Causal Modelling of Factors Influencing Quality of Nursing Care in China

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Abstract: The quality of nursing care is essential and contributes to restoring people's health and well-being, especially when people are hospitalized. Various factors relating to the quality of nursing care have been identified, including nursing shortages. However, in China, there has been little research undertaken on factors influencing nursing care quality. This cross-sectional study aimed to develop and test the Chinese Model of Quality Nursing Care. A multi-stage, proportional stratified random sampling was used to recruit 784 registered nurses in three affiliated hospitals of a medical university in the People's Republic of China. Eight Instruments were used for data collection: a demographic data form, the Good Nursing Care Scale, the Nurse Staffing Item, the Practice Environment Scale of the Nursing Work Index, the 3-item Utrecht Work Engagement Scale, the Psychological Empowerment Scale, the High-performance Work Systems Scale, the 8-item Survey of Perceived Organizational Support. In addition, the Analysis of Moment Structure software program was used to test the hypothesized model.

Results indicated that the modified model fitted the empirical data and explained 31% of the variance in the quality of nursing care. Nursing practice environment, psychological empowerment and work engagement had positive direct effects on the quality of nursing care, with the nursing practice environment having the strongest total effect. Nursing practice environment, high-performance work systems, and perceived organizational support indirectly positively affected the quality of nursing care through psychological empowerment and work engagement. Unexpectedly, the patient-to-nurse ratio had no significant influence on the quality of nursing care. The results support the need for hospital managers to take action to improve the organizational support and work environment and create high-performance work systems to retain more nurses and midwives to enhance the quality of nursing care. The model requires further testing in practice and possible refinement.

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Introduction

As concerns about healthcare quality continue to spread, there has been increased attention and effort to assess and improve population health and the quality of nursing care (QNC). The QNC varies across countries and settings. For example, in Africa, only 36% of the patients were satisfied with this.[1] In Mongolia, the QNC was perceived as being at a high level,[2] while in China, the situation for the QNC varies among different regions, departments, and nurses' work experiences. In 2019, a survey of 398,073 clinical nurses in China revealed that the QNC in 739 tertiary hospitals was

medium to high.[3] However, various indicators reflect the QNC, such as the fall rate among older Chinese people increased substantially during the past three decades.[4] However, the incidences of catheter-associated urinary tract infection and ventilator-associated pneumonia decreased each year from 2018 to 2020.[5] Studies about the QNC have also included attention to safety and infection prevention issues.[6]

By the end of 2025, all tertiary and secondary hospitals across China are expected to provide a high-quality nursing service;[7] caregivers are encouraged to continue improving the QNC through improving the nursing work system such as through the application of the "Internet plus Nursing Service" program as well as to advance the coverage and depth of the QNC.[7] In 2020, the National Health Commission introduced Nursing Professional Quality Control Indicators for healthcare institutions to manage nursing quality.[8]

Since China initiated the Belt and Road Initiative (BRI) in 2013, President Xi Jinping proposed the Health Silk Road (HSR) in 2016 and officially identified health as an essential part of the BRI. The intention was that China would share and learn from other countries in healthcare fields. As the demand for healthcare professionals to provide high-quality care rises, health cooperation will bring important opportunities for developing and transforming the health industry in China and around the world.[9] Due to COVID-19 containment and post-pandemic recovery, China is expanding its transformation of the BRI with new content. Among these new additions, the HSR is seen in the Chinese diplomatic language as the main priority of China's BRI agenda.[10]

In addition, China has been reforming public hospitals suffering from poor governance structure and distorted after decentralization and deregulation policy experimentation since 2009,[11] so that high-performance work systems (HPWSs) were widely investigated in the healthcare field. The nursing shortage in China is also a serious issue. There were only 3.34 nursing and midwifery practitioners per 1000 population,[7] much lower than ratios in the highest regions in 2023: 8.20 in the United States and 7.70 in European regions

per 1000 population, respectively.[12] In attempting to address the issue of nurse shortages, factors that made nurses attracted to work in hospitals (so called magnet hospitals) were identified, such as the nursing practice environment (NPE).[13] To summarize, improving QNC is imperative for China and the world. However, QNC is not all high around the world. Understanding the context and factors involved in poor nursing care is necessary, and then learning how to understand and intervene to improve QNC. Hence, we developed and tested a causal model to understand what and how certain factors influence QNC.

