Preliminary reliability and validity of the Chinese version of the ward organizational features scales for registered nurses.

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Abstract

Background: This study aimed to examine the preliminary reliability and validity of a Chinese version of the Ward Organizational Features Scales (C-WOFS).

Methods: An existing English version of the WOFS was adapted. Translation and back-translation were conducted to ensure linguistic consistency and cultural sensitiveness. The C-WOFS comprises six scales including the Scales of Physical Environment of the Ward, Professional Nursing Practice, Professional Working Relationships, Ward Leadership, Nurses' Influence, and Job Satisfaction. Then a cross-sectional survey was conducted, and 1200 nurses were recruited from four general hospitals in two districts of Shanghai, China. 994 of them completed the survey.

Results: Confirmatory factor analysis of the six originally-specified scales indicated a poor fit to the data. A subsequent Exploratory Factor Analysis (EFA) improved the fit. After EFA, all items in the Scale of Physical Environment of the Ward were retained, and 16 items were removed from the other five scales. Two factors were generated from the original version of one-domain Job Satisfactory Scale, while the domains of the other five scales were the same as those in the original scales. The final version of C-WOFS contained 88 items and 15 subscales, distributed across six scales. The Cronbach's α for each scale and subscale ranged from 0.71 to 0.94.

Conclusion: The preliminary reliability and validity of the C-WOFS is satisfactory and promising to assess and correlate ward organizational features of hospitals in Mainland China. Further psychometric properties of the C-WOFS will be tested and reported.

Introduction

Quality of patient care should be a top priority to nursing managers and hospital administrators. Numerous studies repeated the reliability of nursing staffing promotes quality of patient care [1-3]. However, shortages of nursing human resource, poor retention, and turnover rates have been significant issues in the global nursing community [4,5]. Mainland China is also facing a nursing shortage crisis, due to the increasing need for high quality health care for its large population and to expanding technological advancements in patient care. According to China's Nursing Development Plan in China (2010-2015), the number of registered nurses should be increased to 2.86 million by the end of 2015, implying that there will be 0.81 million vacancies to be filled in during this five-year period. Meanwhile, high levels of dissatisfaction and burnout have been reported among hospital nurses, especially those working in large cities with dense population in China, and the rates of intention to leave their current jobs were high [6-8]. A study conducted in Shanghai investigated 2,250 nurses from 19 general hospitals and found 50.2% of nurses were dissatisfied with their job and 40.4% intended to leave [6].

Improving recruitment, satisfaction and retention are main strategies to promote reliable staffing [9]. In recent years, rather than recruiting new nurses to address staff shortages, managers and policy makers have emphasized strategies for improving work environments to make nurses more willing to stay in the nursing profession, thereby reducing turnover rate and stabilizing nursing teams [10-12]. The American Association of Colleges of Nursing (AACN) and International Council of Nurses (ICN) have advocated that creating positive practice environments is essential for addressing the shortage of nurses [13,14]. In the "High-quality Nursing Service Evaluation Criterion," published in 2014 by China's State Health and Family Planning Commission, hospital administrators and nursing managers were required to create supportive work environments to ensure high-quality care and to satisfy nursing staff. Lake defined the nursing work environment as "the organizational characteristics of a work setting that facilitate or constrain professional nursing practice" [15]. Evidence indicates that a healthy and positive work environment can support nurses to functioning extensively in clinical practice, to work effectively in an interdisciplinary team of caregivers, and to mobilize resources quickly [16].

Studies also found that nurse recruitment, satisfaction, and retention depended on elements of nursing work environments. For example, elements of work environment, such as leadership, staffing and nurse-doctor relationships, workgroup cohesion, quantitative workload, organizational constraints were associated with nurses' job outcomes, including job satisfaction, levels of burnout, retention, and turnover rates [17-19]. A study conducted in mainland China used the Chinese version of Practice Environment Scale of the Nursing Work Index (PES-NWI) to examine the associations of hospital work environments with job satisfaction, job-related burnout, and intention to leave among nurses in Guangdong Province (a southeast province in mainland China) [20]. Their study found that improving nurses' work environments was associated with job dissatisfaction and burnout among nurses [20]. More importantly, the environment where nurses work is also highly associated with the quality of patient care. The main elements of patient care are mortality [21], patient safety [22], and the patient experience of hospital care [22,23].

