


BMJ Open Transcultural adaptation and psychometric evaluation of the mainland China version of Nursing Home Survey on Patient Safety Culture Questionnaire: a cross-sectional survey based on 50 nursing homes in China

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ABSTRACT

Objective To provide a validated Chinese-language measurement of the Nursing Home Survey on Patient Safety Culture (NHSOPS) in mainland China. The primary goal is to carry out a transcultural adaptation of the NHSOPS Questionnaire into Chinese and evaluate its psychometric properties.

Design A psychometric evaluation study is constructed. First, the ‘translation–back-translation–cultural adaptation’ and the pretesting procedure were followed to introduce the NHSOPS. Second, a cross-sectional survey was used to assess the psychometric properties for the mainland China version of the NHSOPS (M-NHSOPS), and a test–retest survey was then applied.

Setting and participants The survey was carried out among 1397 nursing home staff from 50 nursing homes in Southwest China.

Outcome measures Exploratory factor analysis (EFA) was used to assess the potential structure, and confirmatory factor analysis (CFA) was then applied. Reliability was assessed by the content validity index, Cronbach’s α and the test–retest value.

Results Among the 1397 respondents, 1211 were included (86.7%). EFA was used, and a nine-factor structure was explored. Five factors (Cronbach’s $\alpha > 0.6$) were selected into the new structure for the M-NHSOPS. Moreover, data showed that it was suitable for CFA, and convergent validity and discriminant validity were satisfactory. On the other hand, M-NHSOPS contains five dimensions and 22 items. The overall Cronbach’s α value was 0.883; the values of each dimension ranged from 0.648 to 0.913. Additionally, content validity showed significant performance. Eventually, test–retest reliability was 0.892, and each dimension was 0.713, 0.809, 0.924, 0.795 and 0.859, respectively ($p < 0.001$).

Conclusions M-NHSOPS has acceptable reliability and satisfactory validity among staff of nursing homes in Southwest China, and further verification among samples in other regions of mainland China is required.

INTRODUCTION

Preventing incidents such as medication errors and misconducts are of paramount

Strengths and limitations of this study

- Well-applied translation and cultural adaptation process.
- Clarified inclusion criteria for different staff of the scale.
- Relatively abundant sample size.
- Further verification among samples in other regions of mainland China is required.
- Further explorations of patient safety culture connotations in nursing homes in mainland China are recommended.

importance in elderly care institutions,¹ and patient safety culture (PSC) refers to the prevailing attitudes, beliefs, values and behaviours of employees formed by health institutions to achieve the goal of patient safety.² The inverse association between PSC and adverse event occurrence was proved.³ Thus, PSC has been accepted as an essential quality indicator across all health-care settings.⁴ For improvement, the most common approach has been to develop or introduce reliable PSC assessment tools in specific countries and then conduct cross-sectional surveys in organisations.

As mentioned above, assessing the current situation and identifying the weak aspects of organisations are regarded as the most challenging procedures.⁵ Correspondingly, a reliable tool is a prerequisite for reliable assessment. On one hand, up to now, research on the evaluation of PSC has largely been confined to hospitals.⁶ Numerous tools such as Safety Attitudes Questionnaire (SAQ) and Hospital Survey on Patient Safety Culture (HSOPS) were developed. SAQ and HSOPS have been widely introduced, such as

in Norway,^{7,8} Greece⁹ and China^{10,11}. On the other hand, some pieces of evidence showed that nursing homes (NHs) are at high risk.¹² Residents in NHs have multiple health problems and require advanced medications. Some of them even have cognitive impairments, which leads to increased potential risks.¹³ However, previous research for PSC on NHs has been lacking.⁴

Despite increased advocacy of use of PSC in NHs in recent years, efforts in evaluating PSC in NHs, primarily available tools, are still lacking.¹² In 2008, the Agency for Healthcare Research and Quality (AHRQ) developed a specific tool—Nursing Home Survey on Patient Safety Culture (NHSOPS) for NHs,¹⁴ which had previously developed HSOPS. Subsequently, NHSOPS has also been validated into different regions and cultures, including Norway,¹⁵ France,¹⁶ Switzerland¹⁷ and Spain¹⁸. In mainland China, NHs are categorised by the government into three types: NHs hosted and managed by government party (named as type A in this research), hosted by the government but managed by the non-government party (type B) and hosted and managed by the non-government party (type C).¹⁹ Research suggests that the government-owned nursing homes still enjoy more benefits than private organisations in staffing, funding and insurance.²⁰ However, at the same time NHs are still occasionally associated with safety risks. The Chinese NH industry is under initial development, and the quality varies among different NHs in comparison with developed countries.²¹

