

FACTORS INFLUENCING STRESS AMONG NURSES IN WENZHOU, CHINA: A CROSS-SECTIONAL STUDY

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Abstract

This predictive correlational study aimed to elucidate the psychological stress experienced by nurses in Wenzhou, China. Additionally, it seeks to discern the predictive power of various associated independent variables concerning nurse stress. The study involved 173 nurses functioning within adult inpatient wards, chosen through a multistage random sampling methodology. Data compilation employed a comprehensive array of tools including demographic questionnaires, the Perceived Stress Scale, the Chinese Nurse Stressor Scale, the Brief COPE, the Perceived Social Support Scale, and the Psychological Capital Questionnaire. The analysis incorporated Pearson correlation coefficients and multiple linear regression.

The findings disclosed a moderate level of nurse stress, with a score of 17.06 ± 4.532 out of a possible 40. Nursing stressors, social support, and psychological capital collectively accounted for 32.4% of the variability observed in stress levels among nurses operating within Wenzhou hospitals. These outcomes underscore the significance of addressing nurse stress through strategies such as mitigating nursing stressors, bolstering social support structures, and enhancing psychological capital.

Future research should focus on developing interventions designed to alleviate nurse stress. These interventions should prioritize the reduction of nursing stressors, the augmentation of social support networks, and the enhancement of nurses' psychological capital.

Key words: Nurses, Psychological Capital, Social Support, Stress, Stressors

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Introduction

Stress is also called psychological stress which is defined as a relationship between the person and the environment that is appraised by the person as relevant to his or her well-being and in which the person's resources are taxed or exceeded Lazarus and Folkman (1984). It is caused by the perception of imbalance between one's reaction ability and the requirements of environment. In a previous study of 2,889 registered nurses in China's Sichuan province, 62.02% nurses were found to have high levels of stress (Gu, Tan, & Zhao, 2019).

High stress level cause somatic symptoms and psychological problem in nurses. The somatic symptoms were fatigue, headache, insomnia, gastrointestinal upset, endocrine, and disorders (Gu et al., 2019). High stress level also could lead to a decline in mental health, the nurse appears psychological conditions of depression and irritability (Gu et al., 2019). It is necessary to study the factors that contribute to increased nurse stress in order to ensure patient safety, improve nurse health, and reduce nurse turnover.

Based on Lazarus and Folkman's transactional theory of stress and coping (1984), "it is perfectly appropriate to measure stress as either input, response, or strained relationship, as long as the one being measured is made explicit" (Lazarus & Folkman, 1984). Stress response was selected as the index to measure nurse stress. Stress response is influenced by stressor, coping strategies. Coping strategies are affected by coping resources which is included social support and positive belief.

Based on the literature review, studies have obtained contradictory findings about nurse stress, coping strategies, social support and psychological capital. Many studies have focused on the nurses' stressor (Zheng, Sui, Zhang, & Yang, 2019), but few studies described the relationship between nursing stressor and nurse stress. In previous studies, there have been conflicting results regarding the relationship between nurse stress and coping strategies. Some studies found there were correlation between coping strategies and nurse stress (Portero de la Cruz, Cebrino, Herruzo, & Vaquero-Abellán, 2020), but some study showed there was no significant correlation (Yao, Lin, & Zhang, 2022) And few study (Alharbi & Alshehry, 2019) showed that coping strategies could predict the stress of nurses. Social support was defined as the interrelated social relationships and connections that help individuals cope and deal with stressful life situations (Lazarus & Folkman, 1984). Some study showed that social support could predict nurse stress and it could negative effect on nurse stress. Psychological capital was defined as "an individual's positive psychological state of development" (Luthans, Youssef, & Avolio, 2006). So psychological capital can be considered as an individual characteristic that establishes or possesses positive beliefs. In earlier studies, psychological capital was negatively correlated to nurse stress (Kim & Kweon, 2020). However, there were fewer studies related to whether psychological capital could predict nurses' stress. So followed transactional theory of stress and coping, and literature review, nurse stress could be effected by nursing stressor, coping strategies, social support and psychological capital.

Despite long-running research on nurses' stress, GAP still exists. Although the number of registered nurses is increasing year by year in China, the number of registered nurses in Wenzhou is

still the lowest in Zhejiang Province of China and lower than the national average. At the same time nurses need to serve many overseas Chinese who return to Wenzhou hospitals for treating their own illnesses in addition to the people of the Wenzhou area. It is necessary to study the stress of nurses in Wenzhou and its influencing factors. Therefore, the aims of this study were to 1) describe the stress among nurses in Wenzhou, China; 2) determine how much power of the correlated independent variables could predict nurse stress. The research hypothesis was nursing stressor, coping strategies, social support and psychological capital can predict stress among nurses work in Wenzhou hospitals.