The main components of nursing work environments involve ward organizational features, which denote physical, social, professional and organizational traits of work environment for clinical nursing in hospital wards [16]. Ward organizational features are integral parts of nursing working environments. Research [17,18,24] found that the role of management, peer relations, availability of equipment, and the physical environment were the main elements of ward organizational features influencing nursing work environment. Studies also found problems with ward organizational features may lead to poor retention, low job satisfaction, and more turnover among nurses [25,26]. However, although practice environment research appeared more than a decade ago in western countries, studies on this topic has been limited in China. It is urgent for hospital administrators, particularly nursing managers to obtain a map regarding factors associated with nursing work environments because problems cannot be resolved, unless they can be efficiently identified. There are several Chinese versions of instruments used in mainland China to assess nursing practice environment, including Chinese versions of the Nursing Practice Environment Scale (C-NPES) [27], the Perceived Nursing Work Environment Scale (C-PNWE) [28] and the Practice Environment Scale of the Nursing Work Index (PES-NWI) [20]. However, to the best of our knowledge, there is no study conducted in mainland China comprehensively assessing ward organizational features and exploring their impact on both nurses' perception to their work and on the quality of care they provide. Moreover, while English-language instrument existing to evaluate ward organizational features [29], no Chinese-language instrument has been developed to take account to the various ways in which nursing systems are operationalized.

The Ward Organizational Features Scales (WOFS), focusing on organizational features at the ward level, were developed by Adams et al. [29]. The development of WOFS was based on interviews with 715 staff nurses in 17 hospitals of the United Kingdom. The WOFS, comprising 14 subscales with 105 items across six scales, was also based on theoretical components which directly influence nursing practice, including nursing participation statues, supportive management, collaborative relationships with physicians, and supportive relationships with peers [16]. The six-scale WOFS measures nurses' perceptions of the following components: ward physical environment, standards of professional practice, ward leadership, professional working relationships, nurses' influence, and nurses' job satisfaction. The nurses' influence scale focuses on the level of job control, latitude in decision-making and autonomy devolved to nurses [29]. Therefore, the WOFS emphasized the importance of measuring nurses' subjective perceptions of the physical work environment, work processes, and job design at the ward level. The results of its psychometric properties were satisfactory. For example, most of scales of the WOFS demonstrated convergent validity across instruments [16]. Because of the WOFS were developed by British scholars in the context of British National Health Service (NHS), whether the instrument is applicable to medical system of main land of China needs examination. Therefore, the current study conducted in mainland China will examine the reliability and validity of the Chinese version of Ward Organizational Features Scale.

Materials and Methods

Study design

A cross-sectional survey was designed.

Setting and sample

The study was conducted in four general hospitals (two Level Two, <1000 beds; two Level Three, >1000 beds) in two districts (Yangpu District and Zhabei District) of Shanghai. We included the registered nurses who were contract or permanent staff of the hospitals and who independently provided direct care to patients. We excluded head nurses of the units and nurse directors of nursing department of the hospitals; nurses not providing direct care for patients; and nurses having training courses or not working independently. We distributed total of 1200 survey packages to nurses who showed interest in participating in the survey. Of those, 944 (78.7%) completed the questionnaires.

