



# Development of a quality of life questionnaire for nursing home residents in mainland China

Dongjuan Xu<sup>1,2</sup> · Jie Gao<sup>1</sup> · Liqin Chen<sup>3</sup> · Huanyu Mou<sup>1</sup> · Xiaorong Wang<sup>4</sup> · Jiying Ling<sup>5</sup> · Kefang Wang<sup>1</sup> 

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## Abstract

**Objective** To develop and validate a quality of life (QOL) questionnaire for nursing home (NH) residents in mainland China.

**Methods** A cross-sectional study including a development sample ( $n = 176$ ) and validation sample ( $n = 371$ ) of NH residents aged 60 and older was conducted between 2015 and 2016 in Jinan, Shandong Province, China. Resident interviews, literature reviews, expert panels, and pilot studies were used to identify QOL domains and items pertinent to NH life. Exploratory and confirmatory factor analysis were used to develop and validate a QOL questionnaire. Reliability (internal consistency, split-half reliability, and test–retest reliability) and validity (construct and criterion validity) were evaluated for the questionnaire.

**Results** The self-report Chinese NH QOL questionnaire had 9 domains and 38 items including physical health (4 items), food enjoyment (6 items), security (3 items), environmental comfort (5 items), autonomy (2 items), meaningful activity (3 items), interrelationship (6 items), family relationships (3 items), and mood (6 items). The nine-factor model was confirmed with the following fit indices:  $\chi^2/df = 1.872$ , root mean square error of approximation = 0.049, comparative fit index = 0.913, and Tucker-Lewis index = 0.903. The 38-item NH QOL questionnaire showed satisfactory construct validity, criterion validity, internal consistency (Cronbach's alpha = 0.89, split-half reliability = 0.73, test–retest reliability = 0.76).

**Conclusions** The NH QOL questionnaire appears to be a reliable and valid instrument and should be incorporated into a set of quality measures for use with NH residents in mainland China

**Keywords** Quality of life · Nursing home · Instrument development · Validity · Reliability

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Dongjuan Xu and Jie Gao have contributed equally to this work.

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✉ Kefang Wang  
wangkf@sdu.edu.cn

<sup>1</sup> School of Nursing, Shandong University, No. 44, Wenhua Xi Road, Jinan 250012, Shandong, China

<sup>2</sup> School of Nursing, Purdue University, West Lafayette, IN, USA

<sup>3</sup> Department of Nursing Care, Henan Vocational College of Nursing, Anyang, Henan, China

<sup>4</sup> Department of Gerontology, Jinan Central Hospital, Jinan, Shandong, China

<sup>5</sup> College of Nursing, Michigan State University, East Lansing, MI, USA

## Introduction

In addition to attaining good quality of care, nursing homes (NHs) should focus on promoting residents' quality of life (QOL) [1]. Many residents live in NHs for a long period of time and want to live as normal, meaningful, and unconstrained a life as possible [2]. QOL has been recognized as representing the subjective and objective aspects of NH quality of care [3]. The concept of QOL is broader than that of health-related QOL [4], which has been used in most healthcare research, including in general measures such as the 36-item or 12-item short form Health Survey (SF-36, SF-12) [5, 6], the World Health Organization's Quality of Life (WHOQOL) [7], and EuroQol-5D (EQ-5D) [8] and disease-specific measures such as the Quality of Life-Alzheimer's Disease (QOL-AD) [9], Dementia Quality of Life (DQOL) [10], and Alzheimer disease related quality of life (ADRQL) [11]. A study used the WHOQOL Brief questionnaire and the Philadelphia Geriatric Morale Scale (PGCMS) to evaluate QOL in long-term care in five European Union

countries and found that some questions in both questionnaires were inappropriate for this population [12].

