ORIGINAL ARTICLE

Risk Assessment of Shift Work Disorders and Its Effect on Well-Being of Nurses in a Hospital in Iran

Mohammad Javad SheikhMozafari[1,2], Fatemeh MirnajafiZadeh [1*], Ali Mohsenian[3]

[1] Department of Occupational Health Engineering, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran

[2] Students' Scientific Research Center, Tehran University of Medical Sciences, Tehran, Iran

[3] Department of Occupational Health and Safety Engineering, School of Health, Shiraz University of Medical Sciences, Shiraz, Iran

ABSTRACT

Background: Non-standard work shifts are one of the main risk factors for physical and mental disorders. This study aimed to evaluate the reliability of the Shift Work Disorder Screening (SWDS) questionnaire and examine the effect of shift work on the quality of life and well-being of nurses in a hospital in Iran.

Methods: This study was conducted on 85 nurses, of which 41 and 44 had shift and non-shift work, respectively. The SWDS was used to evaluate shift disorders, and the WHO-5 questionnaire was used to assess the well-being of nurses. ICC and alpha coefficients were used to evaluate the reliability. T-test and chi-square tests were used to evaluate the differences between demographic characteristics and questionnaire responses between the two groups of nurses.

Results: The SWDS reliability using Cronbach's alpha and ICC were 0.913 and 0.845, respectively. Fifty-four percent of nurses were high risk, and 46% were low risk, regarding the SWD score. About 59% of shift workers were dissatisfied with their sleep. Nurses who had done shift work for less than a year and fewer than three days per week were less likely to experience disorders. There was a significant relationship between WHO score and SWD risk.

Conclusion: The SWD risk affects the well-being of individuals. The SWDS is a proper tool for shift work disorder risk assessment, and it can be used to assess the risk of adverse safety, health, and performance effects of SWD.

KEYWORDS: *Nurses, Hospitals, Questionnaire, Risk assessment, Well-being, Shift work disorder*

INTRODUCTION

Today, providing 24/7 services is a job requirement for many occupational organizations. The need for 24-hour services in some organizations arises from shift work and night work systems [1]. In general, working hours outside the 7:30-8:00 AM to 5:00-6:00 PM range are considered shift work, which is classified as non-standard due to its harmful effects [2]. According to published reports, about 20% of the workforce in European countries work in non-standard shifts [3].

Another study reported that approximately 30% of the Asian workforce does shift work [2]. A survey conducted across multiple countries found that 20% of workers are employed in shifts other than normal day shifts [4]. Additionally, another study revealed that 15% of the full-time workforce in the United States,

Corresponding author: Fatemeh MirnajafiZadeh
E-mail: fatemehmirnajafii@gmail.com

16% in Australia, 18% in the United Kingdom, and 13% in France work non-standard shifts [5]. Night shifts and other non-standard shifts lead to numerous physiological, psychological, and sleep disorders, commonly referred to as shift work disorder (SWD) [6, 7]. Night shift workers are significantly more prone to vehicle accidents [8], as night shifts reduce alertness, cognitive abilities, and perception, making these shifts one of the primary causes of car accidents [9]. Other complications associated with shift work include cardiovascular issues, gastrointestinal problems, diabetes, irritability, and even cancer [10]. In a study, it was determined that the prevalence of Shift Work Disorder (SWD) among Iranian oil rig workers was approximately 30% [11].

One of the occupational groups required to provide 24-hour services to enhance and maintain the welfare and health of the population is healthcare workers, including nurses [12]. Non-standard work schedules disrupt circadian processes and sleep regulation in nurses, resulting in numerous detrimental effects on their physical and mental health [13]. In the United States, at least 35% of healthcare workers are employed in non-standard shifts [14]. The Ganesan study found that nurses and healthcare workers felt less alert and mentally functional during the early hours of night shifts compared to regular shift schedules [9]. Etemadi reported that shift work nurses suffer from cardiovascular, musculoskeletal, and gastrointestinal issues, with approximately 31% reporting mental health complaints [15]. In a study by Park et al., the prevalence of insomnia and poor sleep quality among nurses was found to be about 80% [16]. Booker identified high-risk non-standard shifts as a significant factor contributing to the prevalence of depression and stress among nurses [6]. Esmaily found that night shifts impair certain aspects of nurses' cognitive functions, such as working memory [12]. Mercy noted that long non-standard shifts in nurses had detrimental effects on fatigue, burnout, social life, and family relationships, leading to an increase in car accidents and near-misses [17]. Rosa et al. observed that shift work among nurses increased risk factors for stress, sleep disorders, metabolic disorders, diabetes, cardiovascular problems, and breast cancer [18].