Recently, two Chinese versions of NHSOPS were reported in 2016 and 2017.^{12,22} For Xiao's²² version in mainland China, the sample size was insufficient ($n=322$), and it lacked consideration of staff classification, content of scale and applicability of certain items. Furthermore, there are numerous differences between mainland China and Taiwan versions including¹² dialects, subcultures, functions, classifications of NHs, types of professionals in NHs, staffing proportions of professionals in different kinds of NHs and different development levels of NHs.^{23–25} Accordingly, NHs in mainland China are still in urgent need of a reliable and validated Chinese version of an assessment tool to evaluate their psychometric properties to have baseline data on the PSC of NHs in mainland China.

In this study, we focus on the intercultural adaptation of NHSOPS into the mainland based on data from 50 NHs in Southwest China and evaluation of its psychometric properties.

METHODS

The NHSOPS contains 42 items focused on 12 dimensions: teamwork, staffing, compliance with procedures, training and skills, non-punitive response to mistakes, handoffs, feedback and communication about incidents, communication openness, supervisor expectations and actions promoting resident safety, overall perceptions of resident safety, management support for resident safety and organisational learning.¹⁴ Two overall rating

questions are at the end of the scale. The total score ranges from 0 to 210; the higher scores represent a superior safety culture in the organisation. Copyright of the original scale (utilisation and translation) was attained in October 2015 from the AHRQ.

This study was conducted in two phases: an initial phase involving the translation and cultural adaptation of the questionnaire and a second phase in which the psychometric properties of the questionnaire were evaluated.

Translation and transcultural adaptation of NHSOPS in mainland China

A cross-cultural adaptation procedure was conducted: translation, back-translation, cultural adjustment and pretesting. The first stage was to translate the original scale into Chinese by two independent native postgraduates with fluency in English. Both graduates majored in nursing and had sufficient understandings on PSC. In the second stage, a professor from evidence-based medicine who had been focusing on the research of PSC synthesised the two Chinese versions into one. Two bilingual translators with no medical backgrounds then translated it back to Chinese separately. Both of them were blind to the questionnaire. A geriatric nursing professor examined the equivalence of context and semantics by comparing the back-translated versions with the original one and checking if it was translated accordingly.

The cultural adaptation process included three parts, with three rounds of group meetings, two rounds of expert consultations and a pilot test. It is recommended by the User's Guide developed by AHRQ for international translators that group meetings focused on translation and adjustment should be used to make a superior cultural adaptation.¹⁴ The research team members included three PhD students, four master's students in geriatric nursing and two master's students in evidence-based medicine. The criteria for inclusion of experts were (1) having relevant experience of safety culture, elderly care, elderly patient management, hospital management, NH management or public health; (2) with more than 10 years of relevant experience; and (3) informed consent. Nineteen experts participated in two rounds of consultations, and all were from the Sichuan Province of China. Their age ranged from 40 to 60, and only one expert was above 60; three (15.8%) of them have worked for 10–19 years, four (21.1%) for 20–29 years and 12 (63.3%) for over 30 years; three (15.8%) of them graduated from junior college, nine (47.4%) were undergraduates, four (21.1%) have master's degrees and three (15.8%) have doctoral degrees; seven (36.8%) of them were head nurses in hospitals, three (15.8%) were deputy head nurse in hospitals, one (5.3%) was in the management layer of the nursing department in a hospital, three (15.8%) were from Sichuan Association of Senior Services, three (15.8%) were in the management layer of NHs, one (5.3%) was a professor of nursing and one (5.3%) was a professor of statistics. Eventually, a pilot test was conducted by querying 200 care providers in NHs

