BMC Geriatrics

RESEARCH Open Access

Caring perception questionnaire of the home-dwelling elderly: development and validation study

Mingjiao Feng[1,2†], Lei Huang[3†], Yuqin Chen[1,2], Yanjie You[1,2], Hongwei Chang[1], Lihua Zhang[1], Fengjian Zhang[1*] and Yilan Liu[1*]

Abstract

Background The care requirements of the elderly who live at home should receive enough attention as the world's population ages. On the basis of this, a questionnaire on the elderly who live at home must be created and validated.

Objective The objective is to create and validate a tool that will allow caregivers to more accurately measure how well-cared-for elderly people perceive them to be at home.

Methods This study developed a caring perception questionnaire through literature review and interviews in Wuhan. Fifteen experts from six provinces reviewed the initial 43-item draft. When faulty questionnaires were eliminated, the valid sample size for the exploratory factor analysis of the first survey was 238. For confirmatory factor analysis, the second survey's valid sample size was 260. The final version included 31 items, validated for reliability and validity.

Results A 52-item questionnaire was created based on interviews, refined to 43 items after expert feedback, with a content validity index of 0.88. The first survey (238 valid responses) showed a Cronbach's α of 0.945, and the second (260 valid responses) confirmed good model fit and consistency. The final version has 31 items.

Conclusions With good reliability and validity, the caring perception questionnaire of the home-dwelling elderly was developed, which could be used as a tool to evaluate the current situation of humanistic care for the home-dwelling elderly.

Keywords Questionnaire, Questionnaire development, Validation, Perception of care, Care perception questionnaire, Humanistic care, Home-dwelling elderly, Elderly at home

†Lei Huang and Mingjiao Feng should be considered joint first author.

*Correspondence:
Fengjian Zhang
fengjianzhang2019@163.com
Yilan Liu
yilanl2020@163.com
[1]Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan 430022, China
[2]School of nursing, Tongji Medical College, Huazhong University of Science and Technology, Wuhan 430030, China
[3]School of Nursing, Xinxiang Medical University, Xinxiang 453000, China

Introduction

Population aging is a global issue where the proportion of elderly people is increasing. The UN projects that by 2050, 16% of the world's population will be over 65, up from 11% in 2019 [1]. In Mainland China, 264 million people were aged 60 and over in 2020, making up 18.7% of the population [2]. The impact of aging varies by country due to differences in awareness, healthcare, and gerontological services. Japan has the highest elderly proportion, but other developing Asian countries may face greater challenges [3]. Aging populations strain healthcare, pensions, and social services. Countries are responding with policies such as Singapore's integrated long-term elderly care services [4] and Japan's adjustments in pension and health services since 1950 [5]. China is also adapting its policies to address increasing elderly care needs [6, 7].

Home-dwelling elderly deserve special attention. In China, elderly care includes family, institutional, and community support [8]. To enhance care, China plans to focus on family care, community support, and supplementary nursing homes [7]. Japan provides more home and community nursing services [9–11], while Finland improves care through better family caregiver training and the Finnish Care Classification [12–14]. Sweden manages home care through registries and supports the psychological needs of elderly individuals [15, 16]. While home-based care aligns with traditional values in China and is preferred by many elderly, current policies do not fully meet their needs [17]. Research is mainly on hospice care, service quality, and disease prevention, with few studies on the experiences of home-dwelling elderly [18, 19].

In the 1980s, Jean Watson first introduced "humanistic care" in the book "Nursing: The Philosophy and Science of Care" [20]. Watson defined caring as a loving interaction that supports physical, psychological, social, and spiritual health [21]. With the global aging population increasing, there is growing focus on humanistic care for the elderly, encompassing unconditional love, understanding, and support [22, 23]. Existing studies, however, only look at family elderly with a single or partial source of care, such as family caregivers, self care, emotion and social network, life satisfaction and community services, and social support for the elderly [24–28]. There is still a lack of an overall evaluation system for the care perception of the elderly at home.

While different tools have been developed to assess care recipients or care providers, no such tool has been developed to assess the caring perception for home-based elderly people. The care perception of elderly individuals presents a diverse range of characteristics. It includes the advantages of family support, but also faces challenges in areas such as care-giving systems, health management, and social support. This study aims to develop a tool to assess the care perceptions of home-dwelling elderly individuals. This tool will help understand their current care perceptions, enhance societal care-giving behaviors, and advance home care services. The questionnaire will address gaps in current assessment tools and offer insights for elderly care research. Practically, it will improve societal understanding of the elderly, facilitate humanistic care, and enhance their quality of life. Overall, the development and validation of this questionnaire will aid in exploring factors affecting care perceptions among home-dwelling elderly individuals.

Methods

This study was completed in 2022, with the primary research location in Wuhan, Hubei Province. Convenience sampling was used to conduct qualitative interviews with several urban elderly individuals living at home in Wuhan. The results, along with a literature review, were used to develop a pool of questionnaire items. Two rounds of Delphi expert consultations were conducted to finalize the first draft of the caring perception questionnaire of the home-dwelling elderly. Several experts involved came from six provinces in China. Then, a survey was conducted with elderly individuals living at home in four cities. The data from these questionnaires were analyzed to assess the reliability and validity of questionnaire, leading to the development of the final version of the questionnaire.