Method

Study design

The study was a predictive correlational study.

Participants and Sample size

Participants were the nurses working in Wenzhou hospitals. The sample inclusion criteria were as follows: 1) providing direct patient care more than 1 year; 2) working in inpatient ward, ICU; 3) healthy, no serious health problems, no hospitalizations for six months, and the exclusion criteria were: 1) the nurse is in lactation; 2) the nurse is pregnancy; 3) hospitalized for mental illness for a year; 4) The nurse is not on nursing duty (during leave or investigation).

Some experts recommend a ratio of 40 participants to 1 predictor for multiple regression (Polit & Beck, 2017). Using this approach to estimating sample size, the study has 4 predictors, which leads to 160 participants needed. 20 % of participants are added to be 192 participants in total for data collection. To maximize the sample size, 192 participants were in total for data collection.

Sampling and data collection

A total of 192 registered nurses were recruited using a multistage random sampling method from hospitals in Wenzhou, Zhejiang province. Stage I: random 3 A tertiary hospitals from 5 A tertiary hospitals in Wenzhou, which were the First Affiliated Hospital of Wenzhou Medical University, the Second Affiliated Hospital of Wenzhou Medical University and Wenzhou Hospital of Traditional Chinese Medicine. Stage II: random nursing units from the medical and surgical wards and ICU wards, which have two medical wards, two surgical wards and one ICU ward from every hospital. The ward sampled randomly in the First Affiliated Hospital of Wenzhou Medical University were general surgical ward, Neurosurgical ward, Neurological ward, respiratory ward and RICU; in the Second Affiliated Hospital of Wenzhou Medical University were general surgical ward, thoracic ward, hematology ward, neurological ward and cardiac care unit (CCU); in the Wenzhou Hospital of Traditional Chinese were orthopedics ward, General surgical ward, nephrology ward, endocrine ward and ICU. Stage III: random nurses from each ward. There were 88 participants from the First Affiliated Hospital of Wenzhou Medical University, 79 participants from the Second Affiliated Hospital of Wenzhou University, and 25 participants from Wenzhou Hospital of Traditional Chinese Medicine.

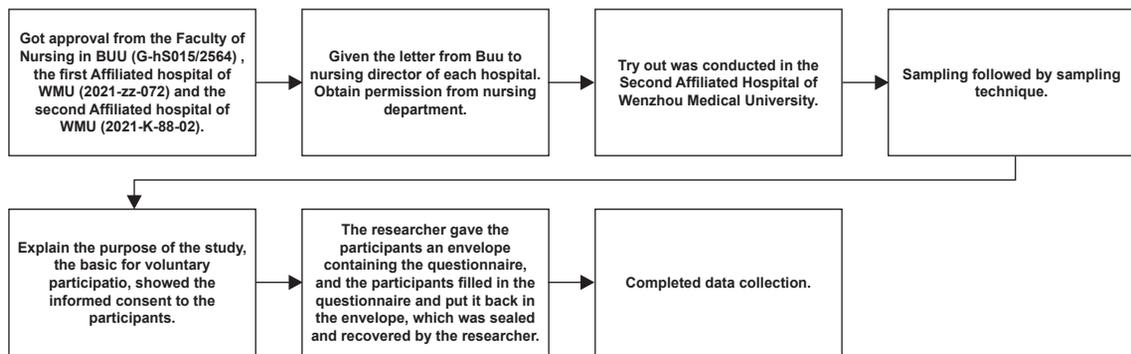


Figure 1 Data collection process

Data was collected from July 2021 to August 2021. Researcher visited the nursing department at each hospital to request participation, and to explain the purpose of this study and the contents of the questionnaires. A total of 192 instructional documents, along with consent forms and prepaid envelopes, were distributed to nurses with the help of the nursing department. The final number of valid questionnaires returned was 173, the return rate was 90.1 %.

Research instrument

Data was collected by these 6 questionnaires: The Demographic Questionnaire, the Chinese version Perceived Stress Scale (PSS), the Chinese Nurses Stressor Scale (CNSS), the Chinese version Brief COPE, the Chinese version Perceived Social Support Scale (PSSS), the Chinese version Psychological Capital Questionnaire (PCQ).