QOL in nursing home residents is generally perceived as a multidimensional construct that consists of aspects considered important to NH residents [13, 14]. A qualitative study, which conducted among 42 NH residents in Berlin, found ten dimensions of subjective QOL including social contacts, self-determination and autonomy, privacy, peace and quiet, variety of stimuli and activities, feeling at home, security, health, being kept informed, and meaningful/enjoyable activity [14]. Some multidimensional instruments were developed to measure NH residents' QOL [4, 15, 16]. For example, the subjective quality of life of nursing home residents (SLQA) was used in three European countries and consisted of five factors: empathy, autonomy, privacy, security, and acceptance [16]. Although there are different instruments that may be used as empirical referents of quality of life, it is a big challenge to get a comprehensive understand of QOL among nursing home residents. Even though the Assisted Living Facility-Quality of Life/Quality of Care Index (ALFQL/QC) was comprehensive with 105 items, potentially significant QOL indicators of the cognitive and spiritual well-being domains were missing. Including these two missing domains would add to the meaningfulness of multidimensional QOL measures [4]. Kelley-Gillespie suggested using a comprehensive integrated model that included six major life domains of physical well-being, social well-being, psychological well-being, cognitive wellbeing, spiritual well-being, and environmental well-being to assess the multidimensionality of NH QOL [4].

Kane et al. developed a self-report QOL questionnaire to assess QOL among older residents in NH, which took into account the specific nature of the NH and combined components pertinent to NH life. Eleven domains were identified: comfort, functional competence, autonomy, dignity, privacy, individuality, meaningful activity, relationships, enjoyment, security, and spiritual well-being [1, 17]. QOL was conceptualized as a general construct, and the various domains were independent but related dimensions of overall QOL. The questionnaire was administered to a sample of 1316 residents from 40 NHs in 5 states, and 10 QOL domains (all of the above domains except individuality) were confirmed by confirmatory factor analysis (CFA) [1]. The evaluation of internal consistency (Cronbach's alpha) and concurrent validity was acceptable. The resident-reported QOL that was assessed by this questionnaire has been used to distinguish NH facilities [18] and has been incorporated into a set of measures that include quality indicators and staff retention to create a five-star scale to compare nursing facilities on the Minnesota Nursing Home Report Card (<http://nhreportcard.dhs.mn.gov>). However, the test–retest reliability for this QOL measure has not been examined. The authors also suggested that measures of affect, self-perceived health, and

functional status should be fielded along with this questionnaire to produce a full picture of QOL [1].

In mainland China, QOL outcomes are minimized in current NH quality assessment, and priority is given to health and safety outcomes [19]. There have been many attempts to measure NH residents' QOL in mainland China; however, most studies tend to use the more restricted health-related QOL measures [20, 21], while other studies use qualitative methods [22, 23]. Although these studies are very informative, the methodology used did not allow for the quantification of elements of living as well as care in NHs. It is particularly important to have a QOL questionnaire with multiple domains specific to NH residents in mainland China. Residents' perception of QOL is contingent on the sociocultural context in which they are embedded [24]. For example, self-realization and self-esteem may be of priority in individualistic societies [25], whereas harmonic relationships and fulfilment of family duties may be of higher importance in collectivist societies [26]. In Chinese culture, filial piety is an essential value [27] and it has been widely believed that “raising children for the purpose of being cared in old age” [28] and “more children, more happiness” [28, 29]. Relationship with family members may play an important role even in nursing home residents' QOL. Due to cultural differences, the QOL questionnaires developed by Kane or other researchers cannot be translated and applied directly to the Chinese NH population. For example, the item “religious observances have meaning” in the spiritual well-being domain is not suitable since the majority of Chinese are not religious [30].

The purposes of this study were (1) to identify QOL domains and items pertinent to NH life in mainland China using resident interviews, literature reviews, expert panels, and pilot studies, (2) to develop a QOL questionnaire using exploratory and confirmatory factor analysis, and (3) to test the reliability and validity of the QOL questionnaire.

## Methods

### Phase I: questionnaire development

To identify and describe elements of QOL from the residents' perspective, we conducted a qualitative study using semi-structured, in-depth, and face-to-face interviews. Residents identified 8 domains of QOL in NHs: physical health, food enjoyment, security, environmental comfort, autonomy, meaningful activity, relationships, and mood [31]. These domains, which characterized residents' perspectives on QOL, served as the starting point for developing a QOL questionnaire for NH residents.

Based on the qualitative study and literature reviews, a preliminary item pool with 77 items was created, and expert opinion was sought on the relevance, clarity, and representativeness of each item in terms of the underlying conceptual framework. A panel of ten experts (six academic professors in gerontology and long-term care, two clinical professors in gerontology, and two gerontological nurse practitioners) were surveyed in the first round. The anonymous responses from the ten experts were aggregated and shared with the panel after the first round. Six of eight experts responded in the second round. The process stopped in the second round because we obtained good content validity. The item-level content validity index (I-CVI) and scale-level content validity index (S-CVI) were 0.83 and 0.92, respectively. According to expert opinions, the item pool was further refined. Eight items were removed and six items were added. The relationship domain was divided into two domains: relationships with family members and relationships with staff and other residents. In addition, we revised the words, phases, or sentence structure of some items. The preliminary QOL questionnaire had 9 domains with 75 items.