The demographic information of the participants (Table 1) was collected using the self-designed questionnaire, including age, gender, education level, the ward currently working at, length of working as a nurse, and years of working at the current ward. From Table 1, most of nurses were female (94.7%), having junior college and higher education levels (70.1%, n=662). Most of them were working at general medical and surgical wards (55.8%, n=527) and the emergency and intensive units (23.4%, n=221). The remaining 20.8% of participants were working at operating room (6.1%, n=58); paediatric wards (5.0%, n=47); haemodialysis rooms (3.0%, n=28); gynaecology wards (2.5%, n=24); obstetric wards (2.4%, n=23); and day surgery rooms of outpatient departments (1.7%, n=16), respectively. The average years of working as a nurse were 10.25 (± 9.47) years (ranging from one month to 36

years); while the average years they have been working at the current wards were 6.02 (± 6.64) years (ranging from one month to 36).

Ethical consideration

We obtained permission to use the standard instruments for the survey from the original authors and obtained ethical approvals (approval number: SHSY-IEC-PAP-15-5) from ethics subcommittee of Tongji University for conducting the study from the designated hospitals prior to the investigation. During the process of data collection, the authors also emphasized the consideration of main ethical issues to the nurses concerned. For example, we described their rights self-determination, anonymity and confidentiality, assured the nurses that the questionnaire data would be kept confidential, and they had the right to withdraw at any time. We also pointed out to participants that their names were not recorded on the questionnaire and that their data could not be accessed by the nurse administrators or the hospitals.

Instruments

We administered the C-WOFS in this study. To guarantee linguistic equivalence appropriateness of the phraseology and cultural sensitiveness, we employed two translators both working in nursing disciplines and also having PhD degrees in nursing science granted by higher education institutions of English language countries. One translator translated the original English-language version into an initial Chinese version of WOFS, and another translator back-translated that Chinese version into an English version. Then they compared the original English-language version and the back-translated English-language version demonstrated the adequacy of the Chinese translation. The cultural sensitiveness was also discussed before determining the initial Chinese version of the WOFS.

The original English version of the WOFS [29] comprises a set of six scales, including Physical Environment of the Ward, Professional Nursing Practice, Professional Working Relationships, Ward Leadership, Nurses' Influence and Job Satisfaction. The scale of Physical Environment of the Ward consists of four subscales including Ward Facilities (5 items), Staff Organization (5-items), Ward Layout (6-items), and Quality of Ward Services (4-items). The Professional Nursing Practice scale includes subscales for Professional Practice (13-items) and Hierarchical Practice (6-items). The Hierarchical practice denotes "a style of nursing characterized by lack of innovation and staff development, where nurses feel disempowered and their work devalued by managers and medical colleagues" [30]. The Scale of Professional Working Relationships comprises three subscales: the subscales of Collaboration with Medical Staff (9-items), Collaboration with Other Health Care Professionals (7-items) and Cohesion Amongst Nurses (10-items). The Nurses' Influence Scale comprises a 10-item Ward Management subscale, a 9-item Timing of Ward and Patient Events subscale, and a 5-item Financial and Human Resources Subscale. The 9-item Ward

Leadership Scale and 7-item Job satisfaction Scale are all one-domain scales. The Job Satisfaction Scale includes both positive and negative statements representing job satisfaction and dissatisfaction, respectively. The negative statements in the scale are reverse-scored. All the scales are rated on a 4-point Likert scale, with responses depending on the contents of the items in the corresponding subscales. Scale values were: 1 (strongly disagree, very bad, very difficult, or never), 2 (disagree, bad, difficult, or sometime), 3 (agree, good, easy, or often) and 4 (strongly agree, very good, very easy, or always). The ratings of these scales and subscales were summed to give a total score of a subscale or scale scores.

Procedure

The first author and correspondence author administered the surveys between 6 November 2012 and 17 April 2013. First, the two authors introduced the study to the nurses before the end of weekly meetings organized by departments of nursing or nursing units at the hospitals, respectively. After meeting, the interested nurses contacted the authors about participating survey and the wards they were working in.

