

# Quality of life domains of most importance to nursing home residents: a case study in Shanghai city

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## Research Article

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## Abstract

**Background:** Since the new Chinese leader took office in 2013, an increasingly large number of nursing homes (NHs) in China have undergone culture change transformations intended to enhance the quality of life (QOL) of the elderly. However, current reform measures are primarily based on political and philosophical concepts. As a consequence, the pace of cultural change has been slow. Empirical evidence that identifies necessary improvements in elder care will quicken the transformation of NHs.

**Methods:** This was a cross-sectional descriptive study that employed a face-to-face survey. A total of 310 elder residents from three NHs undergoing cultural reform in Shanghai, China were included in this study. Elderly residents' QOL in 11 domains was examined using the Quality of Life Scale for Nursing Home Elders. The domains included comfort, security, meaningful activities, relationships, function, food enjoyment, privacy, dignity, autonomy, individuality, and spiritual well-being. Hierarchical linear regression was used to identify the predictors of elder satisfaction. The collected data were analyzed using SPSSAU and Excel 2010.

**Results:** After setting cognitive and functional abilities as control variables, of the 11 QOL domains, relationships ( $\beta = 0.15, p < .05$ ), dignity ( $\beta = 0.38, p < .01$ ), and food enjoyment ( $\beta = 0.26, p < .05$ ) remained positive predictors of overall satisfaction. Additionally, dignity ( $\beta = 0.35, p < .05$ ) and autonomy ( $\beta = 0.30, p < .05$ ) were significantly related to elder satisfaction with nursing services and epidemic control.

**Conclusions:** Finally, the importance of dignity, food, relationships, and autonomy for elderly resident satisfaction was established. Among them, dignity had the most significant influence on residents satisfaction, which should be the primary focus of current measures to enhance the QOL of elder residents. Based on empirical results, this study provides effective theoretical supports and practical suggestions for NH cultural change.

## Background

Like many western developed countries, China in the 21st century also faces an increasingly serious problem, population aging. This problem is concomitant with China's rapidly developing economy and international influence [1-3]. By the end of 2020, the number of Chinese elders aged 65 and older had reached 190.64 million, which was 13.5% of the total population [4]. It is estimated that the number of aged will exceed 400 million in 2030, which will be 25% of the national population [5]. Because of the direct influence of population aging and the one-child policy, the traditional way in which families provided for the aged is becoming increasingly untenable. The role of the family has been gradually socialized, with increasing demand by the elderly for access to nursing homes (NHs) [6].

Since 2013, the new government have introduced a series of policies for the reform of NHs, aimed at improving the quality of Life (QOL) of elder residents. These policies and regulations were identified as "culture change" by many researchers [7-9]. For example, in 2013, the State Council issued: "Several Opinions on Accelerating the Development of Aged Care Service Industry" and in December of the same year, a document entitled: "Notice of the Ministry of Civil Affairs on Piloting the Reform of Nursing Homes" was also introduced, with the first pilot work officially implemented in Shanghai, Beijing, and Hangzhou, among other cities [10]. By 2020, more than 500 NHs across the whole country had embarked on the cultural change journey. Despite differences in initiatives, the unified purpose is the evolution of NHs from institution-based nursing models to person-centered nurturing environments.

Even though the total number of NHs devoted to cultural reform has increased, their evolution has been largely based on political and philosophical concepts rather than empirical studies. Further, China's cultural journey is at an early stage and a complete reform system has not been established as it has in the United States [11, 12]. In this study, we concentrated on the 11 people-oriented QOL domains that reflects the values and characteristics of culture change [13, 14], and investigated the relationships among all QOL domains and elderly residents satisfaction in a deeper dimension that transcended analysis of binary relationships in order to identify which QOL factors, when placed in the same situation, are unique and significant predictors of satisfaction. Results enabled the identification of QOL domains related to elderly satisfaction and provided a clear direction for cultural transformation.