A preliminary test was carried out in a convenience sample of 10 NH residents. Because residents felt confused about one item related to bathroom use, we revised this item into two items: “bathroom is close to resident’s room” and “resident can get to bathroom quickly when need it”. We also deleted two items related to religion because almost all residents responded with “not applicable”. The questionnaire, which had 9 domains with 74 items, was used for subsequent psychometric evaluation in larger samples.

## Phase II: psychometric evaluation: exploratory and confirmatory factor analysis

### Participants

Surveys were carried out in two convenience samples of NH residents in Jinan, the capital city of Shandong Province, China. A total of 181 residents in 14 NHs were recruited for the development sample from September to December 2015. A total of 176 (97.2%) residents completed the survey; the collected data were used for exploratory factor analysis (EFA). Twenty residents in the development sample took the retest survey 2–3 weeks after the initial survey to evaluate the test–retest reliability. A total of 376 residents in 33 NHs enrolled in the validation sample from May to September 2016. A total of 371 (98.7%) residents completed the survey, the data from which were used for CFA. The inclusion criteria were as follows: (1) older adults aged 60 and older, (2) have lived in the NH for 1 month or more, and (3) willing to participate in this study. The exclusion criteria were (1) severe cognitive impairment, defined as a Mini-Mental State Examination

(MMSE) total score < 10 [32]; (2) vision or hearing impairment, which could affect the completion of the survey; and (3) coma, end-stage disease, or hospice care.

### Measures

**Quality of life** The self-report NH QOL questionnaire that we aimed to develop and validate in this study used a four-point response scale. Each domain was transformed into a 0–10 scale. The total QOL score is the equally weighted sum of all domain scores, with higher scores indicating better QOL. In addition to this questionnaire, we also asked about residents’ overall QOL with the following question: “Overall, how would you rate the quality of your life here?” Residents were categorized into two groups: very good/good and poor/very poor.

**EQ-5D** The EQ-5D, which is commonly used to measure health-related QOL, has five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression [33]. A visual analogue scale (EQ-VAS) was also used to quantify residents’ health status on a 20-cm vertical scale with end points of 0 and 100 [34]. A higher score indicated better health-related QOL.

**Other variables** We also collected information on age, sex, race, marital status, educational level, cognitive impairment, activities of daily living (ADLs), Functional Comorbidity Index (FCI), and length of stay. Residents were categorized as having moderate or mild/no cognitive impairment, which was measured using the MMSE [35, 36]. The Barthel Index was used to measure ADL disability, which ranged from 0 to 100, with higher scores indicating increased independence [37]. The ADLs were classified into three categories: independence, partial dependence, and dependence. The FCI included 18 common conditions that impacted daily activities and functioning, which was calculated by summing the number of conditions [38].

### Data collection

Researchers first contacted nursing home administrators and obtained their permission to conduct the survey. Later, the trained research assistants approached residents in their facility and collected the data through face-to-face interviews. The interview was completed within 1 h. Written informed consent was obtained before each interview. The residents were assured that all their responses would be kept confidential and anonymous. The study was approved by the Institutional Review Board of Shandong University.

## Data analysis

Descriptive statistics were used to describe the characteristics of residents. A set of *t* tests was conducted to compare the QOL differences between groups. Cronbach's alpha was used to evaluate the internal consistency of the QOL questionnaire. The Pearson correlation coefficient was calculated to evaluate the strength of the association between two variables.

EFA was conducted in the development sample using principal component analysis with orthogonal rotation. Both the Kaiser–Meyer–Olkin measure of sampling adequacy (0.69) and Bartlett's test of sphericity ( $\chi^2 = 5598.94$ ,  $df = 2701$ ,  $p < 0.001$ ) suggested that the sample was suitable for factor analysis [39]. The number of factors was determined using Kaiser's criterion (eigenvalues  $> 1$ ). Items were omitted if they loaded on more than one factor and if the differences between loading scores were less than 0.1 [40]. Two items were highly correlated (0.88): "Does the staff treat you politely" and "Does the staff treat you with respect". We repeated the EFA after omitting one of them. All items with loading scores of 0.4 or above were retained [41]. EFA was conducted using IBM SPSS Statistics version 24.0 (SPSS, Inc., Chicago, IL, USA).