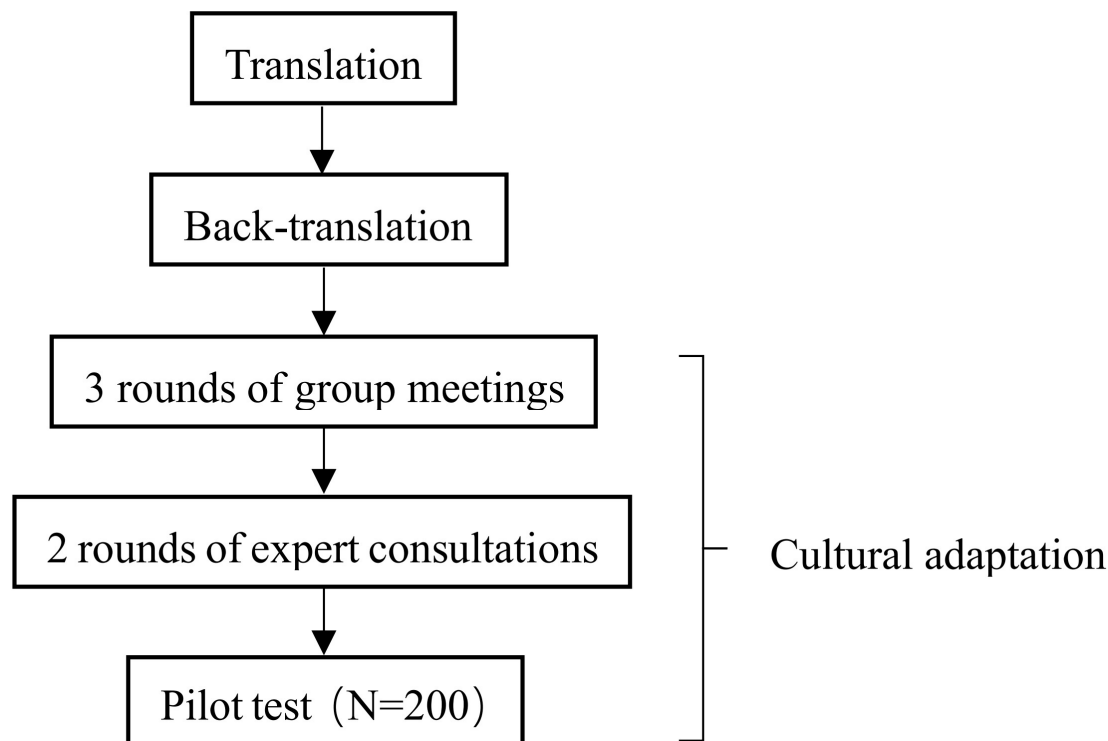


Figure 1 Translation and cultural adaptation process.

to complete the survey (three NHs in Xindu District of Sichuan Province), and no difficulty in understanding or responding was reported. The translation and adaptation process is shown in [figure 1](#).

Psychometric validation of mainland China version of the NHSOPS (M-NHSOPS)

This cross-sectional study was conducted in Sichuan Province, Southwest China, from 2016 to 2017. Initially, we contacted three NHs and pilot-tested a subgroup ($n=200$). Based on the research information, we then accessed each type of NH (A, B and C) from 20 administrative regions. Theoretically, at least one type of NH (A, B and C) should be extracted for each area.

In this study, 50 NHs were enrolled, and 1397 staff were invited. Inclusion criteria were (1) personnel who provide direct care service to the elderly in NHs, (2) working full time and (3) informed consent and voluntary participation. Exclusion criteria were (1) staff who are absent or leaving the NH and (2) internship or trainee. Questionnaires were distributed by the research team and checked immediately after completion by respondents. In case of failed completion for certain items, members of the research team would remind them for completion. Questionnaires were excluded if their missing value is $> 20\%$ from this survey. To evaluate test–retest reliability, a subgroup ($n=30$) completed the survey twice on day 0 as well as on day 14. This study was approved by the institutional review board of the West China Hospital, Chengdu, China.

Statistical analysis

Data were analysed by SPSS V.24.0 and AMOS V.19.0, and $p < 0.05$ was considered statistically significant in two-tailed tests. The general characteristics of our volunteer NHs and respondent staff were described by means (SD) or frequencies of categorical items.

