ORIGINAL RESEARCH

The Relationship Among Organizational Identity, Psychological Resilience and Work Engagement of the First-Line Nurses in the Prevention and Control of COVID-19 Based on Structural Equation Model

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Purpose: To explore how the organizational identity and psychological resilience affect work engagement of the front-line nurses in the prevention and control of coronavirus disease 2019 (COVID-19) and to establish the relationship model based on these factors.

Material and Methods: Convenience sampling was applied to collect questionnaire samples from 216 nurses (from 12 cities in 6 provinces). General information questionnaires, organizational identity scale (OIQ), psychological resilience scale (CD-RISC), and Utrecht Work Engagement Scale (UWES) were used as tools for data collection.

Results: Both organizational identification and psychological resilience had a positive impact on work engagement (r=0.457~0.669). The structural equation model indicated that psychological resilience had a significant partial mediating effect on the relationship between organizational identity and work engagement; the mediating effect value was 0.25, the overall effect value of work engagement was 0.73, and the mediating effect accounted for 34.2%.

Conclusion: Our results revealed that organizational identity could directly affect nursing. It can also indirectly affect nurses' work engagement through the intermediary role of psychological resilience. In face of the COVID-19 epidemic, hospitals and nursing managers could improve the level of nurses' job involvement by improving organizational identity, which in turn may have a positive effect on psychological resilience.

Keywords: coronavirus disease, COVID-19, pneumonia, nurses, organizational identity, psychological resilience, work engagement

Introduction

Coronavirus disease 2019 (COVID-19), which has been defined as pandemic, is a highly infectious disease that spreads from person to person through droplets and contact.[1] Currently, there is no specific treatment or vaccine for COVID-19. Antiviral therapy, combined with supportive nursing care, is the primary treatment strategy for COVID-19.[1,2]

Nurses have a pivotal role in the management process, since they provide treatment and symptom relief for patients, collect clinical trial data, protect patients' safety, and monitor the body functions of critically ill patients.[3] With the global

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spread of COVID-19, front-line nurses have achieved sustained success in fighting the epidemic,[1,3,4] and their merit has been recognized by politicians and the public.[5]

Since the outbreak of the COVID-19 epidemic in Wuhan in December 2019, front-line anti-epidemic teams have been established in various places, and nurses have become the leading force in preventing and controlling this epidemic. However, medical staff, especially nurses, are at a high risk of infection when dealing with infective patients, which may increase fear.[6,7] Due to the limited information about COVID-19, high work intensity, high occupational exposure risk, and complex working environment, the work engagement of front-line nurses is inevitably affected. Work engagement can be defined as positive behavior or a positive state of mind at work that leads to positive work-related outcomes.[8] The levels of nurses' work involvement can have a significant effect on their performance in the workplace, thereby affecting patient's safety and outcomes.[9]

The job demands-resources (JD-R) model suggests a close relationship between job demands and job resources,[10] where latter ones were classified into two categories: internal resources (psychological factor) and external resources (organizational aspects). Adequate job resources can effectively balance the various task requirements during work so that individuals can maintain a good work state, which leads to high work engagement.[11] Therefore, the aim of this study was to explore the internal associations among organizational identity, psychological resilience, and nurses' work engagement by applying the job demands-resources (JD-R) model theory and structural equation model. In addition, this study provided a verified theoretical basis for nursing managers for taking effective measures so as to improve the work engagement level of front-line nurses in COVID-19 prevention and control.

Materials and Methods
Study Objects

A total of 216 front-line nurses from 12 cities in 6 provinces (Zhejiang, Jiangsu, Shanghai, Anhui, Hubei, and Gansu) in charge of COVID-19 prevention and control were surveyed using the convenience sampling method between February and March 2020. The inclusion criteria were as follows: 1) officially registered nurses; 2) those who are in direct contact with confirmed or suspected cases; 3) front-line working experience for more than 15 days; 4) signed the informed consent for voluntary participation. Exclusion criteria were as follows: those who quit front-line working due to compelling reasons, such as disease or personal matters.