CFA was conducted in the validation sample using weighted least squares (WLS) estimation procedures. The goodness of fit of the model was evaluated using the Chi square adjusted by the degrees of freedom ( $\chi^2/df$ ), root mean square error of approximation (RMSEA), comparative-fit index (CFI), and Tucker-Lewis index (TLI) measures. A  $\chi^2/df$  ratio less than 2, an RMSEA less than 0.06, and a CFI and TLI greater than 0.90 indicated a good fit to the data [40, 42, 43]. CFA was conducted using Mplus version 8 (Muthén & Muthén, Los Angeles, CA, USA).

## Results

### Sample characteristics

Table 1 presents the characteristics of the residents in the development and validation samples. The mean age was approximately 78 years; more than half were women; and approximately 20% were married.

### Exploratory factor analysis

Exploratory factor analysis yielded 9 factors (domains) with 41 items, and loading scores ranged from 0.46 to 0.82. The nine domains were mood (6 items), food enjoyment (6 items), interrelationship (6 items), environmental comfort (5 items), meaningful activity (4 items), physical health (4 items), security (4 items), family relationships (3 items), and

**Table 1** Sample characteristics

	Development sample ( $n = 176$ ) mean $\pm$ SD or n(%)	Validation sample ( $n = 371$ ) mean $\pm$ SD or n(%)
Age (years)	77.6 $\pm$ 9.6	77.5 $\pm$ 8.7
Sex		
Male	81 (46.0)	151 (40.7)
Female	95 (54.0)	220 (59.3)
Race		
Han	174 (98.9)	364 (98.1)
Other	2 (1.1)	7 (1.9)
Education		
Illiterate	46 (26.1)	93 (25.1)
Elementary school	60 (34.1)	125 (33.7)
Middle school	29 (16.5)	58 (15.6)
High school or more	41 (23.3)	95 (25.6)
Marital status		
Married	36 (20.5)	74 (20.0)
Single/divorced/widowed	140 (79.5)	297 (80.0)
Length of stay (months)	29.9 $\pm$ 32.1	30.0 $\pm$ 33.8
MMSE	22.3 $\pm$ 4.9	21.1 $\pm$ 5.4
Mild/no	108 (61.4)	206 (55.5)
Moderate	68 (38.6)	165 (44.5)
ADLs	87.7 $\pm$ 20.2	80.2 $\pm$ 25.3
Independent	71 (40.3)	121 (32.6)
Partially dependent	87 (49.4)	179 (48.3)
Dependent	18 (10.2)	71 (19.1)
FCI	2.6 $\pm$ 1.9	2.2 $\pm$ 1.6

MMSE the Mini-Mental State Examination, ADLs activities of daily living, FCI Functional Comorbidity Index, SD standard deviation

autonomy (3 items). These nine factors explained 61.25% of the variance. The eigenvalues for these nine factors were 3.98, 3.82, 3.66, 2.92, 2.36, 2.28, 2.18, 1.98 and 1.94, respectively.