1. Demographic Questionnaire

The Demographic Questionnaire was developed for this research by the researcher. It includes general information: gender, age, marital status, education level, occupational level, length of job experience, children, salary, number of work hours per week, night shift per week.

2. The Chinese version Perceived Stress Scale (PSS)

PSS was developed by Cohen, Kamarck, and Mermelstein (1983) and the Chinese version (Wang et al., 2015) was adopted to measure nurse stress. It has 10 items, 6 items are negatively worded and the remaining 4 are positively worded. The items are rated in a 5-point Likert Type scale (0 = never to 4 = very often), the total score ranges from 0-40, a higher total score denotes greater perceived stress. Followed Matheny's research, stated PSS scores of 0-13, 14-26, and 27-40 to assess low, medium, and high perceived stress (Matheny & McCarthy, 2000). The Cronbach's α coefficient of the Chinese version PSS-10 was 0.91 (Wang et al., 2015) and it was 0.804 in this study.

3. The Chinese Nurses Stressor Scale (CNSS)

CNSS was adopted in order to measure stressor which was redesigned and revised by Li and Liu (2000). CNSS includes five dimensions and using 4-point Likert Type scale to range from 1 (strongly disagree) to 4 (strongly agree), the total score ranges from 35-140, the higher the score indicate the more nursing stressor. The total Cronbach's α coefficient of the original scale was .98 (Li & Liu, 2000) and it was 0.927 in this study.

4. The Chinese version Brief COPE Scale

The Chinese version Brief COPE Scale was translated by Tang, Chan, Ng, and Yip (2016) which was adopted to measure the nurse coping strategies. This questionnaire has 28 questions on a four-point Likert Type scale (1 = “I haven’t been doing this at all” to 4 = “I’ve been doing this a lot”), the total score ranges from 28-112. A higher score indicates a higher use of the coping strategy.

The scale has no consistent factor structure in different cultural backgrounds and applicable populations, so this version questionnaire has been tested in mainland China (Yu et al., 2019) in which found five factors were extracted through exploratory factor analysis which are positive coping, avoidance, social support, blame, and distraction. The Cronbach α coefficient of the total scale was 0.83 (Yu et al., 2019) and it was 0.830 in this study.

5. The Chinese version Perceived Social Support Scale (PSSS)

The Chinese version PSSS was translated by Jiang (2001) to use measure social support of individual from family, friends and significant others.. The Chinese version PSSS which is contain 12 items, with 3 subscales: 1) Peer Social Support (4 items); 2) Family Social Support (4 items); 3) Significant Others Social Support (4 items), it uses a 7-point Likert scale (1 = very strongly disagree to 7 = very strongly agree). The total score ranges from 12-84, 12-36 is low support state, 37-60 is medium support state, and 61-84 is high support state, the high score shows that individuals perceive high social support. The Cronbach α coefficient of the total scale was 0.961 (Jiang, 2001) and its Cronbach’s α coefficient was 0.946 in this study.

6. The Chinese version Psychological Capital Questionnaire (PCQ)

The Chinese version PCQ was revised by Luo and He (2010) based on Luthans’ concept of PCQ (Luthans et al., 2006) and applied to the nursing field which is a self-reported questionnaire. It has 20 items, with 4 subscales: self-efficacy (6 items), optimism (3 items), hope (6 items) and resiliency (5 items). It uses a 6-point Likert-type scale (1 = strongly disagree to 6 = strongly agree). The total score ranges from 20-120, the higher the score, the better the psychological capital. The Cronbach α coefficient of the total scale was 0.932 (Luo & He, 2010) and it was 0.961 in this study.

Data analysis

Data were analyzed using the SPSS statistical software, version 26.0 and $P < 0.05$ was considered statistically significant. Demographic and variable of the study were summarized by descriptive statistics. Pearson correlation analysis was used to examine the correlations among the study variables. Standard multiple linear regression was performed to examine the predicting factors of nurse stress.

Ethical considerations

This study was approved by the Institutional Review Board (IRB) of Burapha University (IRB3-037/2564), the first Affiliated hospital of WMU (2021-zz-072) and the second Affiliated hospital of WMU (2021-K-88-02). All participants provided informed consent before answering the questionnaire. To ensure anonymity of nurse identity, the researcher provided a prepaid envelope to collect only personal information absolutely necessary for this study. Participants were informed that all

information provided in this study would be confidential and that all study results would be reported anonymously. Researcher complied with the epidemic prevention regulations of the hospitals and take own protection during data collection.