Phase 1: Item generation

Using search terms including "home-based elderly care"、"home-dwelling elderly"、"urban elderly"、"humanistic care"、"care perception"、"questionnaire"、"questionnaire development"、"validation"、"reliability and validity testing"、"reliability analysis" and "validity analysis", a comprehensive literature search was conducted across multiple databases (PubMed, Embase, Scopus, WOS, OVID, Web of Science). This search focused on literature related to humanistic care for home-dwelling elderly individuals, care services, and questionnaire development. A total of 50 English and 46 Chinese articles were analyzed to provide a foundation for designing the qualitative interview outline and constructing the item pool for the questionnaire.

Convenience sampling was adopted to select 30 home-dwelling elderly people for a semi-structured interview. Additionally, the sample was drawn from diverse neighborhoods across Wuhan to capture a variety of living conditions and social backgrounds, thereby enhancing the diversity of perspectives. The inclusion criteria includes home-dwelling elderly aged 60 or above in the city of Wuhan, China; normal cognition, clear thinking, and general communication ability. These criteria helped

ensure that the participants were representative of the target population and capable of providing meaningful and reliable responses. The following is the outline of the interview:

1. What kinds of caring have you felt in your daily life? Please give some examples.
2. When you suffer difficulties, who do you usually ask for help? How would you ask for help?
3. Generally speaking, do you feel your caring needs are met?
4. What difficulties or problems do you have at present?
5. What kinds of caring and help do you want?

The data from the interview was analyzed using NVIVO11.0. Based on the literature analysis and semi-structured interview, the item pool of the caring perception questionnaire of the home-dwelling elderly was initially formed.

Phase 2: Delphi method and content validity

Fifteen experts were invited to evaluate the items. In this study, experts were connected by email to screen the questionnaire items and give their suggestions. The expert correspondence questionnaire consisted of three parts: preface (research background and purpose), body part (the preliminary form of the care perception questionnaire for the home-dwelling elderly), and basic information of experts(personal information and questionnaire familiarity). After two rounds of consultation, opinions from experts reached a consensus.

All items of the preliminary care perception scale of the home-dwelling elderly were listed, and experts were asked to explain their modification or deletion opinions. Likert 5-level scoring method being used, 1–5 points were assigned from "very unimportant" to "very important" for each item. The mean importance score ≥ 4.0 and Coefficient of Variation (CV) ≤ 0.25 were taken as the indicator screening criteria, and the items were supplemented, deleted or modified based on expert opinions.

The most commonly used indicators for evaluating the content validity of a scale is the Content Validity Index (CVI), which includes two types: the item-level Content Validity Index (I-CVI) and the scale-level Content Validity Index (S-CVI), with the latter being the average of the former [29]. The evaluation criteria were I-CVI ≥ 0.78 and S-CVI/Ave ≥ 0.80.

The formula for calculating the authority coefficient (Cr) is Cr = (Ca + Cs)/2, in which Ca indicates the experts' judgment criteria and Cs shows the degree of familiarity with each indication. The judgment criteria is based on four characteristics. If the expert authority coefficient exceeds 0.7, the authority level is considered high, and the scores and recommendations provided by the expert are more reliable.

Phase 3: psychometric test

Sampling and data collection

The study was mainly carried on in Wuhan, Hubei Province(59.2%) and second and third-tier cities(39.1%) in China. The surveyed population was the elderly over 60 years old. Their choice of pension mode was a home-based pension, which could actively cooperate with the researchers' investigation. They had no serious mental illness and were not in the terminal stage. They volunteered to participate in the study. The ethics department of the university authorized the study, and the person in charge of the community where the elderly lived was informed and cooperated with the study before questionnaire distribution. The survey tools included general demographic data and a formal draft of the care perception questionnaire.

The sample size for factor analysis should be 5–10 times the number of items [30]. The preliminary draft of the questionnaire contains 52 items according to the literature review and semi-structured interview. To ensure a sufficient sample size for robust statistical analysis, the convenience sampling method was employed for the survey. While convenience sampling is often associated with limitations such as potential selection bias, several steps were taken to enhance the reliability of the data. Participants were recruited from diverse geographic locations within the target population (home-dwelling elderly in Wuhan, China), and strict inclusion criteria (e.g., age 60 or above, normal cognition, and clear communication ability) were applied to ensure the sample's relevance to the study objectives. A total of 260 questionnaires were collected, of which 238 were valid, with an effective rate of 91.54%. These valid samples were used for Item analysis, reliability analysis and exploratory factor analysis(EFA). To validate the questionnaire's reliability, the second round of survey was conducted with home-dwelling elderly individuals using convenience sampling. A total of 290 questionnaires were collected, of which 260 were valid, with an effective rate of 89.66%. The survey data were used for confirmatory factor analysis(CFA). The large sample sizes, rigorous inclusion criteria, and geographic diversity of participants helped mitigate potential biases and strengthen the validity of the findings.

The data collection methods included both online and paper questionnaires, each serving a specific purpose to ensure comprehensive and reliable data. The online questionnaires were published and managed by the researchers, who sorted and screened the responses to eliminate any submissions with significantly shorter completion times. Simultaneously, paper questionnaires were

distributed by researchers who visited various communities where the elderly reside, allowing for direct interaction and assistance to participants, particularly those with limited digital literacy. By employing both methods on the same target population, we aimed to capture a more representative and diverse range of responses while maintaining consistency in questionnaire content and participant criteria.

Data analysis

The data obtained was imported into Excel and coded before the analysis. The methods used for the analysis were: item analysis, construct validity analysis and reliability analysis. IBM SPSS software version 26.0 and AMOS software version 24.0 were used to conduct the statistical analysis.