## Methods

### Research area

As the most economically developed super metropolis in China, Shanghai has one of the largest populations of aged adults. The number of elder people aged 65 and older has shown a significant upward trend for recent years [15, 16], Figure 1. Importantly, Shanghai is also a pioneer and in the vanguard of NH cultural change pilots. Thus, it was selected for analysis by this study. The flow chart of the study and its details were shown in Figure 2.

### Participants

Through stratified random sampling, we selected 310 elders from 15 district-level NHs, which are all on a journey of cultural transformation. The main inclusion criteria for elders participation in the study were: (1) aged 65 years or older, (2) conscious consent to research participation, (3) awareness of place and time, (4) and the ability to communicate and respond to the questionnaire. Participants who had been under extreme stress in the past month were excluded [17]. Finally, there were 10 residents could not complete the survey due to sudden physical limitations. Therefore, of the 310 potential elders, 96.8% ( $n = 300$ ) participated.

Of the 300 participants, 145 (48.3%) were male and 155 (51.7%) were female. Most elders ( $n = 95, 31.7\%$ ) were illiterate, approximately 30% ( $n = 90$ ) had a primary school education, 21.7% ( $n = 65$ ) had a high school degree, and 16.6% had attended university ( $n = 50$ ). Almost all residents (99.3%,  $n = 298$ ) had a son or daughter. Two did not. Age ranged from 65 to 99 with a mean of 80.9 (standard deviation [SD] = 9.87). Length of stay within the nursing home ranged from 6 months to 10 years (Mean = 39.9 months, SD = 26.43 months). Table 1 shows the general characteristics of all participants.

Table 1. General characteristics of participants (n = 300)

Variable	Proportion/Number
Sex	
Male %	48.3
Female %	51.7
Age	
Mean, year	80.9
Education	
Illiterate %	31.7
Primary school %	30.0
High school %	21.7
University %	16.6
Son/daughter	
Yes %	99.3
No %	0.7
Length of in NH	
Mean, days	1497

## Measures

### QOL Scales

QOL was measured with the Quality of Life Scales for Nursing Home Elders by Kane *et al*[13, 14]. This instrument examined the elderly perception of QOL in 11 areas with 4-point Likert Scales. Higher scores usually indicated greater QOL. The following are sample items for each QOL scale with alphas derived from this study. *Physical comfort*: "Do you feel pain in your body when you stay in one place for a long time?" (Cronbach  $\alpha$  = 0.628). *Security*: "Can you obtain a doctor or nurse quickly when you need help?" ( $\alpha$  = 0.773). *Meaningful activity*: "Apart from religious activities, do you enjoy other recreational activities organized by the nursing home" ( $\alpha$  = 0.76). *Relationships*: "Do you consider one or more members of the staff to be your friend?" ( $\alpha$  = 0.794). *Functional competence*: "Can you get to a bathroom quickly anywhere in the nursing home"? ( $\alpha$  = 0.778). *Enjoyment*: Do you enjoy mealtimes at (nursing home name)??" ( $\alpha$  = 0.744). *Privacy*: "Do staff knock & wait before entering your room?" ( $\alpha$  = 0.849). *Dignity*: "Do staff take time to listen to you when you are depressed?" ( $\alpha$  = 0.805). *Autonomy*: "Can you get up or go to bed at the time you want?" ( $\alpha$  = 0.704). *Individuality*: "Are the staff here willing to learn about your interesting life experience?" ( $\alpha$  = 0.305). *Spiritual well-being*: "How often do you participate in religious activities?" ( $\alpha$  = 0.721). Because of poor scale reliability ( $\alpha$  = 0.305, which is lower than 0.6) for individuality, we excluded this domain.