Among the various negative effects of shift work, sleep and mental disorders (SWD) are more common than other complications [6, 13]. SWD is rarely diagnosed among nurses and healthcare workers due to the lack of standard screening tools. Additionally, individual vulnerability to the negative health and safety consequences of shift work is not well understood [5]. One of the effective methods for assessing the risk and exposure of individuals, as well as reducing costs and time, is the use of validated questionnaires. These questionnaires have been utilized in various studies and fields, yielding highly favorable results [19-21]. One way to diagnose SWD promptly is through the use of validated questionnaires. The Shift Work Disorder Screening (SWDS) questionnaire, developed by Barger et al., is one such tool and has demonstrated high validity [5]. Nena et al., using this questionnaire, found that 60% of shift work nurses were dissatisfied with their sleep quality [22]. Barger et al. also found that the questionnaire is an effective tool for diagnosing SWD [5]. Booker et al., using this questionnaire, determined that about 30% of nurses are at high risk of SWD [6]. Candice C. Y. Wen et al. assessed the sleep quality of airline crew using this tool and found that 68% were at risk of SWD [23]. Moini's study assessed the Persian version of the Shift Work Disorder Questionnaire (SWDQ) for accuracy and reliability among female employees. The questionnaire showed acceptable content validity and internal consistency, with a Cronbach's alpha of 63.4%. The results suggest that the Persian SWDQ is a valid and reliable tool for identifying individuals at risk of shift work disorder.

Given the absence of a suitable tool for evaluating and screening SWD among nurses and other healthcare providers in Iran, and considering that nurses and healthcare providers represent a large portion of the occupational population in our country, the primary goal of this study is to assess the reliability of the SWDS questionnaire and adapt it for use in Iran. Given that shift work significantly impacts various aspects of individuals' lives, and considering that nursing is one of the most stressful and demanding professions in the world, this study aims to examine the extent to which shift work disorders affect the overall well-being of nurses in a hospital in Iran. This questionnaire can serve as an effective tool in future SWD studies to help prevent shift-related disorders.

MATERIALS AND METHODS
Questionnaire translation
The present study is a descriptive-analytical one conducted to determine the reliability of the Persian version of the SWDS questionnaire among nurses and healthcare providers in a hospital in Kerman province in 2022. There are several methods for translating a questionnaire from its original language

into a secondary language, such as the Backward-Forward method and the Dual Panel method. In this study, we used the Backward-Forward method due to its simplicity and high validity [20, 24-26]. First, two fluent Iranian translators independently translated the questionnaire from English into Persian. Then, two other fluent Iranian translators, without access to the original version, translated the Persian versions back into English. To ensure that the original English and back-translated English versions were equivalent in terms of semantic content, the two versions were compared and analyzed. After discussion among the translators, the translations were consolidated, and the final Persian version was prepared.

Since this study aimed to determine the reliability of the Persian version of the SWDS questionnaire among Persian-speaking staff, we distributed the final translated questionnaire to 100 nurses in a hospital.

Inclusion and exclusion criteria
The inclusion criteria were having more than one year of work experience, no history of mental health issues, and not being pregnant, while the exclusion criteria included drug use and taking certain medications.

Questionnaires
Demographic questionnaire
The demographic questionnaire included information on age, gender, marital status, type of work shift, caffeine consumption, smoking and drug use, work experience, weekly and monthly working hours, annual income, education level, weight, height, and number of children.

SWDS (Shift Work Disorder Screening) questionnaire
This questionnaire consists of 26 questions divided into 4 sections.

Section 1 includes questions on demographic and work-related information such as age, gender, working in non-standard shifts during the past month, number of non-standard shift days per week, start of non-standard shift work (in terms of month), and start and end times of non-standard shifts (in terms of hour).

Section 2 focuses on sleep and well-being during non-standard shifts, including questions about overall sleep quality, drowsiness at work, difficulty falling asleep and staying asleep, waking up too early and being unable to go back to sleep, feelings of health and well-being upon waking, physical and mental functioning during work,

the possibility of napping during shifts, and napping while driving to or from work.

Section 3 covers sleep and functioning during breaks from non-standard shifts. It includes questions about having at least a one-week break from non-standard shifts, total sleep during breaks, sleepiness during waking hours, difficulty falling asleep at bedtime, staying asleep, overall sleep quality, physical and mental functioning during waking hours, and time delays in falling asleep at bedtime.

Section 4 contains a single question about the likelihood of dozing off or falling asleep while driving after at least two days off from work [5].

Final and shortened version of SWDS questionnaire
This shortened questionnaire consists of four questions extracted from the original 26-question version. It was designed to assess whether these four questions alone are sufficient to determine the risk of SWD. Since the validity of the shortened version was confirmed in the main study, we used only these four questions to assess the final SWD risk, while the original questionnaire was used to evaluate other characteristics related to shift work disorders. The shortened questionnaire includes questions about difficulty waking up too early and being unable to fall back asleep during non-standard shifts, feelings of well-being while awake during non-standard shifts, the likelihood of dozing off at work during non-standard shifts, and the likelihood of dozing off or falling asleep while driving after at least two days off from work. For details on how the final score of this questionnaire is calculated, please refer to the relevant studies [5].

