

Psychometric properties of the Chinese version of the aging transformation scale for elderly dementia patients

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Abstract

Background: The key part of home care services is the assessment of the needs of the home environment for elderly patients with dementia. The present study was conducted to evaluate the psychometric properties of a newly adapted Chinese version of an instrument designed to measure aging transformation needs among elderly patients with dementia. **Methods:** A sample of 175 patients with elderly dementia was selected from ten communities in China. The 55-item aging transformation needs scale was answered by the participants. Content validity, Cronbach's alpha, item-to-total correlation, and exploratory factor analysis were used to assess the reliability and validity of the instrument. **Results:** The aging transformation needs scale has a good surface validity, content validity, and structural validity. The content validity was 0.965; 55 items had large factor loads on their corresponding principal components (≥ 0.5). There was a significant correlation between the aging transformation needs scale and each component ($r = 0.897-0.973$, all $P < 0.01$), and 9 components also had a high correlation ($r = 0.765-0.977$, all $P < 0.01$); the total table Cronbach's α was 0.993, the Cronbach's α of each constituent factor was 0.944-0.990, and the correlation coefficient between factor and content was > 0.40 (all $P < 0.01$). **Conclusions:** Evidence was found to support the reliability and validity of the aging transformation needs scale that measures the quality of the aging transformation needs for patients with elderly dementia from an aging transformation needs perspective.

Background

Dementia is a progressive degenerative disease of the central nervous system. It is the main clinical manifestation of progressive memory impairments, general mental decline, personality changes, and mental behavior abnormalities (Alzheimer's Disease International, 2015). There are currently more than 35 million patients with dementia worldwide, and by 2050 this number is expected to increase to approximately 120 million [1]. Dementia has become one of the most serious chronic diseases leading to loss of physical function [1].

Homecare involves elderly patients who live in their homes and not in old-age care institutions [2]. This model is currently the most important pension model in China [2]. Ten departments, including the Office of the Old Age and the Ministry of Civil Affairs, jointly issued the "Opinions on Comprehensively Promoting the Work of Home Care Services" as early as 2008. This document promoted the development of home care services [3]. The home environment is an important supporting means for home-based care services. Guaranteeing the safe and efficient development of home-based care services is necessary in order to provide a suitable living environment. An aging home environment can help elderly patients maximize their self-care ability and fully integrate and utilize the currently available resources. Therefore, a key part of home care services is the assessment of the needs of the home environment. At present, some home environments can no longer meet the needs of the elderly population, especially those of elderly people with disabilities. Many home environment designs have the following related problems: lack of elevators, unreasonable design and spatial layout, and lack of a safe bathroom space. Additionally, there is a lack of auxiliary facilities and imperfect alarm and help sign systems [4-5]. In view

of this, the author created a suitable aging transformation demand scale and evaluated its reliability and validity.

Literature Review

Research status of foreign aging transformation scales

(1) The Comprehensive Assessment and Solution Process for Aging Residents (CASPAR): CASPAR was developed in 2002 by a multidisciplinary team of rehabilitation, construction, management, etc. professionals in the United States. Experts designed this system to save costs and achieve retrofit assessments under extreme conditions [6]. The tool collects the daily activities and environmental related information of elderly subjects, and assesses the needs of the home care environment, so that experts can develop appropriate transformation plans without visiting the site [6-7]. The evaluator can also evaluate the methods through which elderly patients or their family members request for elderly care professionals such as rehabilitation teachers, nurses, and case managers. It also includes a small amount of on-site measurements and photographs. The entire assessment takes about 25 minutes [6].

CASPAR [8] consists of 6 parts. The aging transformation scale proposes to list the care services that will be provided to the elderly to match those provided by professional care services. Aging reform experts typically use the information collected via the scale to provide a transformation plan after a comprehensive analysis [6]. Several studies have shown that CASPAR has good inter-rater reliability and validity, and the correct recognition rate of environmental problems is above 88% [7]. At present, the tool is widely used in aging transformation of elderly subjects in the United States [8] and has also been adapted for research of aged care services [9-11]. Weeks et al [12] believe that CASPAR adopts a cooperative approach to assess the needs of the home environment transformation of the elderly, which is simple and easy, but requires more time to obtain photographs and field measurements. If the scale of the living environment needs to be reduced, the photographing and field measurement can be omitted.