Expert consultations were analysed by the recovery rate and content validity index (CVI). This measurement includes item-level I-CVI and scale-level S-CVI. The S-CVI at the scale level also includes average S-CVI (S-CVI/Ave) and universal agreement S-CVI (S-CVI/UA). Exploratory factor analysis (EFA) was applied to explore the potential structure. In EFA, the Kaiser-Meyer-Olkin (KMO) value, Bartlett's χ^2 value, df value, the value of variance, eigenvalues and factor loading were calculated to indicate the properties of the new model. A further factor structure was developed with factors whose Cronbach's α is > 0.6 . The confirmatory factor analysis (CFA) was used to test if this factor structure was suitable and, at the same time, convergent validity and discriminant validity were explored. Pearson correlation coefficient was used to calculate the retest reliability. Cronbach's α coefficient was used to assess the reliability of the scale.

Inclusion criteria of items and dimensions of the M-NHSOPS

In this study, EFA was first applied to explore the original structure of the data set, and a preliminary factor structure was obtained, and the validity of each factor was explored. Factors whose Cronbach's α is > 0.6 and item loading is > 0.5 were then selected as the new structure for M-NHSOPS.

Table 1 Characteristics of the nursing homes (NHs) (n=50)

Areas	Type A (no. of NHs/no. of staff)	Type B (no. of NHs/no. of staff)	Type C (no. of NHs/no. of staff)	Total of staff
Qing Yang	1/70	1/40	1/10	120
Cheng Hua	1/24	–	2/ (14/17)	55
Jin Jiang	–	–	2/ (19/13)	32
Jin Niu	–	1/19	1/29	48
Wu Hou	–	–	1/17	17
Gao Xin	1/23	–	–	23
Du Jiangyan	1/57	–	2/ (12/10)	79
Shuang Liu	1/7	1/40	1/20	67
Long Quan	1/51	1/44	1/39	134
Xin Du	1/130	1/68	1/26	224
Pi Du	1/10	–	2/ (36/24)	70
Peng Zhou	1/17	–	1/9	26
Chong Zhou	1/9	–	1/12	21
Da Yi	1/48	1/8	1/11	67
Qiong Lai	1/8	1/8	1/10	26
Pu Jiang	1/5	1/12	–	17
Xin Jin	1/9	1/17	1/9	35
Jin Tang	1/12	1/12	–	24
Qing Baijiang	1/9	1/26	1/6	41
Wen Jiang	1/27	1/17	1/30	74

RESULTS

Translation and transcultural adaptation

The M-NHSOPS contains five dimensions and 22 items. The original dimensions ‘staffing’ (A3, A8, A16 and A17), ‘training and skills’ (A7, A11 and A13), ‘non-punitive response to mistakes’ (A10, A12, A15 and A18) and ‘communication openness’ (B7, B9 and B11) were deleted from M-NHSOPS. Items such as A4, A9, B4, B5, B8, C1, C2 and D3 were also deleted. The M-NHSOPS Scale retains the 5-response Likert Scale and ‘Does Not Apply or Don’t Know’ options as well as two overall evaluation items. Further details are shown in online supplemental appendices 1 and 2.

Of the 1397 questionnaires distributed, 186 questionnaires were excluded since over 20% of items were missing, resulting in a total of 1211 responses (86.7% response rate).

Characteristics of enrolled NHs and participants

Among the 20 administrative areas, nine have all types of NHs, eight have two types that contain at least a type A or a type B NH and three areas have only one kind of NH in which two regions have only type C NHs. The respondents from these facilities ranged from 17 to 224. Additional details are shown in [table 1](#).

Most staff were from type A NHs (42.6%), and 77.3% of them were women. The age ranged from 18 to 80 (42.05±13.04), and those between 46 and 60 comprised

Table 2 Characteristics of the respondents (n=1211)