Item analysis [31]: (1) Critical ratio method: the differences between the two extreme groups (the top 27% of the total score of the scale was high, and the bottom 27% was low) were compared between groups by an independent sample T-test, and the items with $P > 0.05$ and critical ratio greater than 3.00 were retained. (2) Homogeneity test: the items with a significant product difference correlation coefficient ($P > 0.05$) and a high correlation coefficient ($R > 0.4$) were retained. (3) Cronbach's α coefficient method: keep the dimensions and items with internal consistency α coefficient above 0.80; If an item is deleted and the internal consistency α coefficient of the dimension or total scores significantly increases, the item should be deleted. (4) Commonness and factor load: retain the items with commonness value ≥ 0.20 and factor load ≥ 0.45.

Construct validity analysis [32]: (1)The kaiser-Meyer-Olkin Measure of sampling (KMO) value was calculated. When the KMO value was greater than 0.50, the factor analysis can be carried out among item variables. (2) Bartlett's spherical test was performed. When the significance probability value $p < 0.05$, it was suitable for factor analysis. (3) EFA was carried out. The principal component analysis was used for the factor extraction, and the maximum variance method-one of the orthogonal axis method was used for the factor rotation method. Test principles included: cumulative explanatory variation of extracted common factors is greater than 60%; Common factors include at least three items; It conforms to the test principle of gravel map and is easy to name. (4) To further verify the scale structure validity, 260 valid questionnaires from the second round of the survey were used for CFA to evaluate the model fitting degree.

Reliability analysis [32]: Internal consistency reliability: Cronbach's α coefficients of the total amount table and each dimension were calculated. When corresponding Cronbach's coefficients are greater than 0.9, the questionnaire's or first-level index's internal consistency reliability is good.

Ethical consideration

This study was approved by the University Ethics Committee of Tongji Medical College, Huazhong University of Science and Technology. Informed consent was obtained from participants and the data collected were anonymous.

Result

Item analysis

Through the literature review and the results of the qualitative interview, the item pool of the questionnaire was constructed. The 6 s-level indexes under 3 first-level indexes including 52 items were built based on the distinct properties of each first-level index. The total items included 9 items for self-care, 21 items for family relative care, and 22 items for social care. The caring level of each subject can be adequately evaluated by calculating the scores of questionnaires.

Delphi method

For two rounds, suggestions from 15 experts were received. In the first round, 17 surveys were sent out, with 15 responses obtained, resulting in an 88% recovery rate. Fifteen surveys were sent out in the second round, and 12 responses were received. The experts are from Hubei, Henan, Guangdong, Fujian, Jiangsu and Sichuan provinces in China. Their research covers a wide range of fields, including humanistic care, clinical nursing, nursing management, medical humanities, and sociology. All of them have worked for more than 10 years, and hold intermediate-grade or above professional titles in China, as shown in Table 1.

Correlation evaluation coefficient

The authority coefficient of experts was calculated to be 0.92 in the two rounds, indicating the relatively high expert authority. Kendall's W on the questionnaire was 0.196($X2 = 190.86$, $P < 0.01$) in the first round. The C Vs of the items ranged from 0 to 0.23, with 0.140 being the average. Kendall's W on the questionnaire in the second round was 0.196 ($X2 = 190.64$, $P < 0.01$). The C Vs of the items had a fluctuation range of 0-0.24, with an average of 0.110. Although Kendall's W values for the two rounds of expert consultation were not particularly high, they were all significant, indicating that the expert scores were based and credible. The average C Vs of items had shrunk, indicating that expert differences had shrunk.

Establishment of the second index system

In each round, items were evaluated by calculating the average importance score and CV for second-level

Table 1 Characteristics of experts in the Delphi method

Characteristics	*N* (%)
Professional title	
Senior professional title	8 (53%)
Deputy senior professional title	6 (40%)
intermediate professional title	1 (7%)
Work experience (years)	
10–19	3 (20%)
20–29	4 (27%)
30–39	5 (33%)
40–49	3 (20%)
Research area	
Nursing Management	10 (67%)
Clinical Nursing	7 (47%)
humanistic care	7 (47%)
medical humanities	4(27%)
sociology	1 (7%)
Mentor or not	
Doctor tutor	3 (20%)
Master tutor	5 (33%)
others	7 (47%)

Table 2 Results of content validity

Item	I-CVI	Item	I-CVI	Item	I-CVI
a1	1.00	c1	0.92	g4	0.91
a2	1.00	c2	0.83	g5	0.87
a3	1.00	c3	0.75	g6	0.87
a4	1.00	c4	0.79	g7	0.92
a5	1.00	c5	1.00	g8	0.92
a6	0.92	c6	1.00	f1	0.89
a7	0.90	c7	0.88	f2	0.89
a8	1.00	c8	0.88	f3	0.78
b1	1.00	d1	0.67*	f4	0.75*
b2	1.00	d2	0.75*	f5	0.89
b4	1.00	d3	0.67*	f6	0.78
b3	1.00	d4	0.75*	f7	0.78
b5	1.00	g1	0.83	f8	0.78
b6	1.00	g2	0.79		
b7	1.00	g3	0.92		

*indicates I-CVI < 0.78

indexes and items. The revised questionnaire, incorporating these calculations, expert advice, literature review, and research group discussions, comprised three first-level indexes, six second-level indexes, and 43 items.