(2) Housing Enabler: Housing Enabler was prepared by the Swedish rehabilitation engineer Iwarsson [13] in 1996 to assess the accessibility of a living environment. The tool provides a system for collecting and organizing data to provide supporting information for the aging transformation of the home environment. The tool was updated twice in 2000 and 2010, and there are currently two versions of the complete tool and the screening tool [14], and development of an internet platform based on the tool is underway. The full version of the tool has been evaluated by specially trained professionals, including personal, environmental, and score calculations [13]. Fourteen items are present in the personal part, while 12 items are used to assess whether an individual function is limited, 2 items are used to evaluate the use of mobile aids [15], the environment part consists of 3 dimensions including the external environment, entrance, and indoor environment, which are comprised of 28 entries, 46 entries, and 87 entries, respectively, for a total of 161 entries [16]. The higher the score, the greater the problem of the living environment and the stronger the demand for transformation [14]. The full version of the tool was used to conduct an inter-rater reliability test in the elderly populations of five European countries. The results

showed that the individual part-to-evaluator consistency ratio was 91%, the environmental part-evaluator agreement ratio was 85%, and the personal part kappa coefficient was 0.43. The environmental part kappa coefficient was 0.50, which proves that the reliability of the evaluators was good [17-18]. Iwarsson et al. [19] confirmed that non-professionals were trained to use the tool screening version, and the results were highly consistent with those obtained by professionals. Because the tool is more comprehensive and systematic, it has been used in a joint study by five European countries (Germany, UK, Sweden, Hungary, Latvia). The study lasted for 3 years and investigated the relationship between the home environment and the healthy life of the elderly [20].

(3) The Safety Assessment of Function and the Environment for Rehabilitation Tool (SAFER): SAFER was designed in 1993 by a Canadian occupational therapist Oliver [21] for occupational therapists to implement in homes for the elderly in the community. Before an environmental safety intervention, an assessment of the function of the elderly and the home environment is necessary. Each entry in the tool combines the function of the elderly with the environment and does not simply evaluate one of the two. The occupational therapist uses the tool during a home visit to score the environment based on observation, interview, and by asking the elderly to complete an activity, and the entire evaluation process takes about one hour [21]. The tool has been revised several times and the final version includes 97 entries in 14 dimensions [22]. The score is based on questions requiring “yes” or “no” answers, and the higher the score, the less suitable the current environment is for the elderly [21]. The occupational therapist Letts [22] tested the reliability and validity of this scoring system in 1995 and 1998. After expert evaluation, the tool has shown content validity; with a KR-20 coefficient of 0.82, a good internal consistency; both the degree and the test-retest reliability have been shown to be good [23]. In 2006, Canadian occupational therapists transformed SAFER into a more sensitive environmental intervention measurement tool, for functional and rehabilitation environmental safety assessment and for health outcome measurement and evaluation. The scope of this tool is to allow the occupational therapist to measure the suitability for the elderly before and after intervention and to evaluate the effectiveness of environmental safety interventions [24]. The improved version consists of 93 entries in 10 dimensions, using a 4-level scale. The higher the score, the more serious the problem [24]. The tool has good reliability and validity, and the internal consistency is 0.859; the difference in validity is good, and it is negatively correlated with body function status, indicating that a SAFER-HOME not only measures the physical functional status, but also evaluates body function and the environment to a matching degree [24].

(4) Home Assessment Profile (HAP): Designed by the American physiotherapist Chandler [25] in 2001 to assess the environmental factors that may affect the ability of the elderly. The tool assesses the match between the environment and the elderly by trained professionals to observe the activities of the elderly in various areas of the home [25]. HAP consists of 58 items in 7 dimensions. Studies have shown that [25], after balancing other age-related factors such as age, cognitive function, and mobility, the tool can effectively predict the occurrence of falls in the elderly. The higher the HAP score, the greater the likelihood of a fall. The inter-evaluator reliability was 0.92, and the test-retest reliability was 0.92 after two weeks [25].