Characteristics	N (%)
Type of facility	
A	516 (42.6%)
B	322 (26.6%)
C	373 (30.8%)
Sex	
Man	275 (22.7%)
Woman	936 (77.3%)
Age (years)	
18–40	497 (41.0%)
40–60	572 (47.3%)
60–80	142 (11.7%)
Education	
Illiteracy	73 (6.0%)
Primary school	201 (16.6%)
Middle school	320 (26.4%)
High school	95 (7.8%)
Technical secondary school	72 (5.9%)
Junior college	253 (20.9%)
Undergraduate	176 (14.5%)
Master’s degree and above	21 (1.7%)
Position	
Management layer	198 (16.4%)
Doctor	138 (11.4%)
Nurse	186 (15.4%)
Nursing assistant	659 (54.4%)
Others	30 (2.5%)
Professional licenses	
Paramedical staff	
Yes	271 (22.4%)
No	940 (77.6%)
Elderly care assistant staff	
Yes	357 (29.5%)
No	854 (70.5%)
Number of years in nursing home	
< 1 year	147 (12.1%)
≥1 year	1064 (87.9%)
Working hours per week	
< 40 hours	107 (8.8%)
≥40 hour	1104 (91.2%)

the majority. Merely 14.5% of them were undergraduates, and 1.7% of them had acquired a master’s degree. Nursing assistant (54.4%) was the most prominent composition in NHs. Additional details were shown in [table 2](#).

Table 3 Factors and item loadings explored by exploratory factor analysis

Factor number	Items included	Item loadings
1	D6	0.808
	D5	0.774
	D8	0.770
	D9	0.755
	D10	0.734
	D1	0.727
	D7	0.703
	C3	0.644
	D4	0.603
	D2	0.569
2	B3	0.801
	B1	0.779
	B2	0.776
	B10	0.680
	B6	0.513
3	A2	0.844
	A1	0.838
	A5	0.690
4	A11	0.699
	A7	0.653
	A9	0.505
5	B5	0.840
	B8	0.815
6	A6	0.761
	A14	0.693
7	A18	0.658
	C1	0.541
8	B9	0.703
	A17	0.566
9	A10	0.766
	A8	0.626

VALIDITY

Structural validity

To explore the most suitable factor structure of the scale, we applied EFA. Principal component analysis and the maximum variance method were used. Factors with eigenvalues above one were selected, while items with the maximum factor loading value <0.5 and those with double loading were deleted. The KMO value was 0.928, and Bartlett's test of sphericity was significant ($\chi^2=20882.645$, df value was 861 and $p<0.001$), and it accounted for 58.096% of the variance. As a result, nine factors were precipitated. Additional details are shown in [table 3](#).

Based on EFA, a new five-factor structure was formed, of which all factors' Cronbach's α was above 0.6. To test the new structure, CFA was used for which Chi-square/

df (CMIN/df)=2.631, root mean square residual (RMR)=0.026, goodness-of-fit index (GFI)=0.967, adjusted goodness-of-fit index (AGFI)=0.952, normed fit index (NFI)=0.965, relative fit index (RFI)=0.955, incremental fit index (IFI)=0.978, Tucker–Lewis index (TLI)=0.971, comparative fit index (CFI)=0.978 and root mean square error of approximation (RMSEA)=0.037. All items were identified to have a five-dimensional construct with 22 items. Additional details are displayed in [tables 4 and 5](#), respectively.

RELIABILITY

Expert consultation related indicators and content reliability

Two rounds of expert consultations were used to localise the scale, and recovery rates of two rounds were 100%. The CVI was used to assess the fitness between the content to be measured and the content measured. In this study, except for A6 and B10 (both I-CVI values were 94.7%), all values of remaining items were 100%. The S-CVI/UA was 95.2%, and S-CVI/Ave was 99.4%.

Reliability analysis

Values of reliability were calculated on the nine factors extracted by EFA, and Cronbach's α ranged from 0.366 to 0.913. The overall Cronbach's α value of the mainland China version scale was 0.883. Additional details are displayed in [table 6](#).

Test–retest reliability

The Pearson correlation coefficient was applied to calculate test–retest reliability. We retested 30 employees in a NH after a 0–14 interval. The test–retest reliability was 0.892, in which each dimension was 0.713, 0.809, 0.924, 0.795 and 0.859 ($p<0.001$).