The remaining 10 QOL domains were evaluated. Each QOL scale was comprised of three to six items with all but three providing a 4-point Likert-type response, usually with four choices, "never, rarely, sometimes, and usual", and scored from 1 = "never" to 4 = "usual". It's worth noting that three items that had different response sets were components of the meaningful activities and relationships scales. Two questions were posed in terms of whether some activities (e.g., being outdoors, participating in recreational activities) happened from "less than once a month" = 1 to "every day" or "as much as you want" = 4. The other question regarding relationships was in a dichotomous format with 1 = "no" and 4 = "yes". Reverse scoring was used where appropriate, so high scores usually reflected a better QOL. A binary coding system ("mostly no" = 1.5, "mostly yes" = 3.8) was provided for those respondents who were unable to use the 4-point scale. In this study, 10 respondents used the binary system. After completion of almost every question, mean scores (from 1 to 4) for each QOL domain scale were derived. Any missing item scores were replaced by the item mean.

### Control Variables

#### Functional Impairment

Elderly residents' abilities to conduct activities of daily living (ADL) were identified using four ADL measures; bed mobility, toilet use, transferring, and eating[18]. These results were tabulated as a single ADL score. The final score for each elder ranged from 1 = "independent" to 4 = "completely dependent". A higher score indicated lower functional capacity.

#### Cognitive Impairment

Referring to the seven-category Minimum Data Set Cognitive Performance Scale (CPS) [19]proposed by Morris *et al*, we designed five questions in five dimensions (state of consciousness, the level of memory, cognitive skills for making decisions, ability to be understood by others, and ability to enjoy meals

independently) to evaluate the cognitive ability of the subjects. The final CPS score ranged from 1 = "intact" to 4 = "severe impairment". A lower score indicated higher cognitive capacity.

#### Outcome Variables

##### Satisfaction with nursing services

In this module, the Satisfaction with Nursing Care Scale (SNCS) [20] was used to assess participants' satisfaction with the quality of care. The SNCS is a part of the Newcastle Satisfaction with Nursing Scale[21]developed by Thomas *et al*that consists of 19 items using 5-point Likert scales. Scores for satisfaction ranged from 1 = "very dissatisfied" to 5 = "completely satisfied". Final SNCS scores ranging from 1 to 5 were replaced by means determined for a total of 19 items.

##### Satisfaction with epidemic prevention and control (EPC)

Since the end of 2019, COVID-19 has swept the world with more than 100 million people infected[22]. As the elderly have generally weakened immune systems and other predisposing conditions, NHs are hardest hit by epidemics. Based on existing researches[23, 24], we designed five items to evaluate resident satisfaction with EPC based on three dimensions; body temperature measurement, availability of new coronavirus knowledge, and procedures for EPC. The scores for each item ranged from 1 = "extremely dissatisfied" to 5 = "extremely satisfied". Satisfaction with EPC scores ranged from 1 to 5 with replacement of means derived from a total of five items.

##### Overall satisfaction with NHs

For comparison to QOL indicators, we used two items to measure elder satisfaction with NHs. One item required residents to rate their satisfaction with NHs using a 5-point Likert Scale format from 1 ("extremely dissatisfied") to 5 ("extremely satisfied"). The other item examined whether the elderly were willing to recommend the NH to their relatives or friends with a 5-point scale, which ranged from 1 = "completely not" to 5 = "certainly". The final NH satisfaction score ranged from 1 to 5 with replacement of means for two questions.

#### Procedure and Data Analysis

The research was approved by the Shanghai Institution of Technology Human Research Ethics Board. Before conducting the survey, we informed NHs and participants of the purposes and procedures of the study. Also, written informed consent was obtained from all participants.

With the help of research assistants, the elderly completed the survey through face-to-face interviews in a private and quiet atmosphere, usually in the elder's room. Interviews were also conducted in other NH places such as the library and chess room. Each interview required approximately 40 minutes to complete. If necessary, the duration of the interview was extended. When participants felt unwell, they could interrupt the interview and complete the interview later.

Internal consistency reliability of the QOL and the three satisfaction scales were examined by Cronbach  $\alpha$ . Second-order confirmatory factor analysis (CFA) was used to examine domain loading between overall QOL and related domains. Also, we examined potential bivariate correlations among demographic details and the 10 QOL domains. In regression models, only those variables that had significant relationships with one or more outcome variables were considered. Finally, hierarchical regression models were used to analyze possible predictors of different satisfaction categories. Two control variables were included in the first step regression models and the QOL domains in the second step models. Further, no multicollinearity was detected. SPSSAU and Excel 2010 software were used for data analysis.