The sample size estimation was calculated using the formula[12] in enumeration data cross-sectional survey: *N=4 ($U_\alpha S/\delta$)²*, where U_α is the U value corresponding to the significance level α, S is the standard deviation, and δ is the admissible error. After the significance level α was set to 0.05, U_α to 1.96, and δ to [0.25S, 0.5S], a sample size N was between 62 ∼ 246 cases. In this study, a structural equation model was adopted, and the minimum sample size was 200 cases. Considering 5% to 10% drop out rate, the sample size was finally determined to be 210 cases. A total of 216 nurses from 12 cities in 6 provinces, including Zhejiang, Jiangsu, Shanghai, Anhui, Hubei, and Gansu were included in this study. The effective returning rate of the questionnaire was 100%.

Instruments and Measures
General Information Questionnaire

General information questionnaire, which was designed by researchers based on literature review, included age, gender, education, working seniority, professional title, positions, and marriage status.

Utrecht Work Engagement Scale (UWES)

The Utrecht Work Engagement Scale (UWES) developed by Schaufeli et al was adopted in this study.[8] The scale was converted to the Chinese version by Yiwen Zhang; this method is widely used in the assessment of nurses' work engagement status.[13] It contains 3 dimensions (focus, energy, and dedication) and 15 entries in total. Using a 7-point Likert scale, each entry was assigned with a score ranging from 0 to 6 points from "Never happened" to "Every day". A higher total score stood for a higher level of work engagement. The total score of the scale was divided by the total number of entries to get an average score for work engagement. The Cronbach 'α of the scale was 0.944.

Psychological Resilience Scale (CD-RISC)

Psychological Resilience Scale (CD-RISC), which was compiled by Connor and Davidson and revised by Yu et al was adopted in this study.[14,15] The scale includes three dimensions (tenacity, strength, and optimism) and has 25 entries in total. Using a 5-point Likert scale, each entry corresponded to a score ranging from 1 to 5 points from "Never" to "Always". A higher total score

corresponded to a higher level of psychological resilience. The Cronbach's α of this scale was 0.91.

Organizational Identity Scale (OIQ)

Organizational Identity Scale (OIQ) was developed by Miller et al and was converted to the Chinese version by Xuan Li.[16,17] It contains 8 entries. This study applied the OIQ Scale and 5-point Likert scale to collect data. Each entry corresponded to a score of 1–5 points from "Strongly disagree" to "Strongly agree". The higher the score, the higher the degree of organizational identity nurses have. The Cronbach 'α coefficient of this scale is 0.916.

Survey Method

QR code of the questionnaire was sent to all participants through the WeChat group. Participants completed and submitted the online questionnaire by scanning the QR code with their mobile phone. The questionnaire was divided into two parts: the first part contained the information related to informed consent, which explained the purpose, methods, risks, benefits, the confidentiality of the survey in detail; the second part contained multiple-choice questions, all of which were made to be compulsory so as to ensure the integrity of the questionnaire. Only after participants accepted the policy of informed consent in the first part, they could move to the second part. This study has been ethically approved by the Ethics Committee of the Affiliated Hospital of Jiaxing University (the ethical approval number is LS2020-065).

Statistical Analysis

Data were derived from Sojump. Statistical analysis was conducted using software SPSS 20.0 and AMOS 20.0, including descriptive data calculation, correlation analysis, and construction of structural equations. A P value of <0.01 was considered as statistically significant.

Results

A total of 216 questionnaires were collected in this survey. All questionnaires were valid with a 100% effective return rate. The general information of the respondents is shown in Table 1.

The total score of nurses' organizational identity was 36.41±4.85, the total score of work engagement was 68.02 ±22.96, and the total score of psychological resilience was 92.77±13.06 (Table 2).

A significant positive correlation was found between nurses' organizational identity, psychological resilience, and work engagement (P<0.01; Table 3).