DISCUSSION

In the translation period, there were 42 items, which was similar to Xiao's study,²² Taiwan and China versions,¹² and French version,¹⁶ compared with the Norwegian version with 43 items¹⁵ in which it split item B3, 'we have all the information we need when residents are transferred from hospital', into two items. Quality of translation and cultural adaptation were guaranteed by translation, back-translation and cultural adaptation process. Additionally, we used data from the expert consultations to explore content validity. The recovery rates of two rounds were high, indicating the active participation of experts in this study. All I-CVI data were higher than 0.78 for three and more experts.²⁶ The values of S-CVI/UA and S-CVI/Ave were ≥ 0.8 and ≥ 0.9 , respectively, indicating exceptional levels.²⁷ All indicators above showed that the M-NHSOPS has satisfactory content validity.

The recovery rate was significantly higher than the French version of 58.4%,¹⁶ the Norwegian version of 69%¹⁵ and the Swiss version of 66%.¹⁷ However, it was lower than Xiao's study of 92.3%²² and the Taiwan and

**Table 4** Convergent validity analysis table

Factor no.	Items	Factor loading	Reliability coefficient	Measuring error	Composite reliability	Average variance extracted
1	D1	0.724	0.524	0.476	0.917	0.527
	D2	0.588	0.346	0.654		
	C3	0.661	0.437	0.563		
	D4	0.614	0.377	0.623		
	D5	0.792	0.627	0.373		
	D6	0.826	0.682	0.318		
	D7	0.703	0.494	0.506		
	D8	0.785	0.616	0.384		
	D9	0.792	0.627	0.373		
	D10	0.733	0.537	0.463		
2	B1	0.772	0.596	0.404	0.854	0.543
	B2	0.829	0.687	0.313		
	B3	0.795	0.632	0.368		
	B6	0.577	0.333	0.667		
	B10	0.685	0.469	0.531		
3	A1	0.867	0.752	0.248	0.826	0.621
	A2	0.887	0.787	0.213		
	A5	0.570	0.325	0.675		
5	B5	0.815	0.664	0.336	0.855	0.748
	B8	0.912	0.832	0.168		
6	A6	0.658	0.433	0.567	0.658	0.491
	A14	0.741	0.549	0.451		

China versions of 100%.¹² The recovery rate in this study is relatively satisfactory. In this study, the average age of participants was (42.05±13.04), and staff aged from 60 to 80 accounted for 11.7%, while in the French version,¹⁶ only 7.2% of respondents were aged above 56. In Taiwan and China versions, the average age was (37.7±10.5).¹² This result emphasises that respondents in this survey are considerably senior than those in other studies. Illiteracy accounted for 6.0%, and staff whose educational background ranged from primary to high school comprised 50.9%. However, in Taiwan and China versions,¹² there was no illiterate staff, and individuals who have graduated from elementary to high schools were 36.6%, and those who have diplomas and bachelor or higher degrees were 62.4%. In brief, staff in Chinese NHs were lower educated than those in other studies.²⁸ Additionally,

staff who worked in NHs for less than a year comprised 12.1%, while in Cappelen's study, it was 6.3%.¹⁵ Staff who worked at least 40 hours/week comprised 91.2%, while in Cappelen's study, those who worked at least 35.5 hours/week comprised 16.1%. These indicate that staff in this study have less working experience while experience greater overtime than in other regions.

EFA explored a nine-factor structure with 31 items included. The value of KMO indicates sufficient

Table 5 Convergent validity and discriminant validity

Factor number	1	2	3	5	6
1	0.527				
2	0.375	0.543			
3	0.180	0.082	0.621		
5	0.073	0.158	0.019	0.748	
6	0.080	0.156	0.023	0.009	0.491

Table 6 Cronbach's α values of the nine factors

Factor number	Included items	Number of items	Cronbach's α
1	D1/D2/C3/D4/D5/D6/D7/D8/D9/D10	10	0.913*
2	B1/B2/B3/B6/B10	5	0.851*
3	A1/A2/A5	3	0.797*
4	A7/A9/A11	3	0.565
5	B5/B8	2	0.851*
6	A6/A14	2	0.648*
7	A18/C1	2	0.393
8	B9/A17	2	0.422
9	A8/A10	2	0.366