Literature Review and Theoretical Framework

The theoretical framework guiding this study was Clarke and Donaldson's Nurse Staffing and Patient Care Quality and Safety Framework[6] supported by a literature review. Within this framework, the QNC is the appropriate execution of assessments and interventions to optimize patient outcomes and prevent adverse events.[6] In this study, the QNC was defined as the degree of excellence in nursing care provided for patients that meets their spiritual, mental, social, physical and environmental needs.[14] Clarke and Donaldson's Framework[6] indicated that the QNC is influenced by administrative practices.[6] In turn, these practices influence the combination and features of the nurse workforce and result in the construction of the nursing staff of labor markets' characteristics and the quantity of nursing time, as well as the QNC outcomes.[6] Additionally, QNC is affected by staff qualifications, individual nurse traits, knowledge and experience, as well as human factors such as fatigue; the model of care which is used in allocating staff and delivering care; the organizational environments in which nurses work, the needs of all the patients nursing staff are responsible for; the accessibility and arrangement of other staff and support services; and the climate and culture created by leaders within that setting.[6] These factors formed a set of relatively comprehensive interrelated paths that eventually influence nursing care quality outcomes.[6]

However, as Clarke and Donaldson[6] stated, their framework was unfinished, and there could be a host of factors and their interrelationships that could be further found from the literature to influence QNC. Indeed, Clarke and Donaldson's framework does not explain how administrative practices and organizational environments work to influence QNC.

Definitions used in this study

Further, reviewing the literature found that psychological empowerment (PE) and work engagement (WE) mediated the relationships between administrative practices, organizational environments and QNC.[15,16,17] Thus, this study explored this relationship by recognizing that high-performance work systems (HPWSs) are a group of separate but interrelated human resource practices that aim to recruit, select, develop, motivate and retain nurses.[18] The HPWSs is a representation of administrative practices, potentially directly affecting practicing nurses and ultimately influencing the QNC. A nursing practice environment (NPE) is defined as the organizational characteristics of a work setting that either facilitates or constrains professional nursing practice,[13] and represents the organizational environment that influences the QNC. Nursing staffing (NS) is the patient-to-nurse ratio, which is the number of patients to the number of nurses working in one unit over one shift.[19] The NS represents the effects of the number of nursing staff on patients' required service and care. A lower patient-to-nurse ratio can meet more patients' needs and thus influence QNC. Perceived organizational support (POS) is the extent to which the hospital values nurses' contributions and cares about their well-being,[20] and represent the relevant support services that influence the QNC. The PE and WE mediate the relationship between administrative practices, organizational environment, and the quality of nursing care.

In the literature, the HPWSs are widely investigated in the healthcare field. Through psychological interpretation, HPWSs influence (a signal of an organization's intentions) and align with nurses' attitudes and behaviors within the hospital's strategic goals, increasing organizational performance and profits.[21] Nurses who perceive that their hospitals have HPWSs in place are more likely to rate the quality of care delivered as higher than those who do not see evidence of HPWSs.[15]

The HPWSs also empower and motivate employees to increase their productivity and organizational performance.[18] The PE is defined as a nurse's experience of intrinsic motivation based on their cognition about themselves relating to their work role.[22] Gong et al. found that nurses who felt personally empowered were likely to align their interests with the hospitals' interests when carrying out their work.[23] When nurses gain more knowledge and skills, they feel like they gain competence to cope with patients and collaborate well with patients' relatives. The sense of competence is a kind of self-efficacy.[24] When nurses believe in their abilities to do their job, they will give patients more opportunities to be autonomous and independent and encourage them to ask questions about their condition and their medical treatment. These actions increase patients' coping strategies. At the same time, high self-efficacy in nurses results in high effort.[24] Nurses will give encouragement and mental support to patients' relatives, share anger, stress, and openness to resolve problems when they feel misunderstood, and give patients and their relatives sufficient opportunities to be involved in planning care and treatments. These actions help nurses collaborate more efficiently with patients' relatives. In addition, hospitals have also increased the nurses' levels of autonomy, allowed them more control over their work and perceived competence, and enhanced their sphere of influence to view PE as a personal resource.[25] Nurses who experience higher levels of meaning and attachment to their roles are more self-determined, have more confidence in their work, and see their contributions as impactful. Meaningfulness refers to a person's intrinsic sense of caring toward achieving a given task. The HPWSs improve the understanding of meaningfulness and help improve nurses' care-related activities. And there is an indication that PE can act as a mediator in the HPWS-QNC relationship.[16]

In addition, HPWSs represent an investment of time and resources for nurses and encourage them to adopt a long-term perspective on their job and organizational performance,[26] of which the hospitals reciprocate.[27] Through POS, nurses return the positive treatments they received from HPWSs by developing favorable attitudes and behaviors toward their hospitals, thus improving the QNC.[20]

Previous studies consistently showed that NPE could positively influence QNC.[2] This may be due to the hospitals' emphasis on improving nursing development ladders and nursing procedures to provide high QNC. In China, the National Nursing Career Development Plan (2021-2025)[7] and the Healthy China 2030 planning outline[28] recommended that nurses and midwives be trained to improve their ability to provide nursing care. Further, the New Recruited Nurse Training Syllabus (for trial implementation)[29] was issued, and some guidelines were implemented on how to train new nurses. Through participating in hospital training, nurses acquire up-to-date knowledge and practical skills so that they can better take care of patients to improve the QNC.[7]

Moreover, the increasing number of patients and the shortage of nurses have resulted in high NS. In China, the nurse staffing ratio is listed as a quality indicator in the Nursing Professional Quality Control Indicators (2020).[8] The current nursing shortage also increases nurses' workload and leads to burnout, and researchers have repeatedly reported that burnout impacts the QNC.[30] Schaufeli et al. stated that WE was a positive, fulfilling, and work-related state of mind, characterized by vigor, dedication, and absorption.[31] It was the opposite of burnout.[31] When they are more engaged in their tasks, nurses feel more energetic and enthusiastic about their work, thus feeling more motivated towards displaying good staff characteristics and care-related activities, which translates into a higher QNC. Therefore, in this study, the WE is postulated to influence QNC.