Based on the job demands-resources (JD-R) model, the work engagement was used as the dependent variable, organizational identification as the independent variable, and psychological resilience as an intervening variable to establish a hypothetical model. According to the requirements for model construction,[18] the ratio of the overall model fit freedom degree in this study was (χ^2/df) <3, goodness-of-fit index (GFI)=0.925, normed fit index (NFI) and comparative fit index (CFI) both >0.9, the root-mean-square error of approximation (RMSEA) <0.08, and root of the mean square residual (RMR) <0.05. The above data were all within the acceptable range, indicating that the overall adaptability of this structural equation model was satisfactory (Table 4). The relationship between each variable and the value of the path coefficient is shown in Figure 1.

Discussion

Current Status of Front-Line Nurses' Organizational Identity, Psychological Resilience, and Work Engagement

This study showed that the average score of organizational identity among front-line nurses was (4.53±0.61) and the total score was (36.41±4.85), which was higher than previously reported by Huang et al and Xu et al.[19,20] These results indicate that subjects in this study have a strong organizational identity. These nurses are willing to take the responsibility given by the organization, take the initiative to complete various tasks, and promote common development through the combination of organization goals and personal goals. This can be explained by multiple measures taken by the China government in coping with the COVID-19 epidemic. The National Health Commission of China issued the Coronavirus Disease 2019 Prevention and Control Plan, according which Chinese hospitals were required to manage their clinical practice, refer to the set standards and put particular emphasis on the development of organizational identity. Moreover, an adequate workforce, medical resources, and support system have been guaranteed by the hospitals. Hospitals quickly completed the echelon construction of nursing staff to ensure sufficient human resources for front-line nursing as well as formulated appropriate roster according to the workload to ensure adequate rest of staff.[21] Meanwhile, online and

Table 1 General Information of Nurses (n=216)

Factors	Subject	Number	Percent (%)
Gender	Male	11	5.1
	Female	205	94.9
Age	≤25 years old	26	12.0
	26–30 years old	73	33.8
	31–40 years old	108	50.0
	41–50	9	4.2
Education	Technical secondary school	1	0.5
	Diploma degree	35	16.2
	Bachelor's degree or above	180	83.3
Work Seniority	0–5 years	65	30.1
	6–10 years	62	28.7
	11–15 years	54	25.0
	≥15 years	35	16.2
Professional title	Under junior	10	4.6
	Junior	115	53.3
	Intermediate	86	39.8
	Senior and above	5	2.3
Position	Nurse	201	93.1
	Nursing manager	15	6.9
Marriage Status	Married	136	63.0
	Unmarried	80	37.0

face-to-face training and assessment on preventive and protection measures were provided for all staff to enhance their self-protection practices. Besides, hospitals and managers made additional efforts to promote career development among medical staff and enhance their sense of organizational identity.

In this study, we observed high levels of psychological resilience among nurses. The average score was 3 points higher than the average score of the theoretical norm, which was similar to the results of oncology nurses reported by Xin Liu.[22] Moreover, Tan et al found that the prevalence of anxiety among non-healthcare workers in Singapore during the COVID-19 outbreak was higher than among medical staff who have higher psychological resilience.[23] This suggests that medical staff might have better emotional management ability and higher adaptability in the face of the difficulties and challenges that are encountered in prevention and control work during a special period. This might be related to multiple measures taken by hospitals to prevent the occurrence of negative emotions among front-line nurses. For example, hospitals arranged comfortable accommodation and enough food for nurses; psychological consultant and life assistant were available to all nurses via WeChat;[24] emotional experience straining courses, such as yoga, peer support programs, meditation, etc., were held to strength nurses' psychological resilience.[25]

Table 2 Nurses' Organizational Identity, Psychological Resilience and Work Engagement Status (n=216)

Subject	Number of Entries	Total Score	Average Score of Entries
Organizational identity	8	36.41±4.85	4.55±0.61
Work engagement	15	68.02±22.96	4.53±1.53
Psychological resilience	25	92.77±13.06	3.71±0.52

Table 3 Relevance of Nurses' Organizational Identity, Psychological Resilience and Work Engagement (*r* Value)

Object	Energy	Dedication	Concentration	Work Engagement
Organizational identity	0.649*	0.661*	0.623*	0.669*
Psychological resilience	0.480*	0.480*	0.457*	0.491*

Note: *$P<0.01$.

