Research Article

THE INFLUENCE OF FAMILY FUNCTION, WORK ENGAGEMENT, AND SLEEP ON THE MENTAL HEALTH OF NURSES IN CHINA'S TOP THREE HOSPITALS: A CROSS-SECTIONAL STUDY

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Abstract

Objective: This paper aims to explore the influence of family function, work engagement, and sleep on the mental health of nurses in China's top three hospitals.

Methods: The convenience sampling method was adopted to select 1147 clinical nurses from Taihe Hospital Affiliated to Hubei University of Medicine, during the period of August-September 2018 as the survey subjects. Correlation analysis was performed to explore the relationship between clinical nurses' mental health and family function, work engagement, and sleep quality.

Results: The result demonstrated that the main influencing factors of clinical nurses' mental health include the length and emotional degree of family function, sleep quality, and the vitality dimension in work engagement.

Conclusion: The clinical nurses have good family function, sleep quality, and mental health status, and the level of work engagement is average. Besides, work engagement is closely related to mental health. ASEAN Journal of Psychiatry, Vol. 24 (10) September, 2023; 1-7.

Keywords: Family Function; Work Engagement; Sleep; Mental Health; Cross-Sectional Study

Abbreviations: Pittsburgh Sleep Quality Index (PSQI); Symptomchecklist-90 (SCL-90); Utrecht Work Engagement Scale-9 (UWES-9); Family APGAR Index (APGAR); Comparative Fit Index (CFI); Root Mean Square Error Of Approximation (RMSEA); Goodness Of Fit Index (GFI); Non Normed Fit Index (NFI); Tacker-Lewis Index (TLI); Incremental Fit Index (IFI)

Introduction

With the development of the social economy, people's demand for health is getting higher and higher, and the demand for nursing services is also rising [1]. Since the 1980s, research on the mental health of nurses has gradually increased in foreign countries [2]. Foreign researchers have discovered that the occupational pressure of nurses is inevitable, and occupational pressure will affect the individual's sleep, leading to a decline in mental health, which in turn contributes to the generation and development of nurses' turnover tendency [3]. Moreover, only nurses with a good level of mental health can better engage in nursing work [4]. The mental health of nurses affects their sleep quality and thus their work quality, leading to nursing accidents that endanger the safety of patients [5,6]. The positive psychological attitude of nurses can improve the sense of belonging at work and the quality of nursing service [7]. According to data from the 2015 China health

and family planning statistical yearbook, by the end of 2014, the medical-care ratio in China was 1:1.03, which is far lower than the average medical-care ratio in Asian countries of 1:2.3 [8]. The shortage of nurses directly causes an increase in the workload and pressure of nurses, directly influencing their mental health [9]. Current research data suggest that the overall mental health of the nurses in my country is lower than that of the general population, and the mental health of nurses declines over time [10]. The research on the mental health of nurses has attracted increasing attention from researchers worldwide. This study combines existing research results to explore the influencing factors of nurses' mental health status with family function, work engagement, and sleep quality as the starting point. Besides, the influence of family function, work engagement, and sleep quality on the mental health of nurses in China's top three hospitals is deeply explored. Thus, the changes in nurses' mental health are more comprehensively explained, providing evidence-based evidence for future interventions to improve nurses' mental health.

Methodology

Research object

The convenience sampling method was used to select nurses from Taihe Hospital and Hubei Medical College Affiliated Hospital of Shiyan City, Hubei Province during the period of July-August 2018 as the research objects. Inclusion criteria:

1. Aged ≥ 18, graduated from full-time nursing major, and obtained a nurse practitioner qualification certificate;
2. Worked continuously in the hospital for more than one year;
3. Participants with informed consent. Exclusion criteria: (a) assistant, agency, and logistics department nurses; (b) advanced students; (c) those who are on vacation and learners outside.

Determination of sample size

The survey tools of this study include 5 items in the Family Care Scale (FSC), 9 items in the Work Engagement Scale (WES), 24 items in the Pittsburgh Sleep Quality Index Scale (PSQIS), and 90 items in the Self-reporting Inventory Scale (SRIS), with a total of 128 items. According to the actual sample size estimation method, this amount is 5-10 times of the total items in the questionnaire. The sample size of this study is 8 times the total items, 20% of invalid questionnaires are considered, and the sample size is not less than 1,050 cases.

Survey tool

The general information questionnaire: Designed by the researchers themselves, including 5 items (nurse gender, age, working years, education background, and professional title).