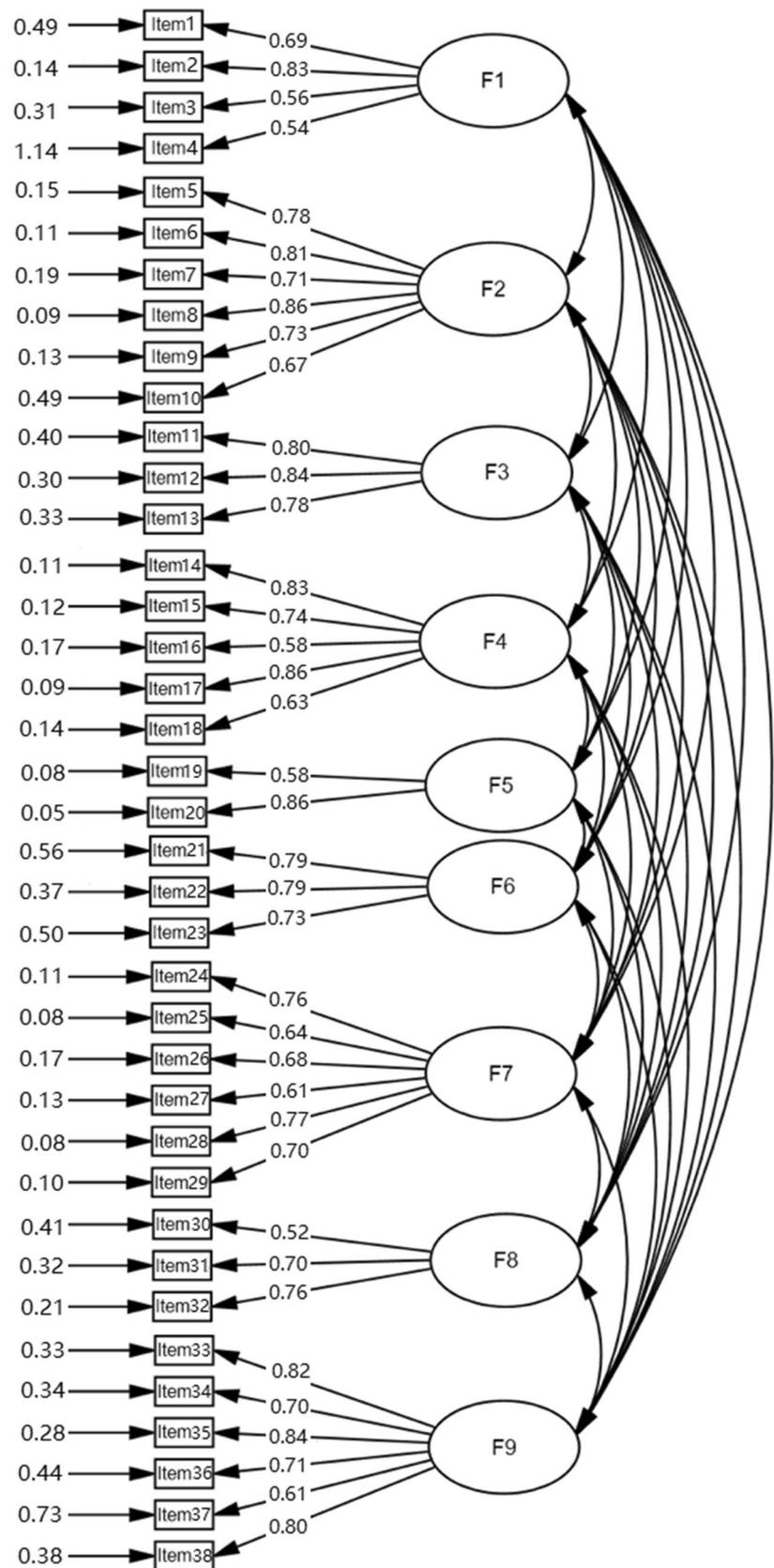
### Confirmatory factor analysis

According to the goodness-of-fit measures, the nine-factor solution with 38 items (Fig. 1) fit the data best, based on calculations for  $\chi^2/df$  (1.872), RMSEA (0.049), CFI (0.913), and TLI (0.903). The factor loading scores ranged from 0.52 to 0.86. Further description for each item on the final NH QOL questionnaire is shown in Online Resource 1, with a total of 38 items.

### Reliability

The NH QOL questionnaire demonstrated good reliability. The Cronbach's alpha of the overall QOL scale was 0.89,

**Fig. 1** Path diagram of the confirmatory factor analysis ( $n=371$ ). Items details are as per the Online Resource 1 attached. *F1* factor 1 (physical health), *F2* factor 2 (food enjoyment), *F3* factor 3 (security), *F4* factor 4 (environmental comfort), *F5* factor 5 (autonomy), *F6* factor 6 (meaningful activity), *F7* factor 7 (interrelationship), *F8* factor 8 (family relationships), *F9* factor 9 (mood)



with the Cronbach’s alphas of the nine domains ranged from 0.66 to 0.88. The test–retest reliability was 0.76. The split-half reliability coefficient of the overall QOL scale was 0.73, with coefficients for the nine domains ranging from 0.63 to 0.88.