In summary, this study aimed to develop and test a causal model of QNC based on Clarke and Donaldson's Nurse Staffing and Patient Care Quality and Safety Framework,[6] including factors from a literature review. The hypothesized model depicting the pattern of relationship among NPE, WE, HPWSs, POS, and PE to influence QNC is shown in **Figure 1.** It was hypothesized that NPE had both positive direct and indirect effect on QNC through PE and WE, whereas, HPWS and POS had only positive indirect effect on QNC through PE and WE, While NS, PE and WE had only positive direct effect on QNC.
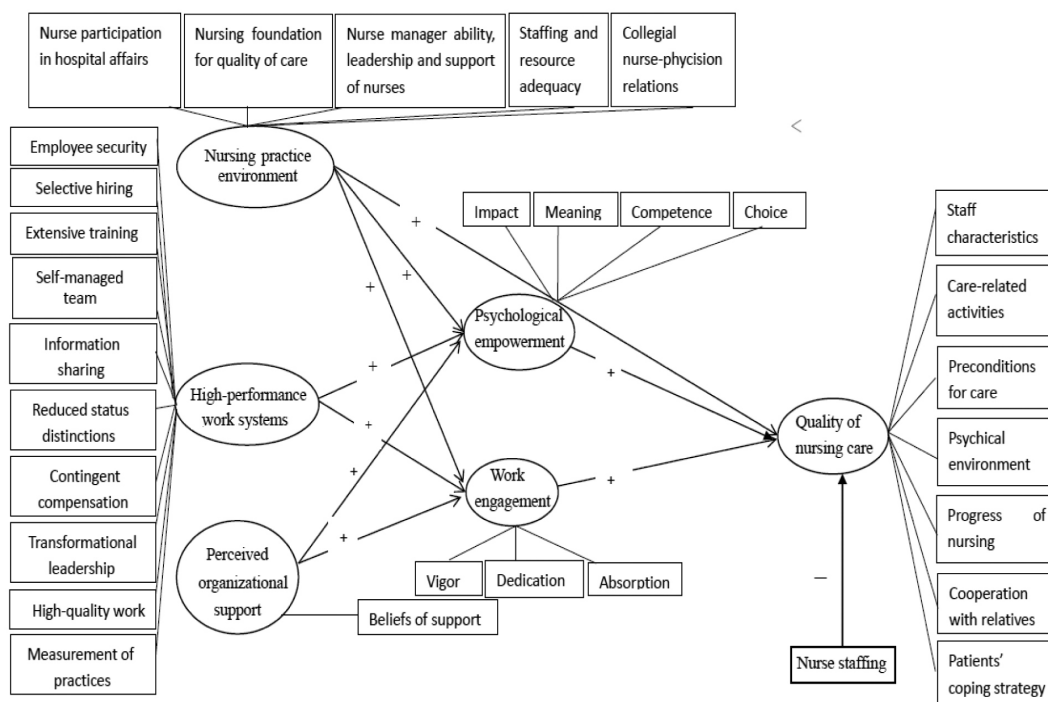

Figure 1. The hypothesized Chinese Model of Quality Nursing Care

Methods

Design: A cross-sectional design was used for this study aimimg to develop the Chinese Model of Quality Nursing Care. The findings are reported using the STROBE checklist.

Sample and Setting: The setting in this study was three affiliated hospitals of a medical university, Yunnan province, the People's Republic of China (PRC). The sample size was computed based on structural equation modeling (SEM) testing. According to Kline,[32] the sample size ratio to parameters should be no less than 10:1 for SEM. This study involved 30 observed variables, six latent variables and a total of 75 estimated parameters, so the minimum sample size was 10 x 75 = 750. The final sample size was 900 nurses, calculated to offset a 20% potential dropout rate (750 x 20% = additional sample = 150). The inclusion criterion was registered nurses (RNs) who worked as staff nurses in the studied hospitals for at least one year. Nurses on vacation, continued education, and maternity leave were excluded.