Content validity

The Clevis ranged from 0.44 to 1, and items with scores of less than 0.78 were removed. The overall S-CVI/Ave of the questionnaire was 0.89. The content validity was good overall. Table 2 provides more information about this. Although the I-CVI of d1, d2, d3, and d4 lied between 0.67 and 0.75, the caring from the government such as some preferential policies like ticket reduction and subsidies, the facility-construction of fitness and entertainment, special channels or services for the elderly bring a lot of convenience to the old people's life. For many old people who lack enough pensions, preferential policies from the government and communities can largely meet the practical needs of the elderly. Studies have found that elderly people are concerned about key basic services provided by the government, such as access to quality health care, whose well-being is also influenced by the quality of urban government services [32]. In addition, many elderly people express an appeal for government services to meet their higher spiritual needs, such as building enough recreational and exercise facilities and places for elderly activities in the community. The I-CVI of f4 was 0.75 but was still retained owing to its significance.

Table 3 Demographic characteristics of the study participants (*N* = 498)

Variable	*N*	(%)
Gender		
Male	205	41.2
Female	293	58.8
Age (years)		
≥ 60	202	40.4
≥ 70	170	34
≥ 80	110	22
≥ 90	16	3.2
Education Background		
no education background	63	12.7
primary school	124	24.9
junior high school	133	26.7
senior high school/technical secondary school	107	21.5
Junior college	31	6.2
Bachelor and above	40	8
Marital status		
single	4	0.8
married	341	68.5
divorced	5	1
widowed	148	29.7
Residence		
The city of Wuhan	233	46.8
second/third-tier cities	198	39.8
other cities	67	13.4
Live alone		
yes	411	82.5
no	87	17.5

Psychometric analysis

Sample characteristics

A total of 550 elderly living at home answered the questionnaire, and 498 questionnaires were included in the study, with a 91% recovery rate. Table 3 shows the main characteristics of this sample. The sample size of 498 included total samples for EFA and CFA.

Item analysis

The CR values of 43 items were all significant, ranging from 3.761 to 13.940(P<0.05), according to the calculation. This version of the questionnaire exhibited discrimination between the high and low-scoring groups on all of the items.

In homogeneity, the correlation coefficient between a1 item, a3 item and the total score of the corresponding first-level index (self-caring index) was less than 0.4 (r1 = 0.380, r2 = 0.381), so these two items were deleted. The correlation coefficient between the b7 item and the total score of the corresponding first-level index (family and relative index) was 0.269, so this item was also deleted. As shown in Table 4. The commonness of all the items was over 0.20. Except that the factor load of a1, a2, a3, a4, a8 and b7 items was lower than 0.45, the load values of other items on the corresponding factor were > 0.45, as shown in Table 5. Therefore, a1, a2, a3, a4, a8 and b7 were deleted.

Reliability analysis

Internal consistency reliability analysis, Split-half reliability: The total Cronbach's α was 0.945, while each first-level index's Cronbach's α ranged from 0.811 to 0.949. The overall split-half reliability was 0.805.

Construct validity analysis

The KMO value of the whole scale was 0.893 (P < 0.001). The Bartlett spherical test revealed a substantial level of significance (X2 = 9704.073, P < 0.001). These indicated suitability for EFA.

Six factors were limited to be extracted. The cumulative variance contribution rate was 69.02% > 60%, indicating that the structure validity was relatively good. The MSA values in the correlation matrix of reflected images ranged from 0.857 to 0.944, all of which were > 0.50. The load of items f2, f4, f7 and d4 on the two factors is > 0.40, and the difference value is > 0.20, so they were deleted. The items of g6 and g8 were divided into two factors, which of whom should be in the fifth factor, so these two items were deserted, as shown in Table 6.

After a further screening of the items by EFA, the caring perception scale for the home-based elderly with 31 items in 6 dimensions was finally determined, as shown in Table 7. The goodness of fit of each dimension and item of the questionnaire was tested by CFA. The results showed that the chi-square test of goodness of fit of the scale model was χ2 = 1049.98. Chi-square value/degree of freedom (χ2/ DF) = 2.49 (P < 0.05), non-standard fit index (TLI) = 0.91, incremental fit index (IFI) = 0.92, Comparison fitting index (CFI) = 0.92, root mean square error (RMSEA) = 0.07. The model fitting degree standard [33] was χ^2 degree of freedom ratio < 3.00, TLI, IFI, CFI > 0.90,

Table 4 Results of homogeneity test

Item	r1	P1	r2	P2	Item	r1	P1	r2	P2
a1	0.618	0.000	0.38*	0.000	c8	0.548	0.000	0.444	0.000
a2	0.687	0.000	0.406	0.000	d1	0.601	0.000	0.530	0.000
a3	0.72	0.000	0.381*	0.000	d2	0.659	0.000	0.609	0.000
a4	0.617	0.000	0.412	0.000	d3	0.715	0.000	0.648	0.000
a5	0.622	0.000	0.453	0.000	d4	0.762	0.000	0.687	0.000
a6	0.744	0.000	0.455	0.000	g1	0.582	0.000	0.568	0.000
a7	0.626	0.000	0.499	0.000	g2	0.615	0.000	0.598	0.000
a8	0.637	0.000	0.416	0.000	g3	0.577	0.000	0.546	0.000
b1	0.792	0.000	0.598	0.000	g4	0.633	0.000	0.621	0.000
b2	0.755	0.000	0.525	0.000	g5	0.703	0.000	0.689	0.000
b3	0.749	0.000	0.584	0.000	g6	0.587	0.000	0.512	0.000
b4	0.787	0.000	0.519	0.000	g7	0.547	0.000	0.491	0.000
b5	0.818	0.000	0.597	0.000	g8	0.658	0.000	0.594	0.000
b6	0.816	0.000	0.564	0.000	f1	0.764	0.000	0.626	0.000
b7	0.519	0.000	0.269*	0.000	f2	0.824	0.000	0.703	0.000
c1	0.624	0.000	0.563	0.000	f3	0.764	0.000	0.629	0.000
c2	0.683	0.000	0.579	0.000	f4	0.797	0.000	0.673	0.000
c3	0.657	0.000	0.542	0.000	f5	0.779	0.000	0.672	0.000
c4	0.711	0.000	0.613	0.000	f6	0.733	0.000	0.596	0.000
c5	0.666	0.000	0.520	0.000	f7	0.834	0.000	0.710	0.000
c6	0.596	0.000	0.514	0.000	f8	0.747	0.000	0.61	0.000
c7	0.599	0.000	0.562	0.000					