## Results

Results of the second-order CFA of the final QOL scales justified a ten-domain structure with forty-two items. The collected data fit the model ( $df = 21$ ,  $\chi^2 = 29.63$ ,  $p < 0.05$ ;  $GF = .907$ ;  $RMSE = .083$ ;  $CFI = .933$ ). Figure 3 illustrates the statistically significant loadings from overall QOL for each domain. The regression coefficients ranged from .404 for meaningful activities to .723 for physical comfort. Descriptive statistics for final QOL domains and different categories of satisfaction from the perspectives of globality and gender are presented in Table 2. Overall, QOL mean scores ranged from the lowest item of 2.18 ( $SD = 0.47$ ) for spiritual well-being to the highest item of 3.77 ( $SD = 0.39$ ) for autonomy. Satisfaction means were 4.16 ( $SD = 0.48$ ) for satisfaction with nursing services, 3.82 ( $SD = 1.49$ ) for satisfaction with EPC, and 3.95 ( $SD = 0.96$ ) for overall NH satisfaction. Regarding gender differences, women scored QOL measures such as dignity and security slightly higher than men. As a result, female satisfaction was usually higher than that of males, whether in terms of nursing services, epidemic prevention and control, or overall satisfaction. Pearson's correlation coefficients in Table 3 were calculated to examine the relationships among different research variables. Only functional and cognitive impairment, but not age or gender, had significant relationships with outcome variables. Satisfaction with nursing services was negatively related to cognitive impairment, but satisfaction with epidemic control was positively related to functional impairment ( $r^2 = -.36$ ,  $p < .05$ ;  $r^2 = .18$ ,  $p < .05$ ). Since there was no significant bivariate relationship between demographics (age and gender) and any outcome variables, they were excluded in further analysis.

As anticipated, most QOL measures had positive relationships with elder satisfaction. However, there were differences in the relationships among QOL factors and satisfaction outcomes, which demonstrates these indicators are not interchangeable. Physical comfort and functional competence did not significantly associate with any satisfaction variable, as a result, neither were included in subsequent analysis.

Hierarchical regression analyses for the three overcome variables are presented in Table 4. In the three regression models, the QOL interpretation for satisfaction exceeded control measures ( $\Delta R^2 = .38$ ,  $p < .05$  for satisfaction with nursing services;  $\Delta R^2 = .25$ ,  $p < .05$  for satisfaction with EPC;  $\Delta R^2 = .61$ ,  $p < .01$

for overall satisfaction with the NH). Dignity was the most significant predictor affecting satisfaction with nursing services and overall satisfaction ( $\beta = 0.35$ ,  $p < .05$ ;  $\beta = 0.38$ ,  $p < .01$ ). Food enjoyment and relationships also significantly impacted overall satisfaction ( $\beta = 0.26$ ,  $p < .05$ ;  $\beta = 0.15$ ,  $p < .05$ ). Notably, autonomy was the only significant predictor that influenced satisfaction with EPC ( $\beta = 0.30$ ,  $p < .05$ ).