WHO-5 Questionnaire (WHO-5 Well-Being Index)
This tool is a brief self-reported measure of the current mental well-being of nurses. Responses are rated on a 6-point Likert scale ranging from 0 to 5 (0 = at no time, 1 = some of the time, 2 = less than half of the time, 3 = more than half of the time, 4 = most of the time, and 5 = all of the time). The total score ranges from 0 to 25, with lower scores indicating greater impairment in quality of life [27]. The validity of this questionnaire has been established in various national and international studies [28, 29].

Statistical analysis
We used SPSS software version 22 to analyze the data. To evaluate the reliability of the questionnaire, the test-retest test (intra-class correlation coefficient

(ICC)) and alpha coefficient were used. To use the ICC coefficient, the test questions were given to a single group twice under the same conditions, and using the ICC, the obtained scores were compared and used as a reliability coefficient. Mann-Whitney and Spearman tests were also used for other statistical analyses. T-test and chi-square tests were used to evaluate the differences in demographic characteristics and questionnaire responses between shift and non-shift nurses. T-test and ANOVA were used to assess the relationship between the SWDS questionnaire and the WHO-5 questionnaire. The Pearson test was also used to evaluate any potential relationship between the two questionnaires. The significance level for all correlation analyses was set at 0.05.

Study population

In this study, two groups of 50 nurses (100 nurses in total) from a hospital in Iran, who worked either non-standard or standard shifts, were selected to assess shift work disorder. The final SWDS questionnaire, both the shortened and original versions, was distributed among nurses working non-standard shifts. Since a minimum of 50 participants is sufficient for reliability assessments, and the hospital setting did not permit the inclusion of more than 100 individuals, questionnaires were distributed among 100 staff members.

Initially, we explained the study's conditions and objectives to the hospital's occupational health officer.

Afterward, the staff were informed about the study's aims; those who participated did so voluntarily.

RESULTS

Demographic information of individuals
In this study, the final questionnaire was distributed among 100 nurses, 85 of whom completed it accurately and thoroughly. Table 1 presents the demographic characteristics of the participants by shift work experience.

Evaluating the reliability of SWDS questionnaire items and assessing the answers given by nurses
Table 2 shows the reliability of the SWDS questionnaire using two methods: Cronbach's alpha and the ICC coefficient.

According to Table 2, the mean reliability scores using Cronbach's alpha and ICC for the second part of the questionnaire (questions 7 to 17) were 0.920 and 0.856, respectively. For the third part (questions 19 to 26), the scores were 0.903 and 0.829, and for the fourth part, they were 0.985 and 0.971, respectively.

In terms of sleep satisfaction, 58.6% of nurses were somewhat or very dissatisfied with their sleep, while 41.5% were slightly dissatisfied. None of the nurses working shifts reported being completely satisfied with the amount or quality of their sleep. Additionally, 85.4% of shift workers experienced

Table 1. Summary of nurses' demographic information by work shift

Demographic factors	Non-shift work N (%)	Shift work N (%)
Gender		
Man	13 (29.5)	5 (12.2)
Female	31 (70.5)	36 (87.8)
Age		
< 35 years	23 (54.6)	28 (68.2)
36-45 years	20 (45.5)	12 (29.2)
45 years<	1 (2.3)	1 (2.4)
Mean age (standard deviation)	35.29 (6.16)	31.73 (6.8)
Marital status		
Married	36 (81.8)	29 (70.7)
Single	8 (18.2)	11 (26.8)
divorced	-	1 (2.4)
Children		
Yes	34 (77.3)	27 (65.8)
No	10 (22.7)	14 (34.1)
Working shift days		
< 3 Days	-	30 (73.1)
3 Days <	-	8 (19.5)
Shift work experience		
< 1 year	-	10 (24.3)
1-5 years	-	18 (43.9)
5 years<	-	13 (31.7)

Table 2. Reliability results of questionnaire items

Items	Alpha coefficient	ICC coefficient
Q7. Overall amount of sleep	0.933	0.874
Q8. Experience sleepiness	0.941	0.889
Q9. Problem falling asleep at bedtime	0.832	0.712
Q10. Problem staying asleep	0.947	0.899
Q11. Problem with waking up too early and not being about to get back to sleep	0.879	0.784
Q12. Overall quality of sleep	0.930	0.869
Q13. Sense of well-being during the time you were awake	0.825	0.702
Q14. Physical and mental functioning during the time you were awake	0.923	0.857
Q15. Doze off at work	0.970	0.942
Q16. Doze off while driving after a non-standard shift	0.988	0.976
Q17. Doze off while commuting (not driving)	0.956	0.916
Q19. The overall amount of sleep During breaking from non-standard shifts	0.896	0.811
Q20. Experience sleepiness during the awakening time During breaking from non-standard shifts	0.937	0.882
Q21. having a problem falling asleep at bedtime time During breaking from non-standard shifts	0.857	0.750
Q22. having a problem with staying asleep During breaking from non-standard shifts	0.778	0.636
Q23. The overall quality of sleep During breaking from non-standard shifts	0.943	0.892
Q24. physical and mental functioning during the awakening time During breaking from non-standard shifts	0.889	0.800
Q25. experiencing time delay in getting to sleep at bedtime During breaking from non-standard shifts	0.944	0.895
Q26. Doze off while driving after at least two days off from work	0.985	0.971

moderate to severe drowsiness during work. Problems with sleep were common, with 76.4% of nurses reporting difficulty falling asleep, 70.7% having trouble maintaining continuous sleep at night, and 75.6% waking up too early and being unable to return to sleep.