Multi-stage sampling procedures were used to select a sample from each hospital and department, as presented in **Figure 2**. Firstly, a simple random sampling method was used to select three hospitals from the five affiliated hospitals. Secondly, a proportional stratified random sampling method was used to calculate the number of nurses chosen in the three hospitals. Thirdly, a proportionate stratified random sampling method was used to determine nurses in each unit of the three hospitals. Fourthly, a simple random sampling method was used to select nurses from the list of nurses in the clinical nursing department who met the inclusion criteria. This process was continued until the 900 nurses were obtained.
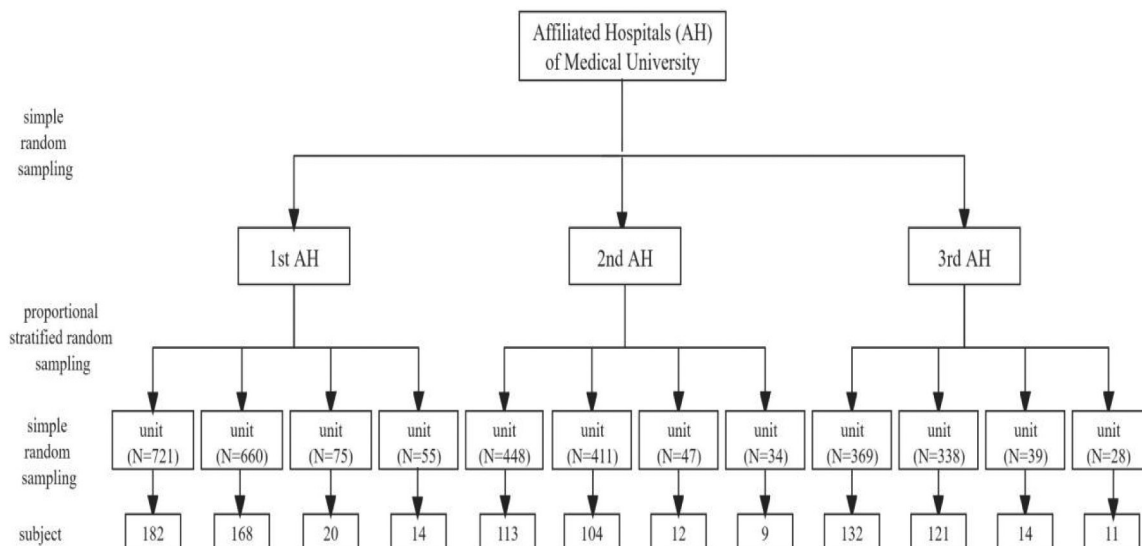

Figure 2. Sampling method of this study

Ethical Considerations: Ethical approval was obtained from the Research Ethics Review Committee of the Faculty of Nursing, Chiang Mai University (approval number 019/2020), confirming that all the intended methods were per the Declaration of Helsinki. All participants signed an informed consent form and were given information about their rights and benefits, that participation in the study was voluntary, and they were free to refuse, stop or withdraw from this study at any time without being punished and losing

any benefits. The information provided by participants was used only for study purposes and kept confidential.

Instruments: There were eight research instruments used in the study as follows:

1. *The Demographic Data Form.* The research team developed this to determine gender, age, marital status, educational level, professional title, the number of working years, the work department, shift work, employment status, and income.

2. *The Good Nursing Care Scale* (GNCS) was developed by Stolt et al.,[14] and is a 40-item, seven categories with a 5-point Likert scale ranging from 0 (can't say) to 4 (fully agree). The total score ranges from 0 to 160, with a higher score indicating higher quality of nursing care. The average scores are divided into six levels: 1.00–1.59 (very low), 1.60–2.09 (low), 2.10–2.59 (fairly low), 2.60–3.09 (fairly high), 3.10–3.59 (high), 3.60–4.00 (very high).

3. *Nurse Staffing Item.* This was developed by Liu et al.[19] Nurse staffing refers to the patient-to-nurse ratio, and to quantify this, the item asks for the number of patients and nurses on their last shift (day/evening/night). The patient number is divided by the nurse number to get the number of patients per nurse.

4. *The Practice Environment Scale of the Nursing Work Index* (PES-NWI) was developed by Lake[13] and translated to Chinese by Wang and Li.[33] This instrument consists of a 31-item with five sub-scales on a 4-point Likert scale ranging from 1 = strongly agree to 4 = strongly disagree. The total score ranges from 31 to 124. The total score is calculated as the mean of the five subscales scores. A mean score of >2.5 on four or five subscales indicates a favorable practice environment.

5. *The 3-item Utrecht Work Engagement Scale* (3-UWES) was developed by Schaufeli et al.[33] The instrument was rated using a 7-point Likert scale ranging from 0 (never) to 6 (always) with 3 sub-scales: vigor (1 item), dedication (1 item) and absorption (1 item). The total score ranges from 0 to 18, with a higher score indicating a higher level of engagement.