*Cronbach's $\alpha > 0.6$

intercorrelations, and the value of Bartlett's test of sphericity demonstrates that the data were ideal for factor analysis. Moreover, the cumulative contribution rate of this study that was over 40% indicates satisfactory construct validity. Comparing the nine-factor structure with the original US scale, four original dimensions (nine items) were deleted (staffing, non-punitive response to mistakes, communication openness and training and skills). The deletion of 'staffing' may be due to the proportion of staffing and the educational background of employees, for which 54.4% of the respondents were nursing assistants and 62.8% received lower education than secondary/high school. In brief, the majority of them have less/no staffing or management-relevant knowledge/experience, and the concept of workplace competition has not appeared to be instilled,²⁹ which prevents them from participating in the staffing/management of the NH. Besides, due to the general management culture in China, there exists strict leadership hierarchy between superiors and subordinates in which management layers tend to be exclusively in charge of such kind of staffing matters,³⁰ and most employees perceive themselves not being in the position to intervene with the upper management. The removal of 'non-punitive response to mistakes' and 'communication openness' may be related to the fact that the 'learn from error' climate and 'open communication' have not been well developed in domestic organisations.³¹ The original dimension 'training and skills' was deleted, which indicates that most staff in NHs have received little training in elderly care. China is in urgent demand of good-quality and well-structured training schemes for all types of staff.³² To check the performance of the new five-factor structure of M-NHSOPS, CFA was applied. All values of GFI, AGFI, NFI, RFI, IFI, TFI and CFI were above 0.9,³³ while CMIN/df was less than 3, RMSEA was less than 0.08 and RMR was less than 0.05,³⁴ which indicates the five-factor structure fits excellently. All values of composite reliability (CR) of the five dimensions were higher than 0.6, which means they achieved the required level.³⁵ All values of average variance extracted (AVE) were above 0.5, indicating satisfactory construct reliability and adequate convergent validity.³⁶ For factor six, despite its AVE value being less than 0.5, its other indicators were satisfactory—factor loadings of the two items were 0.658 and 0.741, respectively, and CR value was 0.658; hence, it was kept in the M-NHSOPS Scale. The square between the respective constructs was less than the square of AVE for the construct that achieved the discriminant validity of M-NHSOPSC.³⁵

In M-NHSOPS, factor one was named 'perceptions of resident safety and related administrative support', which included 10 items (D1/D2/C3/D4/D5/D6/D7/D8/D9/D10). Its Cronbach's α value was 0.913, and item loading ranged from 0.569 to 0.808. It was a combination of three original dimensions 'overall perceptions of resident safety', 'management support for resident safety' and 'organisational learning'. This combination of dimensions is consistent with the composition of factors in the

Norwegian version.¹⁵ However, there was a minor difference: in M-NHSOPS, item D3 was replaced by C3 in the Norwegian version. The composition of the three dimensions in both studies indicates that there exists homogeneity between 'organisational learning' and 'management support for resident safety' in some cultures. Factor two was named 'handoffs' containing five items (B1/B2/B3/B6/B10). Its Cronbach's α value was 0.851, and item loading ranged from 0.513 to 0.801. Items B1/B2/B3/B10 belong to the original dimension 'handoffs', while B6 'staff tell someone if they see something that might harm a resident' belongs to the original dimension 'feedback and communication about incidents'. This can be viewed and explained such that the staff would closely and actively communicate with each other on any potential safety hazards, for which they consider such in-time communication as essential and valuable. Factor three was named 'teamwork' and contained three items (A1/A2/A5). Its Cronbach's α value was 0.797, and item loading ranged from 0.690 to 0.844. The original dimension 'teamwork' contained all three items above and item A9 'when someone gets really busy in this nursing home, other staff help out'. However, in M-NHSOPS, A9 was deleted since in the context of Chinese cultures assisting colleagues is merely a favour and not an individual's responsibility in terms of workplace regulation or ethics. Moreover, factor five was named 'feedback and communication about incidents' and included two items (B5/B8). Its Cronbach's α value was 0.851, and item loading ranged from 0.815 to 0.840. The original dimension 'feedback and communication about incidents' included four items, which were B5, B8, B4, 'when staff report something that could harm a resident, someone takes care of it', and B6 'staff tell someone if they see something that might harm a resident'. B6 was merged into factor two 'handoffs', while B4 was deleted automatically from the original nine-factor structure. Eventually, factor six was named 'compliance with procedures' and contained two items (A6/A14). Its Cronbach's α value was 0.648, and item loading ranged from 0.693 to 0.761. In the original dimension 'compliance with procedures', A4 'staff follow standard procedures to care for residents' was included. The deletion may be due to lack of standard procedures to care for residents in most of the NHs in mainland China as well as lack of national/provincial standard for determining the quality of care in NHs.³⁷