Regarding health, about 30% of nurses felt that their sense of health upon waking had declined, and 34% perceived a decline in their physical and mental health. Additionally, 24% and 19% of nurses reported a slight decline in their sense of well-being upon waking and their physical and mental health, respectively. In the past month, 68.4% of nurses experienced the possibility of napping at work, 44% while driving, and 81% while commuting (not driving).

In terms of sleep quality, 46.4% of nurses were somewhat dissatisfied, 48.8% were slightly dissatisfied, and only 5% were completely satisfied with the quality of their sleep.

Table 2 shows the answers to the SWDS questionnaire. The total number of shift work nurses who had at least one week off from shift work was only 9. About 45% of these nurses did not experience sleepiness during their break. Additionally, around 78% had no trouble falling asleep at bedtime, and approximately 78% did not have issues with staying asleep. Roughly 56% were satisfied with their sleep, and the same percentage (56%) rated their physical and mental performance as normal. About 34% did not experience delays in falling asleep at bedtime.

Regarding the risk of SWD (Shift Work Disorder), approximately 54% of nurses were classified as high risk, while 46% were considered low risk.

WHO-5 Questionnaire
All 5 items of the WHO-5 questionnaire had good internal consistency using Cronbach's alpha. The reliability score was 0.931 for all nurses and 0.921 and 0.941 for shift work and non-shift work nurses, respectively.

In Table 3, the answers of nurses for the WHO-5 questionnaire are shown, separated by shift and non-shift nurses.

Table 4 shows the mean score of the well-being of nurses based on shift type and gender.

In Table 5, WHO-5 scores are presented based on demographic information.

Table 2. Answers given by shift work nurses to the SWDS questionnaire

Items	N	%
Q7. Overall amount of sleep (N=41)		
Sufficient	0	0
Slightly insufficient	17	41.5
Somewhat insufficient	17	41.5
Very insufficient	7	17.1
Average score ± standard deviation	0.734 ± 2.75	
Q8. Experience sleepiness (N=41)		
None	6	14.6
Mild	26	63.4
Considerable	4	9.8
Intense	5	12.2
Average score ± standard deviation	0.843±2.19	
Q9. Problem falling asleep at bedtime (N=41)		
No problem	6	14.6
Minor problem	27	65.9
Considerable problem	5	12.2
Serious problem	3	7.3
Average score ± standard deviation	0.748±2.12	
Q10. Problem staying asleep (N=41)		
No problem	12	29.3
Minor problem	23	56.1
Considerable problem	3	7.3
Serious problem	3	7.3
Average score ± standard deviation	0.818±1.92	
Q11. Problem with waking up too early and not being about to get back to sleep (N=41)		
No problem	10	24.4
Minor problem	24	58.5
Considerable problem	3	7.3
Serious problem	4	9.8
Average score ± standard deviation	0.851±2.02	
Q12. Overall quality of sleep (N=41)		
Satisfactory	2	4.9
Slightly unsatisfactory	20	48.8
Somewhat unsatisfactory	12	29.3
Very unsatisfactory	7	17.1
Average score ± standard deviation	0.835±2.58	
Q13. Sense of well-being during the time you were awake (N=41)		
Normal	5	12.2
Slightly decreased	24	58.5
Somewhat decreased	8	19.5
Very decreased	4	9.8
Average score ± standard deviation	0.806±2.26	
Q14. Physical and mental functioning during the time you were awake (N=41)		
Normal	8	19.5
Slightly decreased	19	46.3
Somewhat decreased	11	26.8
Very decreased	3	٧/٣
Average score ± standard deviation	0.851±2.21	
Q15. Doze off at work (N=41)		
Not at all	13	31.7
Slight chance	22	53.7
Moderate chance	2	4.9
Highly likely	4	9.8
Average score ± standard deviation	0.877±1.92	
Q16. Doze off while driving after a non-standard shift (N=41)		
Not at all	15	36.6
Slight chance	13	31.7
Moderate chance	3	7.3
Highly likely	2	4.9