Then six nursing students who had volunteered to assist distributed the survey packages to those nurses in their wards. Each survey package included an introduction describing the purposes of the study; a written informed consent (particularly emphasizing that participation was entirely voluntary, responses were anonymous, and that the nurse's decision to participate in this survey or not would not affect their work at the hospital). Each package also included questionnaires and an envelope with which to return the materials. The survey package was completed about 20 minutes.

All participants volunteered, and written informed consent was obtained prior to completing their questionnaires. Nurses who completed the questionnaires returned their survey packages in sealed envelopes to the nursing students who collected the packages in their ward within one week.

Data analysis

The preliminary data analysis was conducted using SPSS 19.0. We began with an inspection of the distribution of scores for all items of the initial C-WOFS. All items were normally distributed and no item had a skewness value greater than the cut-off value of ± 3 [31]. We therefore, retained all items for Confirmatory Factor Analysis (CFA).

CFA was performed using Amos 17.0 to test whether the factor structure of each scale of the English-language of the WOFS provided a good fit for the research data obtained using the initial version of the corresponding scale of the C-WOFS. We then examined estimates of each model, including negative error variance, excessive standardized coefficients (≥ 1), and negative error variance and large standardized errors [32]. If none of those were present, CFA was carried out on each scale of C-WOFS based on the factor structure of its English version. In CFA, the goodness-of-fit of the model was evaluated using multiple criteria, including: (a) the goodness of

fit index (GFI: >0.90 acceptable, >0.95 excellent) and adjusted goodness of fit index (AGFI: >0.90 acceptable, >0.95 excellent); (b) the root-mean-square error of approximation (RMSEA: <0.08 acceptable, <0.05 excellent); (c) insignificance of chi-square test (χ^2); (d) comparative fit index (CFI: >0.90 acceptable, >0.95 excellent) [33].

If the results showed that each scale was were poor fit of the original model, Exploratory Factor Analysis (EFA) using SPSS 19.0 will be conducted to further modifying the factor structure and to improve fit. Then principal components analysis with varimax orthogonal rotation was employed on each of the six C-WOFS scales to find a satisfactory factor structure. Prior to the principal component analysis, we carried out two item reduction steps. First, we examined the internal consistency analyses of the items with scale and subscales. We removed items, if the Cronbach's alpha was lower than an acceptable value, commonly taken to be 0.7 [34]. Second, to ensure the sample size was suitable for factor analysis, we tested the KMO (Kaiser-Meyer-Olkin) index and Bartlett's test of sphericity. We also examined the correlation matrix for the items of each scale and retained items for the factor analysis, if most of the coefficients were greater than an acceptable value (0.30).

We then subjected the data to principal components analyses with unrotated solutions. We retained a given factor for principal component analysis with varimax orthogonal rotation, if it achieved an eigenvalue of 1 or greater and if the proportion of variance accounted for by the factor was equal to or greater than 5% [35]. We also inspected scree plots to determine how many factors to retain. Subsequently, we applied principal component analyses with varimax orthogonal rotation and examined the loadings and pattern matrix.

To generate the final version of the C-WOFS, the criteria used to remove items included: (a) if the item loading was less than ± 0.04; (b) if items loaded simultaneously on two or more factors [36]; or (c) if the item loaded on a factor which was not relevant to the content of its original scales. In addition, we analysed the internal consistency of each item, as well as that of each scale and subscale. We retained all items with Cronbach's alpha values greater than the acceptable value (0.70).

Results

Confirmatory factor analysis

The results of CFA showed that each scale was were poor fit of the original model, most of the fit indices were less than acceptable values, indicating Exploratory Factor Analysis (EFA) to further modifying the factor structure (Table 2).

Exploratory factor analysis

The values obtained by the Kaiser-Meyer-Olkin test and the Bartlett test and correction matrix for items in each scale showed an adequate sample size (Table 3) and a favourable inter correlation strength to proceed with the factor analysis.