Results

1. Description of nurse characteristics

The participants of the is study, 97.1% were female, with the half in their 20s (50.3%), followed by those in their 30s (37.0%) and 40s (12.1%). The majority (60.7%) nurses were married and more than half of the participants (55.5%) had one or two children. In terms of education level, the proportion of a bachelor’s degree was the highest (87.3%). Among the occupational levels, the number of nurses (56.6%) was the most, and the number of nurses with more than 5 but less than 10 years of work experience was the most (35.8%), followed by 1 to 5 years (31.2%). More than half (57.2%) of the nurses worked 30-40 hours per week, followed by 40-45 hours per week (25.4%). Most nurses worked two evening or night shifts per week (66.5%). (Table 1)

Table 1 Demographic characteristics of nurses (n = 173)

Characteristics	Number (n)	Percentage (%)	Characteristics	Number (n)	Percentage (%)
Gender					
Male	5	2.9			
Female	168	97.1			
Age (M = 31.86, SD = 6.522, Min = 21, Max = 52)					
21-30 years	87	50.30	Number of children		
31-40 years	64	37.00	0	76	43.90
41-50 years	21	12.10	1	60	34.70
> 50 years	1	0.60	2	36	20.80
			3	1	0.60
Education					
College diploma	18	10.40	Marital status		
Bachelor’s degree	151	87.30	Single	67	38.70
Master’s degree or	4	2.30	Married	105	60.70
Doctor of Philosophy			Divorce	1	0.60
Occupational levels					
Primary Nurse	18	10.40	Years of nursing experience (M = 9.76, SD = 7.194, Min = 1, Max = 33)		
Senior nurse	98	56.60	1-5 years	54	31.20
Nurse-in-Charge	47	27.20	6-10 years	62	35.80
Co-chief	10	5.80	11-15 years	23	13.30
superintendent nurse			16-20 years	19	11.00
			Over than 20 years	15	8.70

Table 1 (Continue)

Characteristics	Number (n)	Percentage (%)	Characteristics	Number (n)	Percentage (%)
Number of work hours per week			Evening/Night shift work per week		
30-40 hours per week	99	57.20	1 per week	38	22.00
40-45 hours per week	44	25.40	2 per week	115	66.50
46-50 hours per week	22	12.70	3 per week	4	2.30
51-55 hours per week	5	2.90	4 per week	8	4.60
56-60 hours per week	1	0.60	5 per week	8	4.60
Over than 60 hours per week	2	1.20			

2. Description of the study variables

The overall score of nurse stress ranged from 6 to 29 (out of possible score is 0 to 40). The mean score of nurse's stress was 17.06 out of 40 ($SD = 4.532$), it could be considered that the nurse stress was moderate. Nursing stressor score ranged for each item was from 1 to 4, with mean of 1.973 ($SD = 0.347$). Coping strategy score of the participants ranged for each item was from 1 to 4, with mean score of 2.328 ($SD = 0.325$). The social support score ranged for each item is from 1 to 7, with a mean of 5.245 ($SD = 1.131$) which means high level social support for individual. The psychological capital score of the participants ranged from 1-6 with a mean of 4.040 ($SD = 0.805$).

Table 2 Mean and standard deviation of the dependent variable (DV) and independent variables (IDV)
(n = 173)

Variable	Range		M	SD
	Possible	Actual		
DV				
Stress	0-40	6-29	17.06	4.532
IDV				
Nursing stressor	1-4	1-4	1.973	.347
Coping strategy	1-4	1-4	2.328	.325
Social support	1-7	2-7	5.245	1.131
Psychological capital	1-6	1-6	4.040	.805

Table 3 Correlation matrix among the independent and dependent variable (n= 173)

Variable	Nurse stress	Nursing stressor	Coping strategy	Social support	Psychological capital
Nurse stress	1.000	.442**	-.047	-.490**	-.483**
Nursing stressor		1.000	-.057	-.536**	-.416**
Coping strategy			1.000	.226**	.231**
Social support				1.000	.559**
Psychological capital					1.000

** $p < .001$.

Results from the standard multiple linear regression analysis indicated that, nursing stressor, social support and psychological capital explained 32.0 % of the variance of nurse stress (Adj $R^2 = 32.4\%$, $F_{(4, 168)} = 21.65$, $p < 0.001$). The analysis also showed that nurse stress was significantly predicted by nurse stressor ($\beta = 0.20$, $p < 0.001$), social support ($\beta = -0.19$, $p = 0.006$) and psychological capital ($\beta = -0.41$, $p < 0.001$). However, there was no significant correlation between nurse stress and coping strategy so coping strategy was not in the regression model. The summary of regression analysis is presented in Table 4.