Table 4 Index Evaluation System and Fitting Results of Overall Structural Equation Model Adaptability

Fit Index	χ^2/df	GFI	NFI	CFI	RESEA	RMR
Theoretical Model	1.62	0.925	0.958	0.983	0.054	0.019
Regression criterion	<3	>0.9	>0.9	>0.9	<0.08	<0.05

Abbreviations: CFI, comparative fit index; df, degree of freedom; GFI, goodness-of-fit index; NFI, normed fit index; RMSEA, root-mean-square error of approximation; RMR, root of mean square residual.
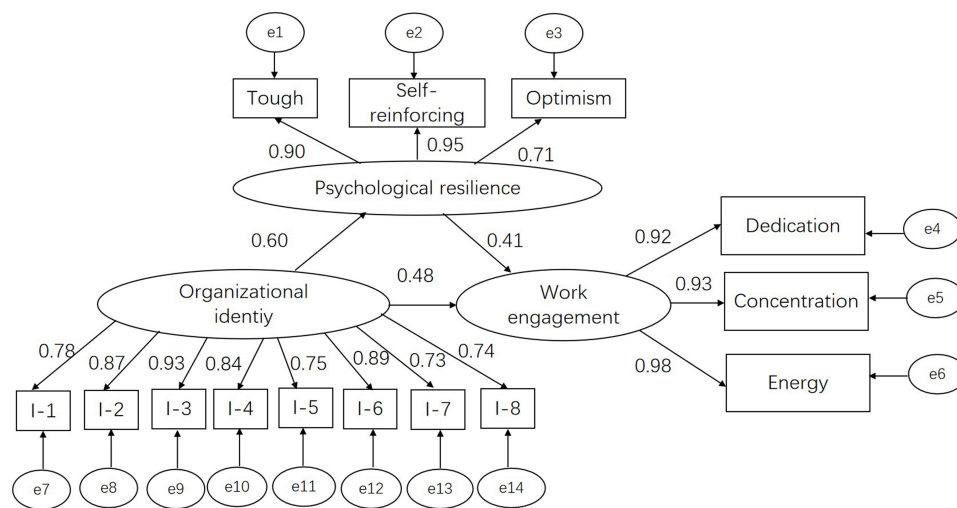
Figure 1 Structural equation model of nurses' organizational identity, psychological resilience and work engagement.
Note: I-1~I-8 illustrate 8 entries of organizational identity.

In the present study, the total average score of front-line nurses' work engagement items was (4.53±1.53), which was 3 points higher than that of the theoretical norm. The total score was also higher than that reported in the previous survey conducted by Chen et al.[26] Because most of the nurses who participated in the front-line work during an epidemic were volunteers or nominated by their organization, they had a good sense of social responsibility and a deep understanding of the significance and urgency of their work. These nurses are dedicated and able to take the initiative and concentrate on the front-line anti-epidemic work.

The Impacts of Organizational Identification and Psychological Resilience on Front-Line Nurses' Work Engagement in Prevention and Control of COVID-19

Our data revealed that organizational identity and psychological resilience were significantly correlated with nurses' overall work engagement and dedication, concentration, and energy (*P*<0.01). Organizational identity implies that the members of an organization identify with the organization in many aspects, including behaviors and ideas. They have the feeling that they own both a rational sense of contract and responsibility in the organization and an irrational sense of belonging and dependence.[27] Dedication, concentration, and energy of different teams are reflected in their work environment.[28] In view of the current complex practice environment during the COVID-19

epidemic, nurses and their level of work engagement are affected by the negative factors of work and organization. If nurses have the support from their leader when coping with difficulties, their energy, sense of dedication, as well as job satisfaction will increase; therefore, they will be more concentrated and active as postulated by the motivational theory.[29] Therefore, during the COVID-19 epidemic, it is necessary for nursing managers to promote the improvement of their leadership as well as a work environment with optimism and self-efficacy, and to improve nurses' work engagement by strengthening their organizational identity.[30]