**Validity**

**Construct validity**

The NH QOL questionnaire was conceptualized as a general construct, and the various domains were independent but related dimensions of overall QOL. Therefore, it was reasonable to assume that the correlations between domains were relatively low and that the correlations between each domain and the overall QOL scale were relatively high. Consistent with our expectations, the correlation coefficients between domains ranged from 0.01 to 0.59, and the correlation coefficients between each domain and the overall QOL scale ranged from 0.21 to 0.75.

The NH QOL questionnaire was constructed according to a broader concept than health-related QOL. It was significantly correlated with the EQ-5D and EQ-VAS, but the correlation effect size was medium, with coefficients of approximately 0.43 (Table 2). The correlation coefficients between each domain and the EQ-5D or EQ-VAS ranged from 0.08 to 0.48.

**Criterion validity**

Using the one-item question about overall QOL, residents were categorized into two groups (very good/good vs. poor/very poor). As expected, higher scores were obtained on

the NH QOL questionnaire and the nine domains among residents in the very good/good group than among those in the poor/very poor group (Table 3). The differences were all statistically significant, except for the autonomy domain.

**Discussion**

Using resident interviews, literature reviews, expert panels, pilot studies, and factor analyses, nine distinct domains were confirmed in our study. The self-report Chinese NH QOL questionnaire (a total of 38 items) included physical health (4 items), food enjoyment (6 items), security (3 items), environmental comfort (5 items), autonomy (2 items), meaningful activity (3 items), interrelationship (6 items), family relationships (3 items), and mood (6 items). The questionnaire appears to be a reliable and valid instrument that can be used in further studies to evaluate NH residents’ QOL in mainland China.

Compared to the QOL questionnaire developed by Kane et al. [1], our questionnaire did not have the spiritual well-being and privacy domains. Originally, we had items about religion (e.g., “I participate in religious activities as Buddhist, Christian, or other”) and privacy (e.g., “I can be alone when I want to”) in the candidate item pool. Residents either thought that these items were not applicable or responded almost identically, such as “never”. These items were thus excluded during the factor analysis. The results for these two domains were as expected. The majority of Chinese individuals have little or no religion [30]. The small proportion of individuals who self-identified as Buddhists, Christians, or others may never or only rarely participate in religious practices or activities [44]. In traditional Chinese culture, especially among older adults, privacy is mainly a foreign

**Table 2** Correlations between the NH QOL questionnaire scores and EQ-5D scores (n=371)

	Mean ± SD	Correlation coefficient	
		EQ-5D index	EQ-VAS
QOL total score	64.6 ± 9.9	0.43**	0.43**
Physical health	6.1 ± 2.2	0.41**	0.48**
Food enjoyment	5.9 ± 1.7	0.18**	0.29**
Security	7.8 ± 2.9	0.14**	0.15**
Environmental comfort	7.0 ± 1.4	0.32**	0.29**
Autonomy	9.8 ± 1.1	0.12*	0.08
Meaningful activity	5.3 ± 3.1	0.23**	0.16**
Interrelationship	7.0 ± 1.2	0.11*	0.15**
Family relationships	8.2 ± 2.0	0.09	0.14**
Mood	7.6 ± 2.6	0.35**	0.32**

QOL quality of life, EQ-5D EuroQol-5D, EQ-VAS Euro-QOL Visual Analog Scale, SD standard deviation

\*\*p < 0.01; \*p < 0.05

**Table 3** Criterion validity evaluation in the validation sample (n = 371)

	One-item question about overall QOL		p
	Very good/good	Poor/very poor	
QOL total score	67.0 ± 8.4	55.0 ± 9.7	< 0.001
Physical health	6.5 ± 2.1	4.4 ± 2.1	< 0.001
Food enjoyment	6.2 ± 1.5	4.6 ± 2.0	< 0.001
Security	8.1 ± 2.8	6.9 ± 3.3	0.005
Environmental comfort	7.3 ± 1.3	6.1 ± 1.4	< 0.001
Autonomy	9.9 ± 1.0	9.6 ± 1.6	0.202
Meaningful activity	5.6 ± 3.0	4.0 ± 3.0	< 0.001
Interrelationship	7.2 ± 1.1	6.4 ± 1.1	< 0.001
Family relationships	8.4 ± 1.8	7.2 ± 2.5	< 0.001
Mood	8.0 ± 2.3	5.7 ± 2.9	< 0.001

QOL quality of life

concept and has not been highly valued; thus, the need for privacy is not very popular [45].

