQ short form, which are widely applied questionnaires with concise wording, as well as self-report questionnaires, which are the most economical means of collecting data. Achieving our research objectives at such low costs is the greatest merit of this study. By gaining the trust of the participants, reminding them to answer truthfully, and controlling response bias as much as possible, we could guarantee to the nurses, in our text explanation given before the questionnaire, that we would not divulge any of their questionnaire results or personal information to their coworkers or supervisors. Nonetheless, the shortcomings of collecting data with self-report questionnaires, such as stability or the fact that the sleep quality and job satisfaction of nurses may vary with time, may not have been completely removed. This was the greatest limitation of this study.

*Practical implications/suggestions*

Based on the results of this study, we urge that administrative managers recognize the importance of the job satisfaction of shift-working nurses to their sleep quality

as well as devise various incentives and means of creating a pleasant workplace in order to improve their job satisfaction and sleep quality. Furthermore, special attention must be given to the sleep quality of nurses working the night shift. Self-management of sleep is extremely important for nurses after they finish a night shift, so we recommend that hospital management offer courses on sleep hygiene to improve the sleep quality of nurses working the night shift.

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