Our data indicated that psychological resilience was significantly correlated with the overall work engagement of nurses and its various dimensions (*P*<0.01). Psychological resilience refers to an individual's good adaptation process in the face of adversity, trauma, tragedy, threat, or stress.[31] As an essential human characteristic, psychological resilience can prevent work burnout, help improve the mental health of nurses, and improve their practical capacity.[31] A previous study found that psychological resilience is positively correlated with work engagement,[32,] which is consistent with the results of this study. However, psychological resilience is dynamic. When facing complex and high-stress working environment during the epidemic (especially when medical staff is infected during work), nurses experience anxiety, stress, and insomnia.[33] Some studies have suggested that mindfulness meditation and transference skills training can be used to improve nurses' strain capacity and

psychological resilience and promote their work engagement.[6] Thus, managers should provide psychological counseling and other psychological health support for their staff, helping them deal with stressful situations.[5]

The analysis of the structural model showed that the impact of organizational identity on nurses' work engagement was 0.67, and the impact of psychological resilience on nurses' work engagement was 0.49, thus showing a direct positive impact. Besides, organizational identity can also positively affect work engagement through the mediating effect of psychological resilience, with a mediating effect value of 0.25. The overall effect value of work engagement was 0.73, and the mediating effect accounted for 34.2%. This indicated that the front-line nurses' organizational identification with the hospital could directly improve the work engagement. It could also indirectly stimulate nurses to increase the work input through the mediating effect of psychological resilience, which is consistent with the job demands-resources (JD-R) model. This model, which was proposed and introduced into the study of work engagement by Demerouti et al,[10] argues that job demand relates to employee's long-term physical and psychological engagement in work, while work resources represent the support employees receive during work. These two factors are mutually reinforcing. When individuals obtain adequate work resources, their higher organizational identity and psychological resilience are more likely to be stimulated. Therefore, they are more likely to meet job requirements with plenty of enthusiasm and energy. Many studies have also confirmed that mental resilience, as an intermediary variable, has a positive effect on work engagement.[34–36] Zhang et al suggested that the process of psychological change of front-line nurses should be divided into early stage, middle stage, and late stage. Nurses' psychological characteristics may change with time. A nurse manager, who is the leading force in promoting front-line work, should implement different interventions according to nurses' psychological status at different stages so as to improve the psychological adaptation of front-line nurses.[7]

In conclusion, strengthening nurses' sense of organizational identity and improving psychological resilience are the key factors for increasing work engagement and improving patient outcomes. Authentic leadership theory advocates development and cultivation of the positive psychological abilities of leaders and their subordinates.[9] It is recommended to cultivate and develop managers' authentic leadership behavior, not only focusing on organizational factors and process control but also discovering the advantages and characteristics of nurses so as more efficiently use their strengths in the organization, which in turn can also increase their sense of organizational identity. Several studies have shown that the implementation of psychological training, stress management, crisis intervention training, and mindfulness meditation may strengthen psychological resilience, as well as improve the quality of work and nursing service. Given the high infection rate and multiple infectious routs of COVID-19, the front-line nurses, the majority of whom are female, are usually coping with a heavy workload and high-risk factors in prevention and control work.[6,37] Therefore, hospital and nursing managers must consider both organizational factors and personal resources factors to maintain the high work engagement level and high work efficiency among front-line nurses. They are also suggested to pay close attention to nurses' emotional and mental changes, taking effective measures to promote organizational identity and making full use of the mediating effect of psychological resilience in improving work engagement level.

Limitation

The sample size in this study was not large enough, and the factors affecting work engagement are too complex. Besides, there is no description of how the basic characteristics of participants affect the variables. Therefore, the authors are looking forward to verifying the study results by expanding the sample size and the range of effective factors, we also need to study whether and how the basic characteristics of the participants affect the variables in the future.

Conclusion

This new model can be used as a reference for managers in the medical and nursing fields. It could also be used to improve nurses' work engagement level by strengthening nurses' organizational identity and psychological resilience under the COVID-19 pandemic background, thus improving patient safety and outcomes.

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Disclosure

The authors report no conflicts of interest in this work.

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