Table 2  
Statistical characteristics for QOL domains and different variables

Domains/ Variables	Total Mean(SD)	Male-only	Female-only
Comfort	3.07(0.38)	3.10(0.41)	3.02(0.35)
Security	3.73(0.36)	3.65(0.41)	3.78(0.32)
Meaningful activities	2.83(0.49)	2.94(0.54)	2.75(0.46)
Relationships	3.30(0.58)	3.19(0.61)	3.37(0.55)
Functional competence	3.58(0.60)	3.52(0.65)	3.61(0.57)
Food Enjoyment	3.09(0.63)	3.20(0.49)	3.03(0.70)
Privacy	3.18(0.70)	3.15(0.78)	3.19(0.66)
Dignity	3.43(0.53)	3.28(0.61)	3.53(0.44)
Autonomy	3.77(0.39)	3.76(0.33)	3.77(0.43)
Spiritual well-being	2.18(0.47)	2.09(0.42)	2.23(0.49)
Functional impairment	1.60(0.42)	1.46(0.38)	1.73(0.52)
Cognitive impairment	1.41(0.54)	1.53(0.53)	1.36(0.58)
Satisfaction with NS	4.16(0.48)	4.15(0.60)	4.17(0.45)
Satisfaction with EPC	3.82(1.49)	3.73(0.39)	3.77(0.44)
Overall satisfaction	3.95(0.96)	3.92(0.20)	3.96(0.79)

SD, standard deviation; NS, nursing services; EPC, epidemic prevention and control.

Table 3  
Zero-order correlations among different variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Age																
2. Sex	.27*															
3. CA(CPS)	.12	.20*														
4. LFADL	-.15	.05	.46**													
5. Physical Comfort	-.01	-.21	.18	-.04												
6. Security	-.07	-.02	.10	-.14	.60											
7. Meaningful activities	-.23	-.12	-.16	-.15	.16*	.23										
8. Relationships	-.10	-.18	-.32**	-.12	.39	.23	.35*									
9. Functional competence	-.08	.06	-.16	-.67**	.44**	.57*	.33	.28								
10. Food Enjoyment	.25	-.14	-.03	.05	.36*	.23	.02	.10	.31							
11. Privacy	-.11	.07	-.26	-.26	.15	.34	.14	.06	.34	-.11						
12. Dignity	-.02	.26	-.18	-.06	.30	.42	-.14	.42	.27	-.17	.23*					
13. Autonomy	-.00	-.08	-.12	-.36**	.12*	-.05	.34*	-.47	.26**	.03	.03	-.14				
14. Spiritual well-being	-.08	.13	-.28	-.09	.52	-.01	-.20	.21*	.10	.58	-.12	.23*	-.23			
15. Sat with NS	-.02	.01	-.36*	-.06	.11	.41	.23	.64*	.04	-.00	.15*	.55**	-.55	-.10		
16. Sat with EPC	-.00	-.17	-.24	.18*	.30	.24**	.44*	.49	.29	-.08	.10	.21	-.02**	.12	.38	
17. Overall satisfaction	-.03	.03	-.18	.05	.36	.11*	.26**	.56**	-.13	.12*	-.30**	.31*	-.39*	.26*	.56**	.52*

Gender was coded: 1 = Male; 2 = Female.

CA, cognitive abilities (higher scores indicated worse cognition); LFADL, level of functioning in activities of daily living (higher scores showed worse functional capacity); Sat with NS, satisfaction with nursing services; Sat with EPC, satisfaction with epidemic prevention and control.

P\* < .05; P\*\* < .01.

Table 4  
Multiple regression model identifying the relationships among elder's QOL domains and satisfaction variables

Satisfaction with nursing services		Satisfaction with EPC		Overall Satisfaction		
	Regression coefficient $\beta$	$\Delta R^2$	Regression coefficient $\beta$	$\Delta R^2$	Regression coefficient $\beta$	$\Delta R^2$
<b>BLOCK 1</b>		<b>0.21</b>		<b>0.10</b>		<b>0.08</b>
Cognitive impairment	-0.19		-0.18		-0.12	
Functional impairment	-0.12		-0.13		-0.15	
<b>BLOCK 2</b>		<b>0.38*</b>		<b>0.25*</b>		<b>0.61**</b>
Security	0.42		0.10		0.08	
Meaningful activities	-0.35		-0.13		0.16	
Relationships	0.35		0.21		<b>0.15*</b>	
Food Enjoyment	0.11		-0.09		<b>0.26*</b>	
Privacy	0.24		-0.18		-0.13	
Dignity	<b>0.35*</b>		0.20		<b>0.38**</b>	
Autonomy	0.13		<b>0.30*</b>		0.09	
Spiritual well-being	0.09		0.04		0.28	
<b>Total R<sup>2</sup></b>		<b>0.59*</b>		<b>0.35*</b>		<b>0.69**</b>

In consideration of space and the importance of indicators, we discarded some less important indicators (SE,  $\Delta F$ , and T), which left the two most important parameters ( $\beta$  and  $\Delta R^2$ ) with significant p-values. All coefficient betas ( $\beta$ ) were derived from the second step of the regression analysis, rather than the first step.