Table 2. Answers given by shift work nurses to the SWDS questionnaire

Items	N	%
Average score ± standard deviation		1.51±2.39
Q17. Doze off while commuting (not driving) (N=41)		
Not at all	6	14.6
Slight chance	13	31.7
Moderate chance	12	29.3
Highly likely	8	19.5
Average score ± standard deviation	2.68	1.10
Q26. Doze off while driving after at least two days off from work (N=41)		
Not at all	28	31.8
Slight chance	3	3.4
Moderate chance	1	1.1
Highly likely	1	1.1
Not applicable	8	9.1
Average score ± standard deviation		1.97±1.62

Table 3. Answers given by nurses to the WHO-5 questionnaire

Items	Shift work N (%)	Non-shift work N (%)
Q1. I have felt cheerful in good spirits		
All of the time	2 (4.9)	9 (20.5)
Most of the time	11 (26.8)	15 (34.1)
More than half the time	10 (24.4)	10 (22.7)
Less than half the time	12 (29.3)	4 (9.1)
Some of the time	5 (12.2)	4 (9.1)
At no time	1 (2.4)	2 (4.5)
Q2. I have felt calm and relaxed		
All of the time	2 (4.9)	9 (20.5)
Most of the time	7 (17.1)	8 (18.2)
More than half the time	16 (39)	16 (36.4)
Less than half the time	11 (26.8)	4 (9.1)
Some of the time	4 (9.8)	6 (13.6)
At no time	1 (2.4)	1 (2.3)
Q3. I have felt active and vigorous.		
All of the time	9 (20.5)	7 (15.9)
Most of the time	9 (22)	9 (20.5)
More than half the time	10 (24.4)	14 (31.8)
Less than half the time	12 (29.3)	9 (20.5)
Some of the time	6 (14.6)	4 (9.1)
At no time	2 (4.9)	1 (2.3)
Q4. woke up feeling fresh and rested		
All of the time	0	12 (27.3)
Most of the time	7 (17.1)	13 (29.5)
More than half the time	13 (31.7)	7 (15.9)
Less than half the time	14 (34.1)	7 (15.9)
Some of the time	6 (14.6)	4 (9.1)
At no time	1 (2.4)	1 (2.3)
Q5. My daily life has been filled with things that interest me		
All of the time	1 (2.4)	7 (15.9)
Most of the time	6 (14.6)	9 (20.5)
More than half the time	13 (31.7)	19 (43.2)
Less than half the time	14 (34.1)	5 (11.4)
Some of the time	5 (12.2)	3 (6.8)
At no time	2 (4.9)	1 (2.3)

Figures 1 show the overall well-being based on the SWD risk.

DISCUSSION

This study aimed to assess the reliability of the SWDS questionnaire and its adoption in Iran. Additionally, we aimed to evaluate SWD among nurses and healthcare providers in a hospital in Iran, to use this questionnaire as an effective tool for SWD assessment to prevent shift-related disorders. The mean reliability scores

Table 4. the mean score of the well-being of nurses based on shift type and gender

Mean score	Shift work nurses N (±)		Non-shift work nurses N (±)	
Shift type and gender	Men	Women	Men	Women
Overall score range is ranged from 0-25	14.4 (4.61)	12.8 (5.06)	20.23 (5.44)	14.51 (5.43)

Table 5. WHO-5 scores based on demographic information and shift type

| Demographic factors	WHO final score	
	Shift work nurse N (±)	Non-shift work nurse N (±)
Age		
< 35 years	12.57 (5.13)	16.04 (5.89)
36-45 years	13.91 (4.90)	15.95 (6.04)
45 years<	14	25
Marital status		
Married	12.20 (5.10)	15.91 (6.29)
Single	15 (4.49)	17.5 (4.40)
Divorced	14	-
Children		
Yes	12.37 (4.65)	15.97 (6.48)
No	14.21 (5.53)	17 (4.02)
Working shift days		
< 3 Days	12.60 (4.84)	-
3 Days <	14.62(5.55)	-
Shift work experience		
< 1 year	13 (6.25)	-
1-5 years	13.88 (4.57)	-
5 years<	11.76 (4.58)	-
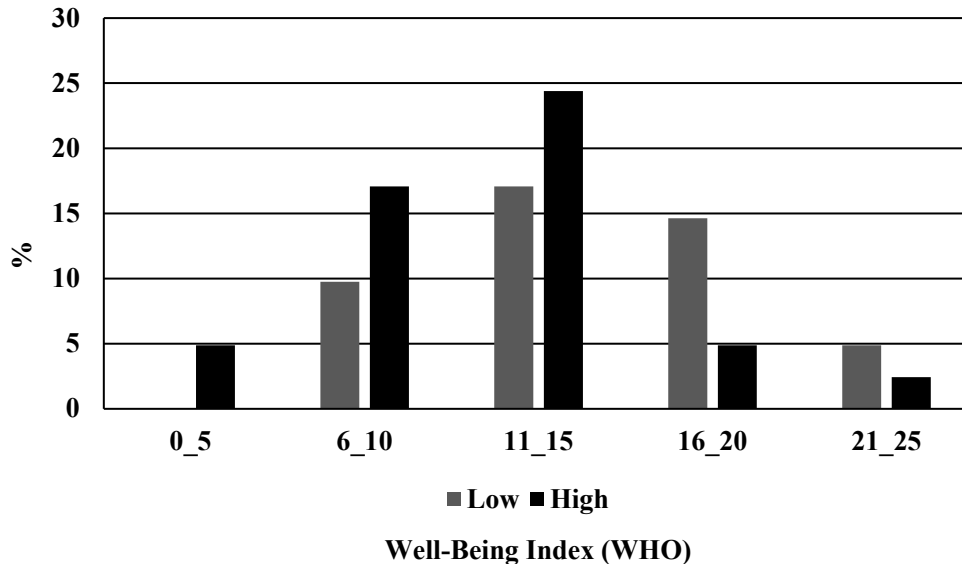
Figure 1. Overall well-being based on type of SWD risk (low or high)