Our QOL questionnaire had some domains, including autonomy, food enjoyment, and meaningful activity, that were similar to those in the questionnaire developed by Kane et al. [1] The security domain in Kane's questionnaire referred to an overall sense of security and order, while our security domain mainly referred to safety in the sense of minimizing falls and accidents. Some items in the comfort domain (such as being cold or bothered by noise) and functional competence domain (referring to the adequacy of the physical environment to support competence) of Kane's questionnaire were factored into one domain in our study: environmental comfort. Our factor analysis also yielded two domains related to relationships: relationships with NH staff or other residents and relationships with family members, with most items from the relationships and dignity domains of Kane's QOL questionnaire. All five items in the dignity domain of Kane's QOL questionnaire asked how residents were treated, handled, or respected by NH staff. The family relationships domain was separated from other relationship-related items in our questionnaire, which may be explained by the historically family care-oriented culture in China. The traditional family structure holds an important position in Chinese culture [46]. A core concept in family values is the idea of "filial piety", which is a virtue of respect and care for one's parents [27]. Our results implied that NH residents highly valued filial piety and embraced it as an integral part of life.

Relative to the QOL questionnaire developed by Kane et al., our questionnaire added two new domains: mood and physical health. The mood domain consisted of six items that described different feelings and emotions, such as sad/unhappy and worried. The physical health domain had four items that described self-perceived general health. Kane et al. suggested complementing their QOL questionnaire with measures of affect, self-perceived health, and functional status to produce a more fully rounded picture of NH residents' QOL [1]. Commonly, functional status is assessed by indicators such as ADLs or instrumental activities of daily living (IADLs). With mood and physical health domains, our questionnaire was able to capture the more comprehensive construct of QOL. In addition, for the purposes of regulatory oversight, facility-initiated quality improvement, or public reporting, policymakers, providers, or researchers may use our questionnaire along with ADLs, IADLs, or other measures to fully assess elements of living as well as care in NHs.

Our QOL was a reliable instrument with satisfactory internal consistency, test-retest reliability, and split-half reliability. We constructed QOL to be a broader concept than health-related QOL, and this effort was confirmed by the correlations between QOL domains and the EQ-5D. As

expected, the physical health and mood domains had higher correlation coefficients (approximately 0.4), while the autonomy, food enjoyment, security, interrelationship, and family relationships domains had lower correlation coefficients (less than 0.2). Moreover, when residents were categorized into two groups, residents in the very good/good group had significantly higher scores in overall QOL and in all domains except autonomy. Our findings for reliability and validity provided support for the notion that the QOL questionnaire had good psychometric properties.

The study has several limitations. First, QOL is subjective, so residents' self-reports are considered to be the gold standard for their QOL. In this developmental phase, residents with severe cognitive impairment were not included. Future work is needed to find and test ways to approximate the QOL of residents with severe cognitive impairment, such as changing the 4-point scale to binary response options (yes/no). Second, the questionnaire was developed and validated among NH residents in Jinan, the capital city of Shandong Province. Given our sampling, we cannot generalize to NHs in rural areas or nationally or create QOL norms. Third, there were only two items in the autonomy domain, so further research is needed to enrich the domain with more items. Fourth, because relationships with family members are typically regarded as outside the control of NHs, this domain should be used with caution when comparing NHs.

## Conclusions

In summary, the self-report Chinese NH QOL questionnaire had nine domains and 38 items with satisfactory reliability and validity. Each domain was relatively independent and related to the overall construct of QOL, which is an important but neglected component of NH care in mainland China. It has been given less attention than health and safety outcomes in current measures of NH quality. The QOL questionnaire is now available and should be incorporated into a set of quality measures for use with NH residents in mainland China.

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**Author contributions** WK and XD initiated, participated in the design of, and coordinated the study and helped in the drafting and editing of the article. XD, GJ, WX and LJ prepared the database and performed the statistical analyses. GJ, CL and MH participated in the implementation of the study, prepared the database, and participated in the drafting of the article. All the authors have read and approved the final version of the manuscript.

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## Compliance with ethical standards

**Conflicts of interest** The authors declare that they have no conflict of interest.

**Ethical approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was approved by the Institutional Review Board of Shandong University.

**Informed consent** Informed consent was obtained from all individual participants included in the study.

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