P\* < .05; P\*\* < .01.

## Discussion

To identify the domains most important to NH residents, relationships were sought between a wide range of QOL domains and elder satisfaction with nursing services, EPC, and with NHs. The selected QOL domains provide a means by which to identify the values unique to cultural change. As expected, by setting functional and cognitive impairment as control variables, most domains had positive and significant relationships with residents' satisfaction. The results incentivize cultural transformation and emphasize the importance of physical and mental health to the happiness of elderly residents.

Bivariate correlation analysis suggested that most QOL domains were significantly related to one or two measures of resident satisfaction. By regression analysis that incorporated control variables and QOL domains, we found dignity to be a significant factor for the prediction of both satisfaction with nursing services and overall NH satisfaction. A couple of years ago, the Centers for Medicare and Medicaid Services (CMS), an American medical institution, identified the importance of dignity in elder care. In fact, dignity issues are involved in all aspects of elder life including interpersonal and mealtime interactions[25, 26]. Therefore, the promotion of dignity is an important start to the journey of NH cultural change.

It is worth noting that dignity was the only factor that predicted NH resident satisfaction with nursing services. Nursing services are accomplished primarily by nurses and associated staff. It is therefore very important that both nurses and staff are trained in a manner that strengthens positive behaviors. Staff and especially nurses should be educated to purposefully maintain and enhance a sense of elder dignity. This training should include; prevention of unnecessary falls, help during showering, help during dining, and the provision of individualized care services that prevent disease deterioration. Further, it is important to acknowledge the power of role models. Thoughtful dignified treatment of NH residents can and should be modeled so that worthy behaviors can be interwoven throughout the cultural change journey.

Even though dignity was significant positive predictors of two satisfaction measures, food enjoyment and interpersonal relationships were also significantly related to overall satisfaction with NHs. Interpersonal relationships were found to be of two types: relationships between elders and staff and relationships between the elderly[27]. For staff, maintaining a respectful and complimentary attitude toward elders was the basis on which a good bilateral relationship was established. Employees should be trained in how to effectively communicate with the elderly and to learn to listen carefully and patiently to the ideas and suggestions of the elderly. Moreover, more meaningful group activities such as music, chorus, calligraphy, and intellectual group competitions, should be organized. These activities not only increase the opportunities for communication between the elderly, but also facilitate the cultivation of a spirit of collaboration and good interpersonal relationships. For those who lack fundamental communication skills and close friendships, personalized care from employees should be provided to avoid severe diseases such as dementia and depression.

There is an old Chinese saying: "People regard food as their heaven." This also seems to apply to elders in NHs. For many pilot cultural change transformations, food and dining environment have been emphasized. However, Qiu has found that many NHs implementing cultural transformation did not adopt dietary culture change measures[28]. The current study found that food enjoyment was positively related to overall satisfaction with NHs, indicating the

importance of food to better elderly experiences and overall satisfaction. Therefore, it is extremely important for traditional NHs to implement change strategies for promoting food enjoyment and the dining experience. Measures such as various food choices, scientific and reasonable diet combinations, as well as the construction of family-style dining environments should be considered.