Table 4 Summary of regression analysis for variables predicting nurse stress among registered nurses in Wenzhou hospital

Predicting variables	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i> -value
Nursing stressor	.08	.03	.20	2.60	.000
Social support	-.08	.03	-.19	-2.28	.006
Psychological capital	-.09	.02	-.41	-5.03	.000

$R = .58$, $R^2 = .34$, Adjusted $R^2 = .32$, $F_{(4, 168)} = 21.65$, p -value $< .001$, Constant = 21.92

Discussion

The results of the study showed that nurse stress was at a moderate level, and it also revealed that nursing stressor, social support and psychological capital could predict nurse stress.

1. Stress among nurses working in Wenzhou hospitals

In the study the nurse stress mean score was 17.06 ± 4.53 which indicated the stress of this study was in moderate level. It's lower than the nurses' stress study by Sun, Jing, Zhou, Wang, and Ji (2020) in Henan Province. It might be related to better management in Zhejiang province. Nurses were less overworked, 57.2% of nurses work 30-40 hours per week, indicating that the working hours are reasonable and lead to have lower stressors than other provinces.

2. Factors predicting stress among nurses

The findings of the study revealed that nurse stress who work in Wenzhou hospital was predicted by nursing stressor ($\beta = 0.20, p < 0.001$), social support ($\beta = -0.19, p = 0.006$) and psychological capital ($\beta = -0.41, p < 0.001$), which is congruence with the objective of the study. However, coping strategy had no correlation with nurse stress so it could not predict nurse stress in this study. All the predictors explained 32.4% of variance in nurse stress.

Nursing stressor significantly predicted stress who work in Wenzhou hospital. The result was similar to the study by Chang (2022). It was consistent with the transactional theory of stress and coping and hypothesis of this study. In this study, the nursing stressor score was lower than the previous study in other provinces (Zheng et al., 2019).

The result of this study showed no correlation between coping strategies and stress among nurses. Coping strategies did not significantly predict nurse stress among nurses working in Wenzhou hospital. This finding is in contrast with the current research hypothesis and some previous literatures. But it's similar the previous study (Yao, Lin, & Zhang, 2022) which showed that there was no significant correlation between nurse stress and coping strategy ($r = .103, p > .05$). This may be related to the tendency of individuals to choose coping strategies; when individuals choose coping strategies of different processes, such as avoidance, problem solving, etc., the total coping scores cannot be correlated with stress.

This study found that nurses had a high level of social support and it had a significant predictive effect on nurses stress. The study also revealed that perceived social support ($\beta = 0.221, p = 0.006$) was able to predict nurse stress which was similar with this study. The high level of social support among nurses can be explained by the Chinese culture, which is more focused on bonding and interpersonal interactions, so nurses score high in these areas. High social support can reduce nurses' stress that the same as was informed by the Transactional theory of stress and coping (Lazarus & Folkman, 1984), social support is an important coping resource, it can help individuals to cope with stressful events, thus reducing stress response.

Psychological capital was another factor which was a strongly negative predictor of stress ($\beta = -0.41, p < 0.001$) in this study. There was similar result had been found in the study among ICU nurses in Beijing of China (Yao et al., 2022). In Lazarus and Folkman (1984) Transactional theory, positive beliefs are very useful coping resources. Thinking positively about yourself can also be seen as a very important psychological resource for coping. The theory includes in this category general and specific beliefs that serve as a basis for hope and continue to respond in the most unfavorable circumstances.

3. Strengths and Limitations

First, only nurses from adult ward and ICU were investigated in this study, and nurses in special wards such as pediatrics, emergency medicine, and obstetrics and gynecology did not participate, and for this reason, it may be difficult to generalize the results of this study to all clinical nurses. Second, this was a cross-sectional study, meaning that it could not explain the

cause-and-effect relationships of the variables. In order to fully understand the interactions between the variables, a longitudinal study describing the temporal context is needed to determine the causal relationships between nurse stress, stressors, social support, and psychological capital.

Conclusion

In conclusion, nurses' stress was at a moderate level in Wenzhou, China, and nursing stressor, social support and psychological capital could predict nurse stress. Based on the finding of the study, it is suggested to carry out related research in the future to reduce nurses' psychological stress by reducing nursing stressors, increasing social support and psychological capital.

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Declaration of competing interest

There is no conflict of interest of this study.

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