In this study, the value of Cronbach's α that is > 0.6 is considered reliable,³⁸ Cronbach's α that ranges from 0.7 to 0.8 is deemed to be acceptable and Cronbach's α that is > 0.8 is considered adequate.³⁹ The overall Cronbach's α of the scale was 0.883. It was close to Xiao's study²² but lower than Taiwan and China versions.¹² Cronbach's α value of dimensions of M-NHSOPS ranged from 0.648 to 0.913, illustrating exceptional reliability and satisfactory internal consistency. The recovery rate of the test-retest experiment was 100%, and all values of the total scale and every dimensions were above 0.7, indicating that the test-retest survey has satisfactory performance on validity.⁴⁰

M-NHSOPS has five dimensions and 22 items, while Taiwan and China versions has four dimensions with 29 items.¹² There exist 17 identical items between versions above; however, they have different compositions of dimensions. This result confirms the differences between mainland China and Taiwan, which is mentioned in the introduction.^{23–25} Moreover, Lin's study was applied among 309 staff in 30 long-term care facilities, and the sample size was smaller than that in the present study. Similarly, significant differences were shown between M-NHSOPS and Xiao's²² version: (1) 23 items were included in Xiao's result, and 22 items were included in M-NHSOPS; (2) in Xiao's study, it merely has 13 identical items with items included in M-NHSOPS; and (3) there are six dimensions in Xiao's research while five dimensions in M-NHSOPS. Moreover, the compositions of each dimension are entirely different. The differences can be explained by the various inclusions of participants between these two studies: (1) the sample size in Xiao's research was too small and merely included six NHs and 322 respondents; (2) in the pilot study, we found that the employees, such as support staff, securities and canteen staff who do not directly provide care service to the elderly, have insufficient understanding and integration of PSC as they do not participate in daily care routine; (3) the scale contains a large number of items related to the care for the elderly, which makes it difficult for the non-direct care provider to respond; and (4) sampling in Xiao's study showed that medical staff accounted for most significant proportion (professional medical staff was 67.7%, while the nursing assistant was 25.8%). However, in Chinese NHs, nursing assistants comprise the largest workforce.⁴¹ In brief, there still lacks sufficient evidence that the inclusion of all staff types in Chinese NHs is practical and applicable at present, even though the original developer suggested otherwise.¹⁴ Regarding this, both the Taiwan and China versions,¹² and this study merely included direct care providers in organisations. Comparatively, in this study, the inclusion criteria of staff fit the staffing situation in mainland China better, and the sample size is relatively adequate.

Sampling was based on both geographical locations and types of NHs. Researchers attempted to include all possible types of NHs in each area except in case no exact sort of NH exists or the only NH in this type refuses to participate. Thus, a total of 50 NHs were enrolled, of which 17 (34.0%) were type A organisations, 12 (24.0%) were type B and 21 (42.0%) were type C. It shows that the sampling in this study was evenly distributed and relatively representative. Similarly, as for staffing in NHs, the average number of employees in type A was 30.4 per institution, in type B 26.8 and in type C 17.8. The staffing in private organisations is comparatively insufficient than the other two types of NHs, and this result is consistent with previous literature reviews in the introduction.²⁰ However, our study also has some limitations: first, the sample was only from NHs in Southwest China. Further verification of M-NHSOPS on a large sample size

elsewhere in China is recommended. Second, this study merely used quantitative research to explore the PSC in NHs in mainland China. However, qualitative research methods are also recommended to be combined in further research to complete the connotations of PSC in Chinese NHs.

CONCLUSION

We introduced the NHSOPS Scale into mainland China with a well-applied cultural adaptation process and validated it with a relatively adequate sample size. This study first clarified the inclusion of types of staff in NHs for use of the scale. M-NHSOPS has five dimensions and 22 items, with excellent reliability and validity, making it acceptable and useful. However, further verification among samples in other regions of mainland China is recommended.

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