for the SWDS questionnaire were as follows: for the second part (questions 7 to 17], Cronbach's alpha was 0.920 and the ICC was 0.856; for the third part (questions 19 to 26], Cronbach's alpha was 0.903 and the ICC was 0.829; and for the fourth part, Cronbach's alpha was 0.985 and the ICC was 0.971. In the study by Nena et al., the reliability for the second and third parts of the SWDS questionnaire was reported as 0.874 and 0.897, respectively. In Barger et al.'s study, the sensitivity and specificity of the questionnaire were 0.74 and 0.82, respectively [5, 22]. Regarding the risk of SWD, approximately 54% of nurses were classified as high risk, while 46% were at low risk. In the studies by Wen, Booker, and Barger, 68%, 23.7%, and 36% of

participants were identified as high risk, respectively [5, 6, 23]. In this study, about 59% of shift work nurses reported being "somewhat" or "completely" dissatisfied with their sleep, while 41.5% were slightly dissatisfied, and none were completely satisfied. Additionally, 22% reported suffering from significant to intense sleepiness. Problems with sleep were prevalent: 19.5%, 14.6%, and 17.1% of nurses experienced considerable to serious issues with falling asleep at bedtime, staying asleep, and waking up too early without being able to return to sleep, respectively. Furthermore, 46.4% of nurses expressed some level of dissatisfaction with the quality of their sleep, with only 4.9% reporting complete satisfaction.

In Barger's and Nena's studies, 70% and 58.2% of participants were dissatisfied with their sleep, respectively. Sleepiness affected 60% and 37.7% of participants. In Barger's study, 50%, 51%, and 53% reported problems with falling asleep, staying asleep, and waking up too early, while Nena's study reported 31.4%, 28.4%, and 35.1%, respectively. Additionally, 65.4% and 40.2% were dissatisfied with the quality of their sleep in those studies [5, 22]. One notable finding was that the number of single and divorced nurses was higher among those who experienced shift work, which may be a side effect of this work pattern. We found a significant relationship between gender and marital status with shift work, but no correlations were observed between other demographic factors and shift versus non-shift work.

In terms of overall well-being, 29% of shift workers reported that their physical and mental health had somewhat decreased, while 34% reported a significant decrease. In Barger's study, these figures were 49% and 38.5%, respectively; and in Nena's study, they were 48% and 28% [5, 22]. In our study, no correlation was found between caffeine consumption, education level, or annual income and SWDS. However, in the studies by Booker and Wen, significant relationships were identified between the consumption of alcohol and caffeinated beverages with SWD, which contradicts our findings [5, 17].

There was a significant relationship between BMI and the risk of SWD. In this study, 41% of nurses who worked less than 3 days a week of shift work were classified as low risk for SWD, while only about 5% of those working more than 3 days a week were considered low risk. Additionally, 39% of nurses with over one year of shift work experience were classified

as high risk for SWD. In the study by Nena et al., a significant relationship was found between SWD and both the number of days and years of shift work, which contrasts with the findings of the present study [22]. This discrepancy may be due to the specific demographic characteristics of our sample. Additionally, the management practices and working conditions in the hospital we studied in Iran might differ from those in previous studies, possibly explaining the variation in findings. Cultural differences and the structure of shift work in the country could influence these results.

Other findings indicated a significant relationship between age and various factors: sleepiness during work shifts, difficulty sleeping at night, staying asleep during sleep time, napping at work, and napping while driving in women. Additionally, marital status was associated with staying asleep during sleep time, waking up too early and being unable to return to sleep, overall sleep quality, feelings of health and well-being, and napping at work or while driving in women. Moreover, having children was linked to staying asleep, waking up too early, overall sleep quality, well-being, and napping at work in women. The number of days worked in shifts correlated with waking up too early and being unable to return to sleep, overall sleep quality, and total sleep amount. Finally, work experience in non-standard shifts was related to difficulty sleeping at night, overall sleep quality, well-being, physical and mental functioning, and the possibility of napping at work and while commuting.