6. *The Psychological Empowerment Scale* (PES) was developed by Spreitzer[22] and translated into Chinese by Li et al.[34] It has 12 items and four sub-scales: meaning,

competence, self-determination, and impact. The 5-point Likert scale ranges from 1 (strongly disagree) to 5 (strongly agree). The total score ranged from 12 to 60, with higher scores representing higher levels of psychological empowerment. For example, the average score between 1.00–2.33 indicates a low level of empowerment, 2.33–3.67 a moderate level, and 3.67–5.00 a high level.

7. *The High-performance Work Systems Scale* (HPWSS) was developed by Zacharatos et al.[18] It is a 5-point Likert scale with ten sub-scales and 51 items. Responses on the scale ranged from 1 (strongly disagree) to 5 (strongly agree). The total score ranged from 51 to 255, with a higher score indicating the organization had implemented a high-performance work system. Average scores between 1.00–2.33 indicate low level, 2.33–3.67 moderate level, and 3.67–5.00 high level.

8. *The 8-item Survey of Perceived Organizational Support* (8-SPOS) was developed by Eisenberger et al.[20] The eight items are on a 7-point Likert scale ranging from 1 = strongly agree to 7 = strongly disagree. The total score ranges from 8 to 56, with higher scores representing higher POS. The average scores between 1.00–3.00 indicate a low POS level, 3.01–5.00 a moderate level, and 5.01–7.00 a high level.

Two instruments, the PES-NWI and the PES, have already been translated into Chinese and used in studies.[34,35] The other five instruments: the Nurse Staffing Item, the GNCS, the HPWSS, the 3-UWES, and the 8-SPOS, were initially developed in English, and back-translated (with permission from all developers) by using the method of Brislin.[36] Three bilingual experts who were university nursing professors were invited to undertake the forward-backward translation. An expert first translated the original scale into Chinese; another translated the Chinese version back into English. Finally, the third expert compared the original scale and the back-translated English version scale to confirm the equivalents.

The reliabilities of the six instruments were pretested with 20 nurses whose characteristics were the same as participants in this study. Cronbach's coefficient alpha for all instruments with pretest and in the main study, as well as item examples, are shown in **Table 1**.

Table 1. Cronbach's alpha reliability and examples of items of instruments

Instruments	Cronbach's alpha		Example of item
	Pilot study	*Main study*	
GNCS	.88	.95	I show a friendly attitude towards my patients.
PES-NWI	.84	.96	Adequate support services allow me to spend time with my patients.
3-UWES	.82	.90	At my work, I feel bursting with energy.
PES	.84	.91	The work I do is very important to me.
HPWSS	.89	.90	I have work in my organization for as long as I want it.
8-SPOS	.90	.85	My organization cares about my opinions.

Note. GNCS = The Good Nursing Care Scale, PES-NWI = The Practice Environment Scale of the Nursing Work Index, 3-UWES = The 3-item Utrecht Work Engagement Scale, PES = The Psychological Empowerment Scale, HPWSS = The High-performance work systems scale, 8-SPOS = The 8-item Survey of Perceived Organizational Support.

Data Collection: After receiving IRB approval, the primary investigator (PI) got the nursing directors' help to facilitate access to the nurses of each hospital and appointed one nurse from each hospital as a research coordinator. The PI then explained the research objectives, benefits, and data-collecting procedures to them and asked for their help distributing the questionnaires. The coordinators then helped the PI collect questionnaires. The participants were asked to return the questionnaires in sealed envelopes (already provided with the PI's name and address) and put them in a special box in the nursing department in each hospital within two weeks. Only the completed questionnaires were kept for data analysis. Data was collected from March–August 2020.

Data Analysis: This was conducted in two stages. In the first stage, data from the questionnaire were entered into the Statistic Package for the Social Science (SPSS) 13.0. Descriptive statistics and statistical assumptions underlying the standard error of the mean (SEM) were examined, including normality, linearity, and multicollinearity. All variables were accepted as a normal distribution. The relationship between independent and dependent variables was linear, and there was no evidence of multicollinearity of independent variables.

After all, the assumptions underlying the SEM were met; the second stage was to test the hypothesized model of QNC using the Analysis of Moment Structure (AMOS) 23.0. A "goodness" of the model fitted between the hypothesized model and the data that was measured; the acceptable ranges of value expected by the following indicators were as follows: $\chi^2/df < 5$, GFI > .80, CFI, TLI > .90, SRMR, RMSEA < .08 and PNFI > .50.[37]

Results

Demographic characteristics

There were 784 completed questionnaires, a response rate of 87.11%. The results showed that out of 784 nurse participants, 98.21% were female. The average age was 32.97 years (SD = 6.70), and 46.17% were between 21 and 30 years old. The average number of working years was 11.10 (SD = 7.87); 43.11% worked in a medical department, 44.77% worked in a surgical department, 73.08% were married, 86.99% held a bachelor's degree, and 52.04% were senior nurses. In addition, 67.99% of the nurses had a monthly income of between 4001–8000 yuan (USD 628.96–1257.60).