r1: the correlation between the item and the corresponding first-level index

r2: the correlation between the item and the overall questionnaire

* indicates r1 or (and) r2 < 0.4

Table 5 The factor loading and commonness value of items in EFA

Item	Factor loading	Commonness Value	Item	Factor loading	Commonness Value
a1	0.386*	0.453	d1	0.538	0.758
a2	0.397*	0.481	d2	0.616	0.741
a3	0.374*	0.595	d3	0.653	0.751
a4	0.399*	0.394	d4	0.694	0.793
a5	0.450	0.391	g1	0.565	0.67
a6	0.452	0.641	g2	0.611	0.812
a7	0.487	0.403	g3	0.545	0.704
a8	0.403*	0.387	g4	0.631	0.808
b1	0.55	0.837	g5	0.697	0.808
b2	0.474	0.84	g6	0.514	0.509
b3	0.538	0.784	g7	0.508	0.591
b4	0.462	0.9	g8	0.603	0.506
b5	0.543	0.91	f1	0.654	0.693
b6	0.513	0.822	f2	0.729	0.8
b7	0.214*	0.399	f3	0.659	0.817
c1	0.582	0.823	f4	0.695	0.756
c2	0.598	0.867	f5	0.694	0.842
c3	0.563	0.859	f6	0.618	0.65
c4	0.622	0.734	f7	0.735	0.783
c5	0.533	0.814	f8	0.637	0.752
c6	0.529	0.703			
c7	0.562	0.458			
c8	0.457	0.639			

* indicates factor loading < 0.45

RMSEA < 0.08. The load values of each item on the corresponding factors ranged from 0.54 to 0.97. According to the model fit standard, the questionnaire fitting index in this study met the requirements of fit. The model fitted well and had good structural validity.

Discussion

The purpose of this study was to develop a questionnaire to measure the caring perception level of the home-dwelling elderly, from themselves, their family relatives and social surroundings. Multiple methods were used in the investigation to provide adequate rationality and accuracy about the credibility, and breadth of applicability of the content involved, the homogeneity and reasonable structure of the scale, covering wide literature reading, in-depth interviews, the Delphi method, and statistical analysis.

The 15 experts from diverse fields across China ensured the questionnaire's authority and standardization. The questionnaire underwent multiple revisions for clarity and ease of use, and its length was suitable for clinical application. Four methods were used for item selection, achieving a Cronbach's α coefficient > 0.9, indicating reliability and consistency. Content validity indices were 0.78-1 at the item level and 0.89 at the scale level. Overall, the questionnaire was rigorously developed, which could be effective for evaluating elderly care perceptions. The analysis of the results produced three first-level indexes: self-caring, family and relative caring, and social caring. Family and relative caring, with twelve items, highlights both cohabiting and non-cohabiting family members' roles, emphasizing respect and daily care. Social caring is divided into three factors: government assistance (material, non-material, and facilities), personal social relationships (friends and neighbors), and non-social relationships (healthcare organizations and volunteers), all contributing to elder support and well-being. Each secondary factor derived from the internal logic of the project content corresponded well with the results of the EFA and effectively reflected the elderly caring perception. This indicates that the initial compilation of the second-level indexes was reasonable. A more detailed analysis of these second-level indexes will be provided in future discussions when using this tool.

One aspect that lowers older people's quality of life is health issues. Although older people may experience health issues that require greater care, their tendency to seek assistance is so low that they frequently lack access to existing medical services [34, 35]. Additionally, geriatric mental health requires self-preservation. The creation of personal interests, which many older people rarely seek, can be considered as one component of the performance of life enjoyment in the situation of gradual decrease in physical function. A hobby can increase life expectancy in the elderly and aid with negative feelings [36]. The items in this questionnaire provide a comprehensive assessment of health care and spiritual care for the elderly. The family has traditionally been a key domestic caregiver for the elderly, with recent recognition of the benefits of inter-generational care [37, 38]. Three second-level factors made up the social area. Government subsidies and material assistance ensure a basic standard of living for elders, reduce stress, and improve comfort and pleasure through supportive policies [39, 40].