After principal components analyses on each of the six C-WOFS scales, all items in the Scale of Physical Environment of the Ward were retained and 16 items were removed from the other five scales. The reasons for deleting the items were: (a) no loading (one item in the Professional Practice Scale); (b) the item loaded simultaneously on more than one factor (one item in the Ward Leadership Scale, one item in the Job Satisfaction Scale, six items in the Professional Relationships Scale and four items in the Influence Scale); and (c) the item loaded on a factor not related to the content of its original scale (one item in the Ward Leadership Scale, three items in the Job Satisfaction Scale and three items in the Professional Relationships Scale). Compared to the initial version of the one-factor Job Satisfaction Scale, the final version of the scale comprised two factors, representing nurses' perceptions of job satisfaction and job dissatisfaction, respectively.

After EFA, the final version of C-WOFS was generated, including 88 items and 15 subscales distributed across six scales. The pattern matrix of factors, contents of the items, and corresponding factor loadings of each scale are listed as the tables of supplementary material.

The cumulative proportions for the factor(s) in the five scales were increased except for the Scale of Physical Environment of the Ward (Table 4).

Reliability of the C-WOFS

The Cronbach's alpha for each scale and corresponding subscales (Table 5). The Cronbach's α coefficient for the scales and subscales were all over 0.70 (from 0.71 to 0.94).

Table 5 also shows the mean scores for the scales and subscales.

Table 1. Demographic information of participants (N=944).

Total	n (%) or mean (SD)
Female	894 (94.7%)
Age	29.8 (9.63)
Education levels	
Technical and secondary school	138 (14.6%)
Junior college	524 (55.5%)
Tertiary and higher	282 (9.9%)
Ward working at	
General medical wards	325(34.4%)
General surgical wards	202 (21.4%)
Emergency departments	135 (14.3%)
Intensive care units	86 (9.1%)
Other wards	196 (20.8%)

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Length of working as a nurse (year)	10.25 (9.47)		Length of working at the current ward (year)	6.02 (6.64)

Table 2. Fit indices of the factor models of the Chinese version of ward organizational features Scales.

Scales	χ^2	χ^2/df	RMSEA	GFI	AGFI	CFI
Physical environment of the Ward	1232.759***	7.52	0.09	0.86	0.82	0.89
Professional nursing Practice.	1513.386***	9.96	0.1	0.83	0.78	0.85
Ward leadership	215.278***	7.97	0.09	0.94	0.9	0.96
Job satisfaction	633.511***	45.25	0.22	0.79	0.58	0.65
Professional working Relationships	3865.201***	13.06	0.12	0.67	0.61	0.73
Influence	2149.133***	9.47	0.1	0.81	0.77	0.85

Notes: χ^2/df: minimum discrepancy; RMSEA: Root Mean Square Error of Approximation; GFI: Goodness of Fit Index; AGFI: Adjusted Goodness of Fit Index; CFI: Comparative Fit Index. ***p<0.001.

Table 3. Results of the Kaiser-Meyer-Olkin and the Bartlett tests on the Chinese version of ward organizational features scales.

Scale	KMO test	Bartlett test χ^2
Physical environment of the ward	0.91	9330.041***
Professional practice	0.93	8795.650***
Ward leadership	0.77	1803.861***
Job satisfaction	0.94	5047.111***
Professional working Relationships	0.92	10964.071***
Influence	0.94	12483.040***

Notes: KMO test: Kaiser-Meyer-Olkin test, ***p<0.001

Table 4. Cumulative proportions for the retained factor(s) of scales of the initial and final version of C-WOFS.

Scale	Initial version of C-WOFS			Final version of C-WOFS		
	Number of factors	Number of items	Cumulative proportion (%)	Number of factors	Number of items	Cumulative proportion (%)
Physical environment of the ward	4	20	67.10%	4	20	67.10%
Professional practice	2	19	45.50%	2	18	55.60%
Ward leadership	1	9	61.90%	1	8	69.50%
Job satisfaction	1	7	64.00%	2	6	67.40%
Professional working relationships	3	26	56.70%	3	17	66.60%
Influence	3	23	55.90%	3	19	63.70%

Table 5. Cronbach's alpha coefficients and means of the scales and subscales of the final version of the C-WOFS.