The Pittsburgh Sleep Quality Index (PSQI), PSQI was developed by Buysse et al., in 1989, and in 1996 to assess the sleep quality of patients in the past month [11]. The higher the score, the worse the quality of sleep; A score of more than 7 points indicates sleep disorder. The sensitivity and specificity of the scale were 98.3% and 90.2%, respectively. Cronbach's α coefficient is 0.84 [12].

The Symptom Checklist-90 (SCL-90) was compiled by Derogatis and is widely used to measure the mental health of various people, consisting of 10 factors and 90 items. The factors are somatization, obsessive-compulsive symptoms, interpersonal sensitivity, depression, anxiety, hostility, horror, paranoia, psychosis, and others (eating and sleeping) [13]. A total score of ≥ 160 points suggests a mental health problem. The higher total score, the more severe the mental health problem. The validity of the scale is between 0.77 and 0.90.

The Utrecht Work Engagement Scale-9 (UWES-9) was compiled by Schaufeli and is widely used to measure employee engagement status, containing 3 dimensions of vitality, dedication, and focus [14,15]. There are 3 versions of the original scale with 17, 15, and 9 items, respectively. This survey adopts a reduced version of 9 items, and the Cronbach's α coefficient is 0.93. The reduced version uses a 7-level scoring method. A score of 0 and 6 means "never" and "every day", respectively. The scores of each dimension of the scale and the total scale are calculated based on the average score of the items. The higher score, the higher the work commitment.

The Family APGAR index (APGAR), also known as the family function assessment form, is used to test family functions and is a relatively simple method of self-report [16]. It can reflect

the subjective satisfaction of individual family members with family functions, a total of 5 questions. Each topic represents a family function, that is, family fitness, cooperation, maturity, affection, and intimacy. Each item adopts a three-level scoring method: rarely 0 points, sometimes 1 point, and often 2 points. The higher the score, the better the family care. A total score of 0 to 3 indicates severe family dysfunction; a score of 4 to 6 means a moderately impaired family function; a score of 7 to 10 reflects that the family is functioning well.

Investigation method

The questionnaire survey method is employed in this study. The trained investigators followed the unified instruction to distribute the questionnaires in the morning meeting among various departments of the hospital. Before the survey, the purpose of the survey and the method of filling in the questionnaire were explained to the survey participants. The survey participants were asked to complete the questionnaire after reading and signing the informed consent form. The filling-in process was completed independently by the survey object, and the surveyor can answer questions at any time. At the end of the investigation, the questionnaire was collected and checked on the spot. In this study, 1,200 questionnaires were actually distributed, and 1147 valid questionnaires were returned. The effective recovery rate was 95.58%, which met the sample size requirement.

Statistical method

Data are inputted into SPSS 22.0 for statistical analysis. Counting data is described by frequency and percentage. Measurement data conforming to the normal distribution are represented by the mean ± standard deviation , and the skewed distribution is represented by the median. T-test and analysis of variance were performed on general data to analyze differences in nurses' family function, work engagement, sleep quality, and mental health status. Pearson correlation analysis and multiple linear regressions were conducted to analyze the relationship among family function, work engagement, sleep quality, and mental health status. AMOS21.0 software and the maximum likelihood method were employed to construct the structural equation model and fit the model to the data, respectively. The model fit was evaluated using the absolute fit index and the relative fit index. Hierarchical regression was performed to examine interaction effects. Besides, the adjustment effect was explored using Microsoft Office Excel 2007. The scores of each scale are analyzed after the mean centralization processing. The study adopted a two-sided test, and the test level was α=0.05.

Results

General demographic data of the research object

The 1147 subjects in this study include: 62 male nurses, accounting for 5.4%; 1085 female nurses, accounting for 94.6%; 45 nurses, accounting for 3.9%; 515 primary nurses, accounting for 44.9%; 455 primary nurses in charge, accounting for 39.7%; 124 deputy director primary nurses, accounting for 10.8%; 8 director primary nurses, accounting for 0.7%. Besides, there are 10 masters, accounting for 0.9%; 1,036 undergraduates, accounting for 90.3%; 85 junior colleges, accounting for 7.4%; 16 technical secondary schools, accounting for 1.4%. There are 40 head nurses, accounting for 3.5%; 52 deputy head nurses, accounting for 4.5%; 1,055 general nurses, accounting for 92%. The average age is 35.40 ± 6.55. It involves nursing staff in 29 departments including gynecology, obstetrics, pediatrics, otolaryngology, infections, orthopedics, and emergency departments.