Previous studies have found that the health needs of the elderly are diverse, manifesting in areas such as daily living, psychological comfort, social interaction, and medical services [41, 42]. The caring perception questionnaire can help understand the caring needs of the elderly living at home, identify differences in care perceptions among different individuals, and develop more targeted healthy aging policies, thus providing personalized intervention measures aligned with the goals of the United Nations healthy aging initiatives. These initiatives emphasize the importance of addressing the multifaceted needs of older adults to promote their well-being, independence, and social participation. By aligning with the UN's vision,

Table 6 The rotated component matrix of the questionnaire

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
a3	0.755					
a6	0.732					
a2	0.663					
a1	0.591					
a4	0.551					
a8	0.545					
a7	0.519					
a5	0.504					
b4		0.938				
b5		0.925				
b2		0.901				
b1		0.878				
b6		0.873				
b3		0.848				
b7		0.593				
c3			0.903			
c2			0.899			
c5			0.872			
c1			0.852			
c6			0.789			
c4			0.762			
c8			0.76			
c7			0.5			
d1				0.8		
d3				0.719		
d2				0.719		
d4				0.699		0.461
g2					0.822	
g4					0.814	
g5					0.777	
g7					0.621	
g3					0.619	
g1					0.604	
f5						0.886
f3						0.886
f8						0.847
f2				0.415		0.764
f1						0.762
f6						0.749
f7				0.412		0.739
f4				0.432		0.727
g8						0.61
g6						0.586

the development of this questionnaire not only provides a tool for understanding the needs of the elderly population but also offers theoretical support and practical guidance for achieving healthy aging goals, particularly in the context of home-based care.

This scale will make it easier to comprehend how humanistic care is currently perceived, increase public awareness of humanistic care for older adults living at home, and advance the growth of the senior care industry. Designed with as few items as possible to represent comprehensive connotations, the humanistic care perception scale focuses on the caring sources and behaviors that significantly impact the elderly. It can help promote humanistic care services that align with the UN healthy aging initiatives, which advocate for inclusive, equitable, and person-centered care systems. By addressing the unique needs of home-dwelling elderly individuals, this scale contributes to fostering a supportive environment

Table 7 The caring perception questionnaire of the home-dwelling elderly

Dimensions and items	Content of items
Dimension 1	Self-caring
a1	I actively seek treatment and recovery when I am sick
a2	I actively seek help from people around me when I encounter difficulties or feel helpless
a3	I am passionate about developing or maintaining my hobbies
Dimesion 2	Caring from from cohabitation families
b1	Cohabitation families talk to me and listen to me
b2	Cohabitation families take care of my daily life
b3	Cohabitation families accompany me to do what I want to do, such as entertainment activities, going out for fun, or having dinner
b4	Cohabitation families pay attention to my health, accompany me to see a doctor and purchase medicine
b5	Cohabitation families comfort and let me relieved when I am distressed and sad
b6	Cohabitation families celebrate my birthday
Dimension 3	Caring from non-cohabitation families
c1	Non-cohabiting families care about me by phone
c2	Non-cohabiting families visit me and accompany me
c3	Non-cohabiting families buy some things for me, such as fruits, nutrients and daily necessities
c4	Non-cohabiting families accompany me to do what I want to do, such as entertainment activities, going out for fun, or having dinner
c5	Non-cohabiting families visit and take care of me when I am sick
c6	Non-cohabiting families help me when I am in trouble
C7	Non-cohabiting families take care of their own work, family, and life, so I don't have to worry as much.
C8	Feel respected in the behavior of the younger generation
Dimension 4	Caring from government
d1	Different levels of government departments provide preferential policies, such as ticket and ticket reduction
d2	Different levels of government departments provide subsidies for me
d3	Different levels of government departments build fitness, entertainment and other facilities for me
Dimension 5	Caring from personal social relationship
g1	Friends, the leader and subordinate before retirement keep in touch with me and care about me
g2	Friends, the leader and subordinate before retirement and neighbors visit me
g3	Friends and juniors accompany me to do what I want to do, such as entertainment and going out to play
g4	Friends, the leader and subordinate before retirement and neighbors help me when I am in trouble
g5	Friends, juniors and neighbors come to take care of me or accompany me to see a doctor when I feel unwell
g6	Neighbors invite me to events
Dimension 6	Caring from personal non-social relations
f1	Medical institutions (former inpatient hospitals and community hospitals) and volunteer organizations care about me by phone
f2	Various forms of volunteers help me with housework, accompany me to the supermarket and the bank and help me buy medicine
f3	Various forms of volunteers accompany me to do things I am interested in, such as entertainment activities and going out for fun.
f4	Various forms of volunteers respond to assist me when I take the initiative to seek help
f5	Volunteers in various forms show me respect

that enhances their quality of life, social engagement, and overall health, thereby supporting the broader objectives of healthy aging as outlined by the UN.

This study also has certain limitations. Firstly, we did not use test-retest methods to assess the stability of the questionnaire. Although the questionnaire validation process was relatively comprehensive, its reliability and validity over time need to be tested in further research. Secondly, the use of convenience sampling may lead to a bias in the research results, as the non-random sample size could cause result distortion. Additionally, the study locations were primarily in Wuhan and several other second- and third-tier cities, which may limit the generalizability of the developed questionnaire to the elderly population. Finally, Two methods of online questionnaire and paper questionnaire were used for data collection. The deviation of questionnaire results caused by the two data collection methods may lead to the inaccuracy of research results. To further promote the application of this tool, future research should be conducted in a broader range of regions within China and in other countries.

Conclusion

This study developed a caring perception questionnaire of the home-dwelling elderly through a literature review, qualitative research, and the Delphi method, and tested its reliability and validity through a formal survey. The results indicated that the scale has good reliability and validity. The developed questionnaire includes 3 dimensions and 31 items, and can serve as a tool for assessing the caring perception among home-dwelling elderly individuals, providing a basis for research on humanistic care for this population.

Acknowledgements
The authors wish to thank the study participants for their contribution to the research, as well as current and past.