Research status of domestic aging transformation scales

With the changes in China's social economy, population structure, and other factors, the aging process is accelerating. With such a background, Chinese scholars have included several adaptations to the living environment of the elderly, the aging of the houses, and the aging of the settlements. Theoretical research and practice of aging construction and transformation design have achieved relatively fruitful results. Li Xiaoyun conducted research on urban elderly community-friendly planning strategies for elderly people, and proposed an elderly friendly community social service planning strategy including housing, health and safety, old age culture, old age service system, age integration, and other planning contents such as, the living unit, friendly open spaces, friendly traffic environment, elderly service facilities, the old community suitable for aging design, and other planning content of the elderly friendly community material environment planning strategy [26]. Zhou Yanqi and others analyzed the causes and performances of the current residential areas in terms of suitable aging design from different subjects such as developers, designers, and buyers. In combination with the needs of outdoor activities, the design principles for an outdoor environment suitable for the elderly were proposed. The design points for different types of activity spaces, outdoor facilities and garden elements in the outdoor environment have also been addressed [27]. Yang Shenmao and others proceeded from the design concept of residential fitness and discussed the "dwelling residential design" in the United States, the "House Design Guide for Longevity Society" in Japan, and the "Residential Design for the Elderly" in China. The difference between the design criteria of the three design guidelines has been previously addressed [28]. Domestic scholars have carried out most of the theoretical research and have been involved in the practice of aging construction and renovation design. There is currently no assessment of the correlation between aging and the home environment, therefore this kind of assessment is necessary in China.

In summary, because of the great differences in China's home environment, living habits and lifestyle, and because China's environmental and pension service professional capabilities are extremely scarce, the feasibility of directly introducing and localizing foreign assessment scales is extremely low. It is necessary to understand the status of the aging environment in China, investigate the living habits of the demented elderly patients in China and understand the requirements of the home environment, and compile a suitable aging assessment scale for elderly Chinese people. Today, with the continuous development of community and home care services, nurses are no longer merely continuing the basic health service functions of the community. With the deepening of the aging process, the functions of community nurses are increasingly expanding towards compound professional skills. Nurses should learn and use the Home Environment Assessment Scale to help design and implement a safer home environment, which will help to improve the quality of community care services.

Purpose of the study

The purpose of this study was to evaluate the psychometric properties of the aging transformation needs scale. Using this scale, we will be able to assess the perceptions of the aging transformation needs for elderly people with dementia in China.

Methods

Instrumentation

The aging transformation needs scale was independently created by a research team. The scale comprises 55 statements each with a five-point rating scale. Five alternative answers are given: 1 = 'none', 2 = 'a little', 3 = 'some', 4 = 'many' and 5 = 'a lot'. The aging transformation needs scale consists of nine factors: entrance (12 items), indoor activities (6 items), toilet (3 items), bath (5 items), decoration (3 items), rest (5 items), preparation/meal (6 items), laundry (4 items), supporting environment (11 items). The self-made version has demonstrated good validity and reliability. Cronbach's alpha coefficients in the studies have ranged from 0.944 to 0.984.

Sample

The sampling frame (n = 200) was provided by all elderly people with dementia elderly identified from ten communities in China from August 2018 to February 2019. Inclusion criteria: a. local households older than 60 years of age; b. meet the diagnostic criteria for dementia in the American Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV), and diagnosed by relevant specialists; c. mainly at home for care. Exclusion criteria: a. severe cognitive dysfunction; b. unconsciousness; c. difficulty communicating and understanding.

The questionnaire was returned by 188 subjects (94.0% response rate). Thirteen questionnaires were left blank and were therefore excluded. The final number of analyzed questionnaires was 175.

Ethical considerations

Permission to conduct the study and to obtain entry for the purpose of gathering the data was obtained from the Ningbo College of Health Sciences Ethics Committee. Written informed consent was obtained from study participants. The community service center managers provided the investigators with the meeting schedule, so that the subjects could be approached about the study during a scheduled meeting time. The study was briefly explained including the voluntary nature of participation and the right to withdraw at any time without negative ramifications. The patients consenting to take part received an envelope containing the questionnaire. The participants completed the questionnaire immediately, placed the questionnaire in an envelope and returned it to the investigators. All the completed questionnaires were kept confidential, were examined only by the investigators and were placed in a locked cabinet for security. To assure anonymity, the code numbers were placed on the completed questionnaires after they were returned return to the investigators.

Statistical analyses

Statistical analyses were performed using the Statistical Package for Social Sciences version 22.0 for Windows (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used to analyze the demographic data. Mean imputation was used to manage missing values associated with the long-term care needs

questionnaire as prescribed by Polit and Beck (2004). For the missing items, the most typical responses based on the mean were computed. A probability value of <0.05 was considered statistically significant.