Family function, work engagement, sleep quality, mental health status of clinical nurses

The total scores of APGAR, UWES-9, PSQI, and SCL-90 for clinical nurses were (6.677 ± 3.279), (31.971 ± 12.096), (6.220 ± 2.187), and (122.47 ± 37.709), respectively. The scores of each dimension are presented in Table 1.

Correlation analysis of nurses' family function, work engagement, sleep quality, and mental health

Correlation analysis demonstrated that the total score of nurses' work engagement was significantly positively and negatively correlated with the total score of family function (r=0.511) (P<0.01) and the total score of sleep quality (r=-0.110), respectively. The total score of family function and the total score of sleep quality (r=-0.110) were significantly negatively correlated (P<0.01). The SCL90-total score was significantly positively correlated with the total sleep quality score (r=0.483) (P<0.01) and was significantly negatively correlated with the total score of family function (r=-0.204) and the total score of work engagement (r=-0.244) (P<0.01) (Table 2).

Table 1. Family function, work engagement, sleep quality and mental health score of 1147 clinical nurses (score, $\overline{X} \pm S$).

Scale	Score
Family functioning	
Fitness	1.24 ± 0.763
Cooperation degree	1.26 ± 0.781
Growth degree	1.36 ± 0.770
Emotional degree	1.29 ± 0.776
Intimacy degree	1.52 ± 0.705
Total score	6.677 ± 3.279
Work engagement	
Dynamic	10.562 ± 4.156
Dedication	10.921 ± 4.0148
Focus	10.489 ± 4.220
Total score	31.971 ± 12.096
PSQI Score	6.220 ± 2.187
SCL-90 score	
Somatization	1.394 ± 0.481
Forced symptoms	1.583 ± 0.595
Sensitivity to interpersonal relationship	1.343 ± 0.480
Depression	1.424 ± 0.536
Anxiety	1.330 ± 0.452
Hostile	1.372 ± 0.491
Terrorist	1.176 ± 0.342
Paranoid	1.259 ± 0.404
Psychotic	1.223 ± 0.366
Other	1.410 ± 0.504
Total score	122.47 ± 37.709

Table 2. Correlation between family function, work engagement, sleep quality and mental health of nurses (r value).

	SCL 90-total score	SCL90-somatization	SCL90-obsessional symptoms	SCL9-sensitive to interpersonal relationships	SCL90-depression	SCL90-aanxiety	SCL90-Hostility	SCL90-terror	SCL90-paranoid	SCL90-psychotic	SCL90-other	Total score for sleep quality	Family function score	Work engagement score
SCL90-total score	1	-	-	-	-	-	-	-	-	-	-	-	-	-
SCL90-somatization	0.851**	1	-	-	-	-	-	-	-	-	-	-	-	-
SCL90-obsessional symptoms	0.910**	0.763**	1	-	-	-	-	-	-	-	-	-	-	-
SCL90-sensitive to interpersonal relationships	0.909**	0.662**	0.807**	1	-	-	-	-	-	-	-	-	-	-
SCL90-depression	0.937**	0.751**	0.861**	0.873**	1	-	-	-	-	-	-	-	-	-
SCL90-anxiety	0.939**	0.775**	0.833**	0.855**	0.883**	1	-	-	-	-	-	-	-	-
SCL90 –hostility	0.872**	0.677**	0.770**	0.785**	0.809**	0.793**	1	-	-	-	-	-	-	
SCL90 -terror	0.812**	0.644**	0.681**	0.777**	0.717**	0.764**	0.697**	1	-	-	-	-	-	-
SCL90-paranoid	0.851**	0.633**	0.739**	0.837**	0.788**	0.788**	0.797**	0.718**	1	-	-	-	-	-
SCL90 -psychotic	0.891**	0.699**	0.744**	0.843**	0.811**	0.857**	0.750**	0.775**	0.825**	1	-	-	-	-
SCL90-other	0.830**	0.756**	0.761**	0.684**	0.754**	0.758**	0.687**	0.597**	0.648**	0.701**	1	-	-	-
Total score for sleep quality	0.483**	0.490**	0.480**	0.355**	0.451**	0.419**	0.398**	0.287**	0.339**	0.347	0.612**	1	-	-
Family function	-0.204**	-0.146**	-0.170**	-0.206**	-0.215**	-0.176**	-0.188**	-0.140**	-0.206**	-0.192**	-0.17	-0.114**	1	-
score														
Work engagement score	-0.244**	-0.183**	-0.214**	-0.235**	-0.248**	-0.216**	-0.236**	-0.190**	-0.242**	-0.212**	-0.196**	-0.110**	0.511**	1
Note: **was significantly correlated at 0.01 level (bilateral).														