In this study, autonomy was the only significant factor affecting elderly residents' satisfaction with EPC, demonstrating that greater autonomy contributes to a greater level of satisfaction. Owing to China's safe and stable internal situation during the novel coronavirus pandemic, this result is easily understood. If the daily life of the elderly is less constrained and permits adequate freedom, the level of satisfaction will naturally increase. Yet, we also found that some NHs were still strictly closed, and even family and friends are not permitted to visit. Perhaps, those NHs should adopt a more open policy to meet the needs of NH residents and their families. In addition, although spiritual well-being had the lowest mean score, the importance of elder spiritual well-being has been explored and acknowledged in many healthcare-related studies[29-31]. As such, necessary measures should be taken to enhance the level of elder spiritual well-being. Some solutions that can be developed to enhance the spiritual well-being of elders are as follows:

- (1) Continuous dissemination to staff and elders of religious customs and rituals.
- (2) Organization of elderly support groups, as well as spiritual care including various tasks that are social and emotional in nature;
- (3) Creation of a spirit-to-spirit relational approach between elders and staff, and cultivation of wisdom and experience for staff .

#### Limitations

This study has limitations. First, it was limited by the inclusion of only those elderly residents who had relatively sufficient cognitive capacity. Residents with levels of dementia were excluded. Some studies [32, 33] have found that cognitively impaired elders can participate in semi-structured or structured interviews. Future studies should examine whether our findings apply to NH residents including older adults with cognitive impairment. Secondly, we were unable to establish a causative link between QOL and satisfaction. It is unclear whether a higher level of satisfaction contributes to great QOL or rather relationships, dignity, food enjoyment, and autonomy result in higher levels of satisfaction. These results need to be confirmed in larger studies that include more participants and NHs in different regions across China.

## Conclusion

Since China entered the new era, the process of NH cultural change has accelerated, yet there is a lack of empirical evidence to guide this change. This study is the first empirical exploration of NH residents' QOL during cultural reform in China. Elder satisfaction with EPC was incorporated into the outcome variables to examine potential relationships between prevention and control of the novel coronavirus and the satisfaction of the elderly during the global pandemic. Using hierarchical linear regression models, the importance and value of dignity, food, relationships, and autonomy for elderly resident satisfaction was established.

Overall, these findings provide effective theoretical supports and practical suggestions for the culture change journey of NHs. Particularly, those approaches that enhance elders' sense of dignity, autonomy, food enjoyment, and interpersonal relationships will provide useful and productive starting points for cultural transformation. Successful implementation of culture change will also require multidisciplinary efforts between organizational leaders, elderly healthcare professionals, policymakers, researchers, and elder residents.

## Abbreviations

QOL: Quality of life; NHs: nursing homes; ADL: Activities of daily living;

CPS: Cognitive Performance Scale; SNCS: Satisfaction with Nursing Care Scale;

EPC: epidemic prevention and control; CFA: Confirmatory factor analysis;

GFI: Goodness-of-fit index; RMSE: Root Mean Square Error of Approximation;

CFI: Comparative fit index; SD: Standard deviation; NS: nursing services;

CA: Cognitive abilities; LFADL: Level of functioning in activities of daily living;

Sat with NS: Satisfaction with nursing services; SE: standard error;

SE: standard error; CMS: the Centers for Medicare and Medicaid Services;

## Declarations

### Ethics approval and consent to participate

The research was approved by the Shanghai Institution of Technology Human Research Ethics Board on December 16, 2020, with reference 2510136781604. Any modifications of research content will be communicated to the Ethics Board. **Also, informed consent to participate in the study have been obtained from literate participants or legal guardian of illiterate participants.** All procedures performed in studies were in accordance with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The study was also carried out in keeping with local laws and regulations.

## Consent for publication

Not Applicable.

## Availability of data and materials

The datasets used during the current study are available from the corresponding author on reasonable request.

## Competing interests

The authors declare that they have no competing interests.

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## Authors' contributions

WTY conceived the study design. XQT and CZ assisted with data collection. XQT analyzed the data and drafted first draft of total paper. All authors have read and approved the manuscript.