Other findings of the study showed a significant relationship between people's well-being and gender, between age and sleepiness during work shifts, difficulty sleeping at night, staying asleep during sleep time, napping at work, and napping while driving in women. It was also demonstrated that there were significant relationships between gender and well-being, between marital status and staying asleep during sleep time, waking up too early and not being able to go back to sleep, overall quality of sleep, feelings of health and well-being, physical and mental health, napping at work, napping while driving, and napping while returning from work in women. There were also relationships between having children and staying asleep, waking up too early and not being able to go back to sleep, overall sleep quality, well-being, and napping at work in women. Additionally, relationships were observed between the number of days of work shifts and waking up too early and not being able to go back to sleep, overall quality of sleep, total amount

of sleep, and finally between work experience in non-standard shift work and difficulty sleeping at night, overall quality of sleep, well-being, physical and mental function, the possibility of napping at work, and the possibility of napping while commuting.

Based on the t-test, we found a significant relationship between the final score of WHO questionnaires and having at least a one-week break from working non-standard shifts in the past year (third part). Therefore, it is suggested to all organizations and employers to pay considerable attention to the issue of rest and breaks from working non-standard shifts for a short period.

This study makes a significant contribution to validate the SWDS for use in an Iranian healthcare setting, providing an adopted tool for assessing shift work disorders among nurses. The findings offer practical insights into the prevalence of SWD and its impact on nurses' well-being, highlighting key demographic factors such as age, marital status, and gender, which correlate with sleep disturbances and overall health. These insights can inform hospital administration and occupational health policies aimed at improving working conditions for shift workers.

Among the limitations of this study are the difficult access to nurses, low cooperation of nurses in completing questionnaires, and issues due to Covid-19. Another limitation was the lack of evaluation of the relationship and impact of shift work on productivity and job performance, so we recommend using other questionnaires related to shift work and job productivity and examining the relationship between them in future studies. A potential limitation of this study was the difficulty in generalizing the results due to the demographic and occupational heterogeneity of the participants. Differences in factors such as work experience, marital status, and other personal characteristics may influence the findings. Future research with larger and more homogeneous samples is recommended to validate and expand the findings of the current study.

CONCLUSION
This study assessed the correlation between the risk of shift work disorder (SWD) and the mental health and well-being of nurses in an Iranian hospital. Our findings indicate that the risk of SWD significantly impacts overall well-being, highlighting the necessity of addressing this issue in healthcare settings. Notably, nurses who took a break from non-standard shift work

for at least one week in the past year reported improved well-being scores, underscoring the importance of incorporating regular occupational leave and job breaks into work schedules. Moreover, we observed that the Shift Work Disorder Screening (SWDS) questionnaire exhibited high reliability in predicting the risk of SWD, making it a valuable tool for evaluating potential adverse effects of SWD on health, safety, and overall functioning in the workplace.

However, we acknowledge that the conclusions drawn from this study are influenced by several limitations, including the demographic heterogeneity of our sample and the cross-sectional nature of our analysis, which restricts causal inferences. Future research with larger, more homogeneous samples and longitudinal designs is recommended to further explore the intricate relationship between shift work and well-being. In light of our findings, we urge hospital administrators and policymakers to prioritize the assessment and management of shift work-related health issues, particularly through the implementation of structured rest periods and the utilization of reliable screening tools like the SWDS. This proactive approach could enhance the well-being of healthcare providers and improve overall workplace safety and productivity.

ACKNOWLEDGEMENTS

CONFLICT OF INTEREST
There is no Conflict of interest.

REFRENCES
1. Moreno CRdC, Louzada FM. What happens to the body when one works at night? Cad Saude Publica. 2004;20:1739-45.
2. Maghzi Najafabadi A, Roohafza H, Feizi A, Sarrafzadegan N. Association between shiftwork and second job with quality of life: a cross-sectional study in a large sample of Isfahan steel company's employees. Koomesh J. 2020;22(1):122-9.
3. Burchell B, Sehnbruch K, Piasna A, Agloni N. The quality of employment and decent work: definitions, methodologies, and ongoing debates. Camb J Econ. 2014;38(2):459-77.
4. Wickwire EM, Geiger-Brown J, Scharf SM, Drake CL. Shift work and shift work sleep disorder: clinical and organizational perspectives. Chest. 2017;151(5):1156-72.
5. Barger LK, Ogeil RP, Drake CL, O'Brien CS, Ng KT, Rajaratnam SM. Validation of a questionnaire to screen for shift work disorder. Sleep. 2012;35(12):1693-703.
6. Booker LA, Sletten TL, Alvaro PK, Barnes M, Collins A, Chai-Coetzer CL, et al. Exploring the associations between shift work disorder, depression, anxiety and sick leave taken amongst nurses. J Sleep Res. 2020;29(3):e12872.
7. Vanttola P, Puttonen S, Karhula K, Oksanen T, Härmä M. Prevalence of shift work disorder among hospital personnel: A

cross-sectional study using objective working hour data. J Sleep Res. 2020;29(3):e12906.