Multivariate regression analysis of clinical nurses' work engagement

The stepwise method is used for multiple linear regression analysis with SCL-90 total score as the dependent variable and the general information of clinical nurses (department, gender, age, title, education, and position), 5 factors of family function, 3 dimensions of work engagement, and Pittsburgh sleep quality index as independent variables. The main influencing factors of the mental health of 1147 clinical nurses include the length and emotional degree of family function, the quality of sleep, and the vitality dimension in work engagement (Table 3).

Structural equation model fitting index

AMOS 21.0 was employed to conduct structural modeling analysis on the path among nurses' family functions, work engagement, sleep quality, and mental health. The χ^2/df, the Comparative Fit Index (CFI), and the Root Mean Square Error of Approximation (RMSEA) of the initial model are 11.744, 0.799, and 0.097, respectively. Therefore, the model adaptability is poor. The model is revised by using bias-corrected confidence intervals and relaxing the restriction on the two dimensions of work engagement and mental health according to the principle of maximum Modification Indices index. The revised model fitting results: χ^2/df=7.120; Goodness of Fit Index (GFI) is 0.881; the CFI value is 0.951; the RMSEA value is 0.073; The Non-normed Fit Index (NFI) value is 0.943; the Tacker-Lewis Index (TLI) value is 0.944; the Incremental Fit Index (IFI) value is 0.951. The χ^2/df of the various indicators of the model is not within the ideal range due to the large sample size. The GFI value is not ideal but within the acceptable range. Other indicators meet the requirements (Table 4).

Table 3. Multiple regression analysis of factors influencing mental health of 1147 clinical nurses.

Independent variables	Regression coefficient	Standard error	Normalized regression coefficient	t value	P value
Constant	79.65	14.5	-	5.587	<0.01
Family function: Growth degree	3.729	1.87	0.076	1.996	<0.05
Family function: Emotional degree	-7.34	2.22	-0.15	-3.313	<0.01
Pittsburgh sleep quality index	7.698	0.44	0.447	17.524	<0.01
Work engagement dimension: Vitality	-1.56	0.61	-0.17	-2.571	<0.01
Note: R=0.539; R2=0.290; adjusted R2=0.281; F=30.864; P < 0.01; "-" blank.					

Table 4. Evaluation indexes of the model.

Fitting index	χ^2/df	GFI	RMSEA	CFI	NFI	TLI	IFI
Ideal value	<5	>0.9	<0.08	>0.9	>0.9	>0.9	>0.9
Model	7.12	0.881	0.073	0.951	0.943	0.944	0.951

Discussion

Comparison of nurses' mental health level and norms in our hospital

Wang et al., revealed that the scores of Chinese nurses in the ten dimensions of SCL-90 have improved during 1998-2016, demonstrating that the mental health of Chinese nurses has dropped significantly, and the mental health of nurses should be emphasized [17,18]. The results of this study indicate that the total score of SCL-90 for clinical nurses is (122.47 ± 37.709), and the scores of all factors are lower than the norms of domestic nurses. This reflects that the mental health level of nurses in our hospital is significantly better than the average level of other hospitals [19].

The close relationship between family function, work engagement, sleep, and nurses' mental health

The results of this study demonstrate that nurses' family functions are significantly correlated with work engagement, sleep, and mental health. Many research results abroad reveal that family function can play a beneficial role in regulating negative emotions such as anxiety and depression of nurses [20-22]. However, the correlation between family function and work engagement and sleep is rarely reported and may be related to the differences in family culture at home and abroad. Beck suggested that postpartum nurses have a high level of anxiety after returning to work from giving birth to a second child, and family function is the main factor of their anxiety, which indirectly affects the work of nurses [23]. Arimura et al., discovered that the sleep status of nurses is affected by their mental health and recommended adjusting the sleep rhythm of medical staff to avoid overwork and improve negative emotions. Arimura et al., reported that work load is an influencing factor of mental health [24]. The above research results are consistent with the results of this research. However, the correlation between the above four variables is comprehensively studied in this study, confirming that nurses' family function, work engagement, sleep, and mental health affect each other [25]. Nurse managers need to implement nurse care measures from multiple angles to truly improve the mental health of nurses.