Scales and subscales of C-WOFS (number of items, and range of score)	N	Cronbach's alpha	Mean (SD)
Physical environment of the ward (20, 20-80)	789	0.92	39.88 (8.68)
Ward facilities (5, 5-20)	804	0.9	9.71 (2.75)
Staff organization (5, 5-20)	800	0.86	10.51 (2.94)
Ward layout (6, 6-25)	795	0.86	13.30 (3.44)
Quality of ward services (4, 4-16)	815	0.88	8.37 (2.39)
Professional practice (18, 18-72)	888	0.87	41.33 (8.75)
Professional practice (13, 13-52)	889	0.94	28.15 (7.96)
Hierarchical practice (5, 5-20)	888	0.71	13.20 (3.02)

Ward leadership (8, 8-32)	832	0.94	14.42 (4.48)
Job satisfaction (6, 6-24)	924	0.71	16.11 (2.86)
Positive attitude (3, 3-12)	923	0.76	7.06 (1.99)
Negative attitude (3, 3-12)	924	0.72	9.05 (1.64)
Professional relationships (17,17-68)	860	0.9	38.66 (6.85)
Between nurses and medical staff (7, 7-28)	870	0.9	16.15 (4.07)
Between Nurses and other Health Care Professionals (5, 5-20)	887	0.88	13.41 (2.77)
Amongst nurses (5, 5-20)	888	0.88	9.17 (2.93)
Influence (19, 19-76)	804	0.93	46.75 (10.46)
Timing of ward and patient events (8, 8-32)	838	0.87	20.87 (4.55)
Ward management (7, 7-28)	844	0.92	16.77 (4.62)
Human and financial resources (4, 4-16)	804	0.89	9.16 (3.13)

Discussion

This study examined the reliability and validity of the C-WOFS. The results of CFA on the six scales in WOFS failed to confirm the original factor structure for our sample of Chinese nurses. The fit indices for the measurement models were also not good, indicating possibly cultural differences and disparities of medical system and culture between mainland China and the UK. Accordingly, we explored the factor structure of the C-WOFS, using EFA. After EFA, two domains emerged from the original version of one-domain Job Satisfactory Scale, while the domains of the other five scales (Physical Environment of the Ward, Professional Nursing Practice, Ward Leadership, Professional Working Relationships, and Influence) were the same as those in the original scales. Internal consistency estimates of reliability for the C-WOFS were satisfactory and compared favourably to those of the original English version. Therefore, our findings showed that the C-WOFS, as revised based on our preliminary statistical analyses, is promising to be applicable in general hospitals of mainland China.

As the results of EFA, the scale of Job satisfaction in the C-WOFS comprised two factors, representing nurses' perceptions of job satisfaction and job dissatisfaction, respectively. This finding shows that these two concepts mean differently for nurses. This difference may be explained to Herzberg's motivation-hygiene theory [37,38], which investigated the concept of job satisfaction and job dissatisfaction. His study found that motivating factors could bring people's satisfaction, while hygiene factors eliminated people's dissatisfaction [39]. However, the hygiene factors did not bring satisfaction [39]. That is, job satisfaction and job dissatisfaction were independent continua, increasing satisfaction did not necessarily reduce dissatisfaction (and vice versa) [39], because the two factors may depend on different sets of job or work environment characteristics. Many studies on exploring the relationship between factors of work environment or organizational features and nurses' job satisfaction, which were

ignoring the distinction of job satisfaction and dissatisfaction, may bring different outcomes. According to Herzberg's theory [39], the hygiene factors of work environment that impact the nurses job dissatisfaction may induced nurses' burnout, intention to leave, turnover; while the motivating factors of work environment bring job satisfaction may results to the retention and motivate them to provide quality of nursing care to patients and improve the quality of patients care eventually. Therefore, the C-WOFS can be used to further explore the hygiene factors and motivating factors among or related to ward organizational features.