8. Åkerstedt T. Shift work–Sleepiness and sleep in transport. Sleep Med Clin. 2019;14(4):413-21.

9. Ganesan S, Magee M, Stone JE, Mulhall MD, Collins A, Howard ME, et al. The impact of shift work on sleep, alertness and performance in healthcare workers. Sci Rep. 2019;9(1):1-13.

10. Strohmaier S, Devore E, Zhang Y, Schernhammer E. A review of data of findings on night shift work and the development of DM and CVD events: a synthesis of the proposed molecular mechanisms. Curr Diab Rep. 2018;18(12):1-7.

11. Sadeghniiat-Haghighi K, Mehrabinejad MM, Hajighaderi A, Najafi A, Rahimi-Golkhandan A, Zahabi A. Shift work disorder, insomnia, and depression among offshore oil rig workers. Iran J Psychiatry. 2021;16(2):162.

12. Esmaily A, Jambarsang S, Mohammadian F, Mehrparvar AH. Effect of shift work on working memory, attention and response time in nurses. Int J Occup Saf Ergon. 2021:1-6.

13. Chen D, Jiang M, Shi X, Geng F, Qi H, Zhang Y, et al. Predictors of the initiation of shift work disorder among Chinese intern nurses: a prospective study. Sleep Med. 2020;68:199-206.

14. Shockey TM, Wheaton AG. Short sleep duration by occupation group—29 states, 2013–2014. MMWR Morb Mortal Wkly Rep. 2017;66(8):207.

15. Etemadi Nezhad S, Yazdani Charati J, Pourhossein M. Physical and Psychological Problems Associated with Shiftworking in Nurses of Mazandaran Province, 2017. J Health Care. 2019;20(4):312-20.

16. Park E, Lee HY, Park CSY. Association between sleep quality and nurse productivity among Korean clinical nurses. J Nurs Manag. 2018;26(8):1051-8.

17. McElroy SF, Olney A, Hunt C, Glennon C. Shift work and hospital employees: A descriptive multi-site study. Int J Nurs Stud. 2020;112:103746.

18. Rosa D, Terzoni S, Dellafiore F, Destrebecq A. Systematic review of shift work and nurses' health. Occup Med (Lond). 2019;69(4):237-43.

19. Sheikhmozafari MJ. Validity and reliability of the Persian version of the NPQ Neck Pain Assessment Questionnaire among Iranian housekeeping company workers. J Occup Hyg Eng. 2022;9(2):120-8.

20. Sheikhmozafari MJ, Alizade PM, Ahmadi O. Validation of the Persian version of the workplace physical-ergonomic conditions evaluation (PECE) questionnaire. Int J Musculoskeletal Pain Prev. 2021;6(3):554-61.

21. Ahmadi O. Reliability and validity assessment of the Persian version of the noise exposure questionnaire (NEQ): an NIHL predictor tool. J Occup Health Epidemiol. 2022;11(3):209-22.

22. Nena E, Katsaouni M, Steiropoulos P, Theodorou E, Constantinidis TC, Tripsianis G. Effect of shift work on sleep, health, and quality of life of health-care workers. Indian J Occup Environ Med. 2018;22(1):29.

23. Wen CC, Nicholas CL, Clarke-Errey S, Howard ME, Trinder J, Jordan AS. Health risks and potential predictors of fatigue and sleepiness in airline cabin crew. Int J Environ Res Public Health. 2021;18(1):13.

24. Tsang S, Royse CF, Terkawi AS. Guidelines for developing, translating, and validating a questionnaire in perioperative and pain medicine. Saudi J Anaesth. 2017;11(Suppl 1):S80.

25. Mohammad Alizadeh P, Ahmadi O, Mazloomi B. Assessment of Noise Effect on Employee Comfort in an Open-Plan Office: Validation of an Assessment Questionnaire. J Occup Health Epidemiol. 2021;10(3):193-203.

26. Ahmadi O. Validity and reliability of Farsi version of office lighting survey Questionnaire (OLS). J Occup Hyg Eng. 2021;8(4):26-33.

27. Bech P, Olsen LR, Kjoller M, Rasmussen NK. Measuring well-being rather than the absence of distress symptoms: a comparison of the SF-36 Mental Health subscale and the WHO-Five well-being scale. Int J Methods Psychiatr Res. 2003;12(2):85-91.

28. Bech VN, Per. The WHO quality of life (WHOQOL) questionnaire: Danish validation study. Nord J Psychiatry. 2001;55(4):229-35.

29. Omani-Samani R, Maroufizadeh S, Almasi-Hashiani A, Sepidarkish M, Amini P. The WHO-5 well-being index: a validation study in people with infertility. Iran J Public Health. 2019;48(11):2058.