Regression analysis with nurses' mental health as the independent variable

This study indicates that the length of family function, emotional degree, Pittsburgh Sleep Quality Index (PSQI), and the vitality of work engagement dimensions in the regression equation jointly explain the variance of mental health by 28.1%. The pittsburgh sleep quality index has the largest standardized regression coefficient, followed by the emotional degree in family functions. This suggests that the factors influencing the mental health of nurses are complex and multifactorial. Family function, sleep status, and work engagement are all influencing factors of nurses' mental health. Among them, sleep status has the greatest impact on nurses' mental health. Previous clinical studies have demonstrated that the relationship between anxiety, depression, and sleep symptoms is significant [26]. These negative emotions would increase the individual's sleep latency to a certain extent, making it difficult for people to fall asleep and even wake up in the middle of the night, wake up early, and dream more. As a result, sleep efficiency is reduced, and sleep symptoms such as sleep structure symptoms appear. Sleep helps to remove metabolic waste from the brain, such as lactic acid and β-amyloid. Sleep deprivation affects all aspects of physical health, and has extensive effects on emotional and mental performance, as well as physiological functions such as cardiovascular, endocrine, immune system, and energy metabolism, leading to irreversible damage [27,28]. Long-term repeated episodes of lack of sleep can cause emotional symptoms, which can also increase the barriers of various systems such as immunity, learning, and memory. However, Xin revealed that the factors affecting nurses' mental health mainly come from work and family. This may be related to the fact that the study did not include sleep status in the analysis. Therefore, the structural equation model method should be used to analyze the specific effects of family function, work engagement, and sleep on the mental health of nurses, and more targeted measures should be taken to improve the mental health of nurses.

The specific influence of family function, work engagement, and sleep on nurses' mental health

According to the structural equation model, the standardized path coefficient of PSQI on nurses' mental health is 0.44, and the total effect value is the largest. This suggests that the nurse's sleep status could positively affect the nurse's mental health. Compared with the domestic norm, the sleep quality of the nurses in this study is lower than the domestic norm standard owing to the

nurses' shift pattern. The results of this study are consistent with those of Fernandez [29]. The study reveals that sleep disorders can cause symptoms such as irritability, irritability, inattention, memory difficulties, fatigue, anxiety, and depression. The standardized path coefficient of work engagement to nurses' mental health is 0.17, and the total effect value is the second largest, indicating that work engagement could positively affect the mental health of nurses. The more focused, energetic, and dedicated nurses at work, the lower their risk of mental health disease. In this study, the average score of nurses' work engagement was between 2-4, which was moderate. The focus dimension has the lowest score, which is in line with the results of other studies [30]. Nursing work needs not only to pay attention to the treatment of patients but also to take care of the patients to meet the physical, psychological, social, and spiritual needs of the patients. However, the nurse cannot be fully focused sometimes under fatigue. The standardized path coefficient of family function to nurses' mental health is 0.17, implying that family function will positively affect nurses' mental health. This is consistent with the results of multiple studies [31]. Family function can play a beneficial role in regulating nurses' anxiety, depression, and other negative emotions, and thus influences nurses' mental health. A study of nurses returning to work after the second child suggested that family function is the main factor influencing nurse anxiety [32]. Hospital administrators should create a good working environment for clinical nurses and take corresponding measures at the organizational level to improve nurses' sleep status, increase nurses' work engagement, strengthen nurses' family functions, and promote nurses' mental health.

Conclusion

The mental health of nurses is affected by many factors. This study demonstrates that the better the family function, the higher the work commitment, the better the sleep status of nurses, and the higher the level of mental health. Nursing managers should use training, psychological intervention, and other methods to improve nurses' mental health from the perspective of improving nurses' sleep, work engagement, and family functions. This study also has certain limitations. First, data from a tertiary first-class hospital were only collected. It is recommended to conduct multi-center surveys in the future to make the results more convincing and representative. Second, the influence of family function, work engagement, and sleep status on nurses' psychology was mainly explored. Thus, more variables can be included for research in the future. To sum up, this study is the first to apply the structural equation model method to explore the influence of family function, work engagement, and sleep status on the mental health of Chinese nurses, as well as its mechanism. The results provide a reference for the intervention of nurses' mental health and lay a scientific foundation for nursing managers to implement nurse care strategies.

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Authors' contributions

LT Li, X Chen, CQ Ai attended to the patient. X Chen wrote the manuscript. Y Zhan, MH Wang, and BX Gong gave conceptual advice. All authors read and approved the final manuscript.

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Availability of data and materials

The datasets analyzed in this case report are available from the corresponding author on request.

Ethics approval and consent to participate

This study was approved by the Medical Ethics Committee of Taihe Hospital, Shiyan City, Hubei Province [Research quick review (No. 2020KS0157)].

Consent for publication

Written informed consent was obtained from the patient for the publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-chief of this journal.

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