Author contributions
The authors of this study collaborated on this article and contributed as follows: Mingjiao Feng was responsible for study design, experiment execution, data collection and analysis, and original draft writing. Yilan Liu and Lei Huang participated in study design and experiment execution, provided data analysis and interpretation, and participated in draft revisions. Yuqin Chen, Yanjie You and Hongwei Chang participated in the experimental execution and data collection of the study, conducted data analysis and interpretation, and participated in the revision of the draft. Lihua Zhang and Fengjian Zhang provided background knowledge and literature support for the study, and participated in the results discussion and draft revision.

Funding
This research is funded by the Henan Provincial Science and Technology Research and Development Project (252102320196).

Data availability
I declare that all data and materials are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate
This study was approved by the University Ethics Committee of Tongji Medical College, Huazhong University of Science and Technology (project No. S053). Participants' identity information was anonymized to protect their personal information. Informed consent was obtained from all subjects. All methods were carried out in accordance with relevant guidelines and regulations.

Consent for publication
Not applicable.

Statement
All methods of the research were carried out in accordance with relevant guidelines and regulations upon the University Ethics Committee of Tongji Medical College, Huazhong University of Science and Technology. All experimental protocols were approved by the University Ethics Committee of Tongji Medical College, Huazhong University of Science and Technology in China.

Competing interests
The authors declare no competing interests.

Received: 13 July 2023 / Accepted: 11 February 2025
Published online: 04 March 2025

References

1. The UN. https://www.un.org/zh/global-issues/ageing
2. National Bureau of Statistics of China. Bulletin of the 7th National Population Census (No. 5) - Age composition of the population. https://www.stats.gov.cn/sj/tjgb/rkpcgb/qgrkpcgb/202302/t20230206_1902005.html
3. Chen LK. Population Aging and Health Care services: what governments should do. Arch Gerontol Geriatr. 2021;92(Jan–Feb):104296.
4. Malhotra R, Bautista MAC, Müller AM, Aw S, Koh GCH, Theng YL, Hoskins SJ, Wong CH, Miao C, Lim WS, Malhotra C, Chan A. The aging of a Young Nation: Population Aging in Singapore. Gerontologist. 2019;59(3):401–10.
5. Nakatani H. Population aging in Japan: policy transformation, sustainable development goals, universal health coverage, and social determinates of health. Glob Health Med. 2019;1(1):3–10.
6. Luo Y, Guo C, Wang Y, Zheng X. Trends and Challenges for Population Health and Migration - China, 2015–2050. China CDC Wkly. 2020;2(28):520–4.
7. Fang EF, Xie C, Schenkel JA, Wu C, Long Q, Cui H, Aman Y, Frank J, Liao J, Zou H, Wang NY, Wu J, Liu X, Li T, Fang Y, Niu Z, Yang G, Hong J, Wang Q, Chen G, Li J, Chen HZ, Kang L, Su H, Gilmour BC, Zhu X, Jiang H, He N, Tao J, Leng SX, Tong T, Woo J. A research agenda for ageing in China in the 21st century (2nd edition): Focusing on basic and translational research, long-term care, policy and social networks. Ageing Res Rev. 2020;64:101174.
8. Ministry of Civil Affairs of the People's Republic of China. 2018 Statistical Bulletin on the Development of Civil Affairs. https://images3.mca.gov.cn/www2017/file/201908/1565920301578.pdf
9. Song P, Tang W. The community-based integrated care system in Japan: Health care and nursing care challenges posed by super-aged society. Biosci Trends. 2019;13(3):279–81.
10. Iwata H, Matsushima M, Watanabe T, Sugiyama Y, Yokobayashi K, Son D, Satoi Y, Yoshida E, Satake S, Hinata Y, Fujinuma Y. The need for home care physicians in Japan– 2020 to 2060. BMC Health Serv Res. 2020;20(1):752.
11. Morioka N, Kashiwagi M. Adverse events in home-care nursing agencies and related factors: a Nationwide Survey in Japan. Int J Environ Res Public Health. 2021;18(5):2546.
12. Suwa S, Tsujimura M, Kodate N, Donnelly S, Kitinoja H, Hallila J, Toivonen M, Ide H, Bergman-Kärpijoki C, Takahashi E, Ishimaru M, Shimamura A, Yu W. Exploring perceptions toward home-care robots for older people in Finland, Ireland, and Japan: a comparative questionnaire study. Arch Gerontol Geriatr. 2020;91:104178.
13. Kajander-Unkuri S, Kämäräinen P, Hartikainen T, Turjamaa R. Effectiveness of a combined web-based and simulation-based continuing education on home-care professionals' competence to evaluate older people's acute care needs in Finland. Health Soc Care Community. 2021 Oct 13.
14. Puustinen J, Kangasniemi M, Turjamaa R. Are comprehensive and individually designed care and service plans for older people's home care a vision or a reality in Finland? Health Soc Care Community. 2021;29(5):e144–52.
15. Meyer AC, Sandström G, Modig K. Nationwide data on home care and care home residence: presentation of the Swedish Social Service Register, its content and coverage. Scand J Public Health 2021 Dec 29:14034948211061016.
16. Jarling A, Rydström I, Ernsth-Bravell M, Nyström M, Dalheim-Englund AC. Becoming a guest in your own home: home care in Sweden from the perspective of older people with multimorbidities. Int J Older People Nurs. 2018;13(3):e12194.
17. Wang Z, Liu Z. Older adults' demand for Integrated Care and its influencing factors: a scoping review. Int J Integr Care. 2021;21(4):28.
18. Tang X, Ge S, Ma C, Chen X, Pei Y, Zhou L, Wu B. Evaluating the quality of Home Care in China using the Home Care Quality Assessment Tool. J Transcult Nurs. 2021;32(2):173–9.
19. Huang L, Zhang F, Guo L, Chen Y, Feng M, You Y, Zhang L, Jiang Z, Liu Y. Experiences and expectations of receiving volunteer services among home-based elderly in Chinese urban areas: a qualitative study. Health Expect. 2022;25(6):3164–74.
20. Watson J. Nursing: human science and human care. A theory of nursing. NLN Publ. 1988;15–2236:1–104. PMID: 3375032.
21. The philosophy and science of nursing. Watson J. Colorado Associated University. 1985.
22. Jeste DV, Blazer DG 2nd, Buckwalter KC, Cassidy KK, Fishman L, Gwyther LP, Levin SM, Phillipson C, Rao RR, Schmeding E, Vega WA, Avanzino JA, Glorioso DK, Feather J. Age-Friendly communities Initiative: Public Health Approach to promoting successful aging. Am J Geriatr Psychiatry. 2016;24(12):1158–70.
23. Huang L, Wu HY, Zhang FJ, Zhao HM, Chen YQ, Feng MJ et al. Factors associated with the perceived need for assistance from voluntary services in home-based older adults in Chinese urban areas: a cross-sectional study [J]. BMC Geriatr, 2023, 23(1).