Model testing

Before testing the model in China, we examined each variable's mean, SD and level; results are shown in **Table 2**. The QNC and PE were at a high level, whereas POS and HPWSs were at a moderate level, and NPE and WE were at a favorable and average level.

Table 2. Mean, SD, and level of each variable (n = 784)

	Mean	*SD*	*Level*
NS	5.75	4.60	–
HPWSs	3.25	.38	Moderate
NPE	3.10	.49	Favorable
POS	4.04	1.10	Moderate
PE	3.78	.60	High
WE	3.42	1.15	Average
QNC	3.54	.35	High

Note. HPWSs = high-performance work systems; NPE = nursing practice environment; POS = perceived organizational support; PE = psychological empowerment; WE = work engagement; QNC = quality of nursing care; NS = Nursing staffing (patient-to-nurse ratio)

Model testing found some of the indices of the original model (**Figure 1**) did not fit with the standard of the goodness-of-fit (**Table 3**). Thus, in re-evaluating the fit between the model and the data the model did not initially fit satisfactorily; by modifying indices as well as theoretical and empirical results, then by deleting non-significant path coefficients between NPE and WE, POS and PE, NS and QNC, justifications and modifications were brought to the model. The model was then reanalyzed until it matched satisfactorily and fitted the data, thus bringing the indicators' values within an acceptable range. Finally, all of the goodness-of-fit indices of the final model (**Figure 3**) met the standard of fit (**Table 3**). The results of the SEM analysis indicated that the modified model for the QNC based on Nurse Staffing and Patient Care Quality and Safety Framework[6] fitted the sample data well. The final model could explain 31% of the variance in QNC (R^2 = .310).

Table 3. Comparison of the goodness-of-fit indices in the hypothesized and modified Chinese Models of Quality Nursing Care

Goodness-of-Fit Indices	Standard of Fit	Hypothesized Model	Modified Model
χ^2	Low χ^2	2779.635	2019.183
df		617	481
χ^2/df	1–5	4.505	4.198
SRMR	< .08	.064	.057
RMSEA	< .08	.067	.064
GFI	> .80	.811	.844
TLI	> .90	.874	.904
CFI	> .90	.883	.913
PNFI	> .50	.792	.810

Note. SRMR = standard root mean square residual; RMSEA = root mean square error of approximation;

GFI = goodness of fit index, CFI = comparative fit index; TLI = Tucker-Lewis index (non-normed fit index);
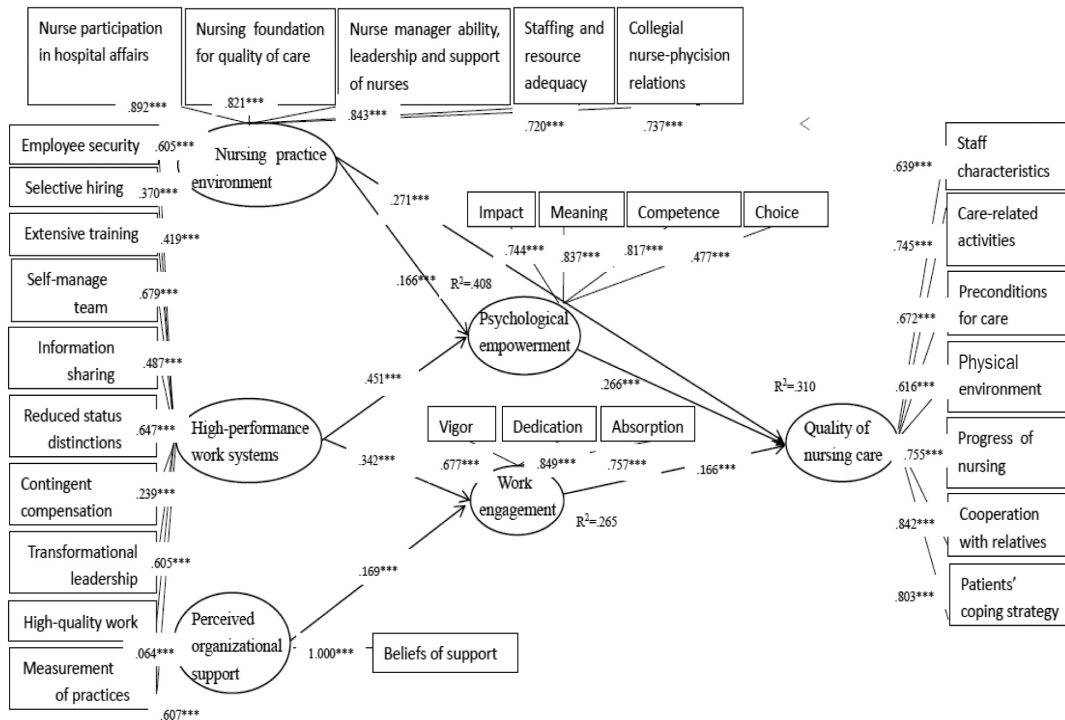
PNFI = parsimonious normed-fit index