The WOFS focused on nurses' perceptions of important aspects of ward organizational features, rather than all aspects of ward organizational features [29]. These aspects that nurses concerned were related to job satisfaction and or job dissatisfaction, and also influences on their professional practice and quality of care at the ward level. For example, Adams et al. found that high levels of job satisfaction were associated with higher degrees of cohesion among the ward nursing team and higher collaboration with medical staff [40]. Gunnarsdottir et al. also found that higher levels of job satisfaction were associated with more positive perceptions of professional relations [19]. In addition, Shen et al. reported that nurse-physician relationships directly affected quality of care [41]. Djukic et al. also found that several organization factors, such as nurse-physician relations, workgroup cohesion, as well as physical environment, and job satisfaction are directly associated with patient care quality [42].

For the relationship between nurses' perceptions of leadership and job satisfaction, Adam et al. found that perceived leadership remained important, but had weak impact on job satisfaction [40]. However, this finding was different from other research [43-45]. Blake et al. found that effective nursing leadership is important to nurses in paediatric intensive care unit, and also significantly influenced their intent to leave [43]. Similarly, two studies conducted [44,45] in Hong Kong found that leadership was significantly and positively linked to

nurses' job satisfaction and trust to their managers and work engagement, in turn, predicted their perceived quality of unit care. Moreover, evidences have shown a positive association of relational leadership with a variety of patient' outcomes, such as increasing patients' satisfaction [23], decreasing length of hospital stay and adverse events [46]. The inconsistent findings from the studies of Adams et al. and other researchers indicate the further explorations using the C-WOFS [40].

In addition, previous research by WOFS has demonstrated that nursing staffing was associated with nurses' perception of ward organizational environment. Adams et al. found that the number nurses in acute wards was associated with ward organizational systems, a range of care processes and staff outcomes [29]. For example, the nurse/bed ratio had a positive association with nurses' perceptions of their ability to cope with workload, multidisciplinary collaboration and job satisfaction [30].

This ratio was also linked to the way in which nurses organize care provision [47]. Adams et al. reported a strong link between staff stability and standards of professional nursing practice, indicating that staff stability is important for achieving innovative and high quality of practice [47]. However, staff instability undermined nurses' ability to cope with the workload, their cohesion with nursing colleagues, and collaborative working with doctors [30].

These findings are valuable to our future studies on this area because the severe shortage of nursing human resource in China and more job dissatisfaction and burnout were found among Chinese nurses than European nurses [25]. You et al. reported that 61% of Chinese nurses described their work environment as poor or fair compared to 54.9% of European nurses evaluated [25]. In addition, other issues related to dissatisfaction of work environment were reported by Chinese nurses, including less involvement in hospital affairs, unfair chance for promotion and poor physical health which affected their professional practice [20,28]. Therefore, the above related findings identified by the researchers suggest directions of future explorations with the C-WOFS in mainland China.

There are some restrictions in our study. The participants of this study were the nurses from Levels 2 and 3 general hospitals in Shanghai. Nurses working at special hospitals and community health centers were not recruited in our study. To further test the applicability of the C-WOFS, future studies should take into account of this issue and also recruit nurses from other areas of China. As the word limitation of this paper, the findings regarding further psychometric properties, such as concurrent validity and convergent and divergent validity, will be reported in other papers and discussed based on the findings of above-mentioned literature.

Taken together, reliable instruments are valuable for nurse leaders and policy-makers to detect factors influencing nurses' practice both from hospital and wards levels. Compared to other mentioned instruments existing and assessing work environment at hospital level in China, the C-WOFS is promising and complimentary to further exploring the issues inducing nurses to either stay or leave their positions, with consequent impacts on the quality of patient care.

Acknowledgements

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