24. Ris I, Schnepp W, Mahrer Imhof R. An integrative review on family caregivers' involvement in care of home-dwelling elderly. Health Soc Care Community. 2019;27(3):e95–111.
25. Huang L, Wu HY, Zhang FJ, Peng X, Guo L, Liao LL, Hu MY, Wang S, Guan CY, Liu YL. Scope and inclination of voluntary service for urban community-living older adults provided by volunteers with nursing background: a qualitative study. Health Expect 2024, 27(1).
26. Kemperman A, van den Berg P, Weijs-Perrée M, Uijtdewillegen K. Loneliness of older adults: Social Network and the living environment. Int J Environ Res Public Health. 2019;16(3):406.
27. Chen Q, Amano T, Park S, Kim B. Home and Community-based Services and life satisfaction among homebound and poor older adults. J Gerontol Soc Work. 2019;62(7):708–27.
28. Farriol-Baroni V, González-García L, Luque-García A, Postigo-Zegarra S, Pérez-Ruiz S. Influence of Social Support and Subjective Well-being on the perceived overall health of the Elderly. Int J Environ Res Public Health. 2021;18(10):5438.
29. Shi JZ, Mo XK, Sun ZQ. Content validity index in scale development[J]. J Cen South Univ(Med Sci),2012,37(2): 49–52.
30. Sun ZQ, Xu YY. Medical statistics[M]. 4e. Beijing:People's Medical Publishing House; 2019. p. 381.
31. Wu ML. Practice of questionnaires statistical analysis - operation and application of SPSS [M]. Chongqing: Chongqing University,2010:166–281.
32. Hogan MJ, Leyden KM, Conway R, Goldberg A, Walsh D, McKenna-Plumley PE. Happiness and health across the lifespan in five major cities: the impact of place and government performance. Soc Sci Med. 2016;162:168–76.
33. Wu ML. Structural equation modeling - operation and application of AMOS [M]. Chongqing: Chongqing University,2010:236–7.
34. Teo K, Churchill R, Riadi I, Kervin L, Cosco T. Help-seeking behaviours among older adults: a scoping review protocol. BMJ Open. 2021;11(2):e043554.
35. Lee JMG, Chan CQH, Low WC, Lee KH, Low LL. Health-seeking behaviour of the elderly living alone in an urbanised low-income community in Singapore. Singap Med J. 2020;61(5):260–5.
36. Tomioka K, Kurumatani N, Hosoi H. Relationship of having hobbies and a purpose in Life with Mortality, activities of Daily Living, and Instrumental activities of Daily Living among Community-Dwelling Elderly adults. J Epidemiol. 2016;26(7):361–70.
37. Lai DWL, Lee VWP, Li J, Dong X. The Impact of Intergenerational Relationship on Health and Well-Being of older Chinese americans. J Am Geriatr Soc. 2019;67(S3):S557–63.
38. Shu Z, Xiao J, Dai X, Han Y, Liu Y. Effect of family upward intergenerational support on the health of rural elderly in China: evidence from Chinese longitudinal healthy longevity survey. PLoS ONE. 2021;16(6):e0253131.
39. Abruquah LA, Yin X, Ding Y. Old age support in Urban China: the role of pension schemes, self-support ability and intergenerational assistance. Int J Environ Res Public Health. 2019;16(11):1918.
40. Zhou M, Sun X, Huang L. Does Social Pension Expansion relieve depression and decrease medical costs? Evidence from the Rural Elderly in China. Int J Public Health. 2022;67:1604296.
41. Liu X, Liu Z, Zheng R, Li W, Chen Q, Cao W, Li R, Ying W. Exploring the needs and experiences of palliative home care from the perspectives of patients with advanced cancer in China: a qualitative study. Support Care Cancer. 2021;29(9):4949–56.
42. Lommi M, Matarese M, Alvaro R, Piredda M, De Marinis MG. The experiences of self-care in community-dwelling older people: a meta-synthesis. Int J Nurs Stud. 2015;52(12):1854–67.

Publisher's note