Figure 3. The modified Chinese Model of Quality Nursing Care

In the final model **(Figure 3) and Table 4,** the NPE (β =.326, p < .01) had the highest total effect on QNC, followed by PE (β =.266, p < .001), HPWSs (β =.177, p < .001), WE (β =.166, p < .001) and POS (β = .051, p < .05). The standardized direct effects (DE), indirect effects (IE), and total effects (TE) of the independent variables (IV) on dependent variables (DV) of the modified Chinese Model of Quality Nursing Care was shown in **Table 4.**

Table 4. Direct effects (DE), indirect effects (IE), and total effects (TE) between variables (n = 784) of the modified Chinese Model of Quality Nursing Care

Endogenous Variables	R^2	Influencing Variables	TE	DE	IE
QNC	0.310	NPE	.326**	.271***	.054*
		HPWSs	.177***	–	.177***
		POS	.051*	–	.051*
		PE	.266***	.266***	–
		WE	.166***	.166***	–
PE	0.408	NPE	.166**	.166**	–
		HPWSs	.451***	.451***	–
		POS	.086ns	.086ns	–
WE	0.265	NPE	.060ns	.060ns	–
		HPWSs	.342***	.342***	–
		POS	.169**	.169**	–

Note. ns = not statistically significant. *p < .05. **p < .01. ***p < .001
NPE = nursing practice environment, HPWSs = high-performance work systems, POS = perceived organizational support, PE = psychological empowerment, WE = work engagement, QNC = quality of nursing care.

Discussion

The modified Chinese Model of Quality Nursing Care in this study explained 31% of the variance in QNC. The NPE, PE, and WE had positive direct effects on QNC. In addition, the NPE, HPWSs and POS indirectly positively affected QNC through PE and WE. The NPE had the strongest total effect on QNC. Surprisingly, the NS staffing had no effect on QNC. The results mostly support the hypotheses and framework of Clarke and Donaldson.[6]

The NPE was rated as favorable, indicating that nurses perceived their workplace as a good environment in which to work. The NPE had a direct positive effect on the QNC and an indirect positive effect on the QNC via PE. The result was consistent with the previous findings.[2] The studied hospitals emphasized improving nursing foundations for a better quality of care. Nursing departments promote nurses' professional knowledge and skills through training programs. For the training of nurse managers, the studied hospital sent their nurses to train in other hospitals, other provinces, and overseas, for training and study purposes. To train clinical nurse specialists, nurses joined hospital committees to exchange and improve their knowledge and skills. In addition, some affiliated hospitals opened a stoma wound specialist care clinic and a diabetes teaching and consulting clinic, where nurses had the opportunity to ensure nursing quality, cultivate their talents, and help improve scientific research.[38,39]

Nurses perceived the hospitals performed HPWSs at a moderate level. In this study, the HPWSs (administrative practices) positively influenced the QNC through WE and PE. The result was consistent with the previous findings.[15,16,21] Through employment security, selective hiring, extensive training, information sharing and contingent compensation,[38,39] the HPWSs were perceived as critical personal resources that intrinsically motivate;[18] these resources trigger work engagement and transform into positive outcomes.[33] The HPWSs promote the nurses' dedication to work; nurses invest their excess resources back into the hospitals by being more engaged in their work. For instance, employment security encourages nurses to take a longer-term view of their work and organizational performance,[26] represents an investment of time and resources in nurses, which is paid off by nurses' engagement with the hospital.[27]

There was an indirect positive relationship between POS and the QNC via WE. The reason might be that when nurses feel their hospitals value their contributions and care about their well-being, nurses reciprocate the positive treatments they have received from hospitals. In doing so, they build a positive, fulfilling, work-related state of mind.[31] This is primarily done through developing favorable attitudes and behaviors toward their hospitals;[26] good work attitudes can make for a good quality of nursing care.

The NS is the ratio of the number of patients cared for by one nurse during a shift. The findings of this study demonstrated that, in the hospitals where the study was conducted, the average number of patients one nurse had to care for was 5.75 (**Table 2**). This number exceeds the Chinese national standard of 2.5 patients per nurse.[7] In this study, the NS ratio did not affect the QNC as it was expected it would. The result was not consistent with the previous findings.[6] The reason may be the NS ratio would directly influence the quantity of nursing time and indirectly influence the QNC.[6] Moreover, under different staffing conditions and work environments, the same nurse may provide different quality of care to patients with similar needs.[6] Thus, it is hard to tell whether the patient-to-nurse ratio influenced the QNC in the study environment.

Limitations

The findings and the contribution of the current study must be evaluated, and some potential limitations must be considered. First, the study was conducted in one area of China, thus the generalizability of the results

is limited. Second, to collect data by self-reporting of nurses may not depict the true QNC. Third, the finding that the nurse-patient ratio did not influence QNC needs further exploration. In addition, this model of QNC explained only 31% of the variance, indicating that other characteristics, such as nurses' qualifications, patients' characteristics, and illness severity should be included in further study.