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## Figures

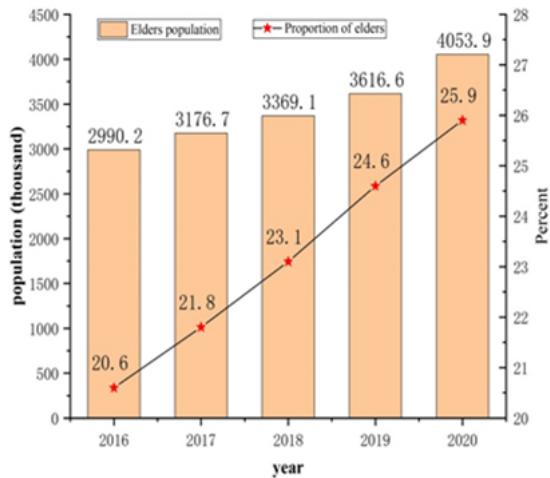


Figure 1

The elderly population of Shanghai and its proportion for the most recent five year period

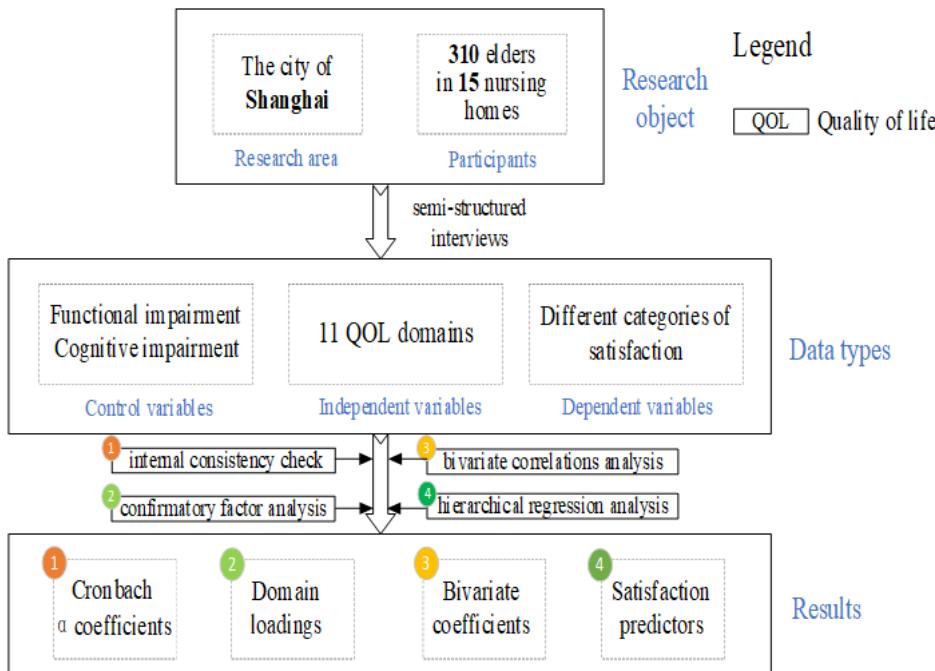


Figure 2

Research flow chart

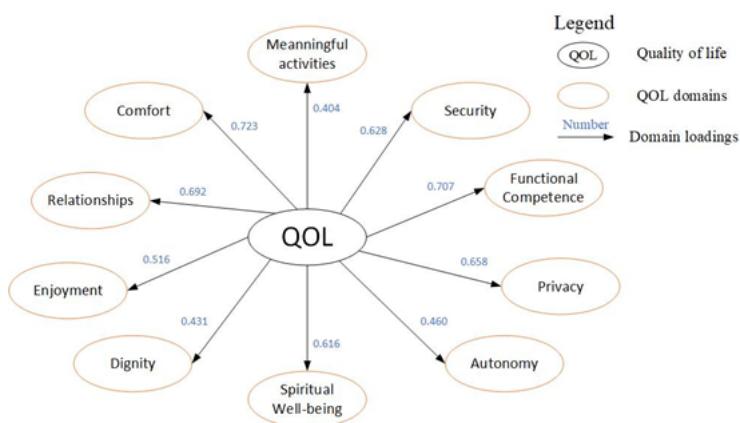


Figure 3

Domain loadings on overall QOL based on the second-order confirmatory factor analysis of the scale