Implications for Nursing Practice

This study was undertaken during the COVID-19 pandemic, a time when nurses had to work hard to try to provide QNC. The world has yet to enter a post-pandemic period, and great effort is required by many to achieve the goal of the United Nations Sustainable Development Goals (SDG) to reach a 9 million health workforce worldwide in 2030. Our study results support the need for hospital managers to take action to retain more nurses and midwives to enhance the QNC. Our results also highlight the importance of a good NPE in increasing the level of QNC. Nurse managers should establish a supportive, fair and impartial work environment, maintain effective communication with nurses and help them with career development and planning. Also, HPWSs design and implementation are essential for nurse–hospital relationships and QNC. The hospitals› management should hire individuals who meet the requirements for clinical nurses and provide continuous training and retraining programs to improve nurses' technical and behavioral skills. Furthermore, hospital managers should care more about nurses' contribution and well-being. Our model needs further testing in future by including different samples and indicators, and refining the factors therein; this includes patient feedback on the quality of nursing care, as well as patient mortality and morbidity statistics to give a more holistic overview of the phenomenon.

Acknowledgments

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แบบจำลองเชิงสาเหตุของปัจจัยที่มีผลต่อคุณภาพการพยาบาล

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บทคัดย่อ: คุณภาพการพยาบาล มีความสำคัญและมีส่วนที่ทำให้เกิดการฟื้นคืนสู่สภาพเดิมและความผาสุก ของคนโดยเฉพาะเมื่ออยู่ในโรงพยาบาล โดยมีการระบุปัจจัยที่มีความสัมพันธ์กับคุณภาพการพยาบาล อย่างไรก็ตามยังไม่มีการศึกษาถึงความสัมพันธ์ขององค์ประกอบว่ามีอิทธิพลต่อคุณภาพการพยาบาล อย่างไร การศึกษานี้มีวัตถุประสงค์ เพื่อพัฒนาแบบจำลองเชิงสาเหตุคุณภาพการพยาบาลและนำไป ทดสอบ โดยเป็นการศึกษาแบบภาคตัดขวางด้วยวิธีสุ่มตัวอย่างแบบหลายขั้นตอน ใช้เครื่องมือแปดชุด ได้แก่ แบบเก็บข้อมูลผู้ให้ข้อมูล, the Good Nursing Care Scale, Nurse Staffing Item, the Practice Environment Scale of the Nursing Work Index, the Utrecht Work Engagement Scale, the Psychological Empowerment Scale, the High-performance Work Systems Scale, และ the Survey of Perceived Organizational Support ในการเก็บรวบรวมข้อมูลจากพยาบาลจำนวน 784 คน จากโรงพยาบาลเครือข่าย ของมหาวิทยาลัยการแพทย์คุนหมิง สาธารณรัฐประชาชนจีนจำนวนสามแห่ง ใช้โปรแกรม AMOS เพื่อทดสอบแบบจำลองเชิงสาเหตุที่ตั้งสมมติฐาน

ผลการวิจัยแสดงให้เห็นว่า ในแบบจำลองที่ดัดแปลงหลังสุดมีความเหมาะสมกับข้อมูลเชิงประจักษ์ ที่ได้และสามารถอธิบายความแปรปรวนได้ร้อยละ 31 ของคุณภาพการพยาบาล โดยมีตัวแปรห้าตัว ได้แก่ สภาพแวดล้อมในการปฏิบัติการพยาบาล ระบบการทำงานที่มีผลการดำเนินงานที่ดี การรับรู้ต่อการ สนับสนุนจากองค์กร การเสริมสร้างพลังอำนาจทางจิตใจ และความยึดมั่นผูกพันต่องานมีผลทางตรง หรือทางอ้อมต่อคุณภาพการพยาบาล ผลการวิจัยที่ไม่คาดคิดคืออัตราส่วนของผู้ป่วยต่อพยาบาลไม่พบว่า มีอิทธิพลต่อคุณภาพการพยาบาล ผลการวิจัยนี้ สามารถนำไปใช้เพื่อเป็นหลักฐานในการสนับสนุน ผู้บริหารโรงพยาบาลในการดำเนินการปรับปรุงสภาพแวดล้อมในการทำงาน การสนับสนุนจากองค์กร และสิ่งแวดล้อมในการทำงานที่มีผลการดำเนินงานที่ดีเพื่อให้เกิดการปรับปรุงคุณภาพการพยาบาล

คำสำคัญ: แบบจำลองเชิงสาเหตุ คุณภาพการพยาบาล ระบบงานที่มีผลการปฏิบัติงานสูง สิ่งแวดล้อม ในการปฏิบัติการพยาบาล การรับรู้การสนับสนุนจากองค์กร การเสริมสร้างพลังอำนาจด้านจิตใจ ความยึดมั่นผูกพันต่องาน

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