An expert panel was used to establish content validity prior to the implementation of the study. The aging transformation needs scale was sent to five administrators at five community service centers located in five cities in China. Each expert was asked to rate the relevance of each item on a four-point scale from 1 = 'not at all relevant' to 4 = 'very relevant'. The items were considered to have content validity if the items were rated as either three or four. A content validity ratio (CVR) of 0.80 or better indicated good content

validity. The formula developed by Lawshe (1975) for the calculation of this ratio is
$$CVR = \frac{ne - N/2}{N/2}$$
, in which 'ne' is the number of panelists indicating 3 = 'fairly relevant' or 4 = 'very relevant' about a specific item/question and N is the total number of panelists. A concluding question was inserted at the end of the scale to evaluate each administrator's opinion on the relevance of the questionnaire as a whole. Four alternative answers were given: 1 = 'do not need at all', 2 = 'do not need', 3 = 'do need somewhat' and 4 = 'do need totally'. To test the internal consistency of the instrument, Cronbach's alpha coefficient was calculated for the total score of the long-term care needs questionnaire and the sub-questionnaire. Correlations of 0.80 and higher are highly desirable (Polit& Beck 2004). An item analysis was conducted to provide information about how each individual item related to other items in the sub-questionnaire. Correlations of 0.40 or higher are generally recommended (Spector 1992). Item-total correlations below 0.30 are usually considered unacceptably low (Polit & Beck 2004).The factor structure of the scale was examined using an exploratory factor analysis and principal component analysis (PCA) with a varimax rotation. A PCA was performed to identify independent sub-questionnaires from the total 30-item scale. A varimax rotation was used in the extraction. To evaluate the constructed sub-questionnaire, four factors were chosen in the extraction of the factor analysis. A loading of 0.50 was used for the items to be included in each factor/sub-questionnaire.

Results

All of the subjects suffered from dementia and their ages ranged from 60 to 98 years old, with an average age of 78.67 years. The monthly income ranged from 1000 to 8000 yuan, with an average income of 3546.68 yuan. There were 98 females (56.0%) and 77 males (44.0%). Most patients had a primary school education degree (n = 108, 61.7%). Most subjects were widowed (n = 100, 57.1%).

According to the meaning of the aging transformation needs scale and its constituent factors, five experts analyzed the degree of consistency between the nine constituent factors and their descriptions. The results are shown in Table 1.

Table 1 Evaluation of the surface validity of the aging transformation needs scale (items)

Factors	Very relevant	Related but still needs to be changed	Must be modified to be relevant	Irrelevant	Total
Import and export demand	55	3	2	0	60
Indoor activity needs	28	2	0	0	30
Toilet needs	13	1	1	0	15
Bathing needs	24	1	0	0	25
Modifying needs	13	1	1	0	15
Rest needs	22	3	0	0	25
Meal needs	28	2	0	0	30
Laundry needs	19	1	0	0	20
Supporting Environmental needs	50	3	2	0	55
Total	252	17	6	0	275

The CVR between the expert panelists ranged from 0.8 to 1.0. The results of the last question concerning the relevance of the total aging transformation needs scale showed that the five administrators unanimously agreed that the total scale was relevant.

To determine the validity of the aging transformation needs scale, a factor analysis was conducted which was deemed appropriate given the Kaiser–Meyer–Olkin (KMO) measure of 0.93 and the significant Bartlett test ($X^2 = 5739.316$; $P < 0.0001$). A KMO value of 0.93 indicated that the sample size was sufficient for the factor analyses and the significant results of the Bartlett test showed that the correlation matrix of the scale items was appropriate for the factor analyses. To determine the factor structure of the ageing transformation needs scale, a PCA with a varimax rotation was conducted. Nine factors, accounted for 95.2% of the variance. The factor load test adopts the maximum variance rotation method, and the entries of the 55 scales have large factor loads on their corresponding principal components (all ≥ 0.5). The factor analysis results suggest that the home environment suitable for the aging transformation needs scale has a higher structural validity.

The aging transformation needs scale scores are shown in Table 2. Overall, the patients highly perceived their aging transformation needs [mean = 26.84; standard deviation (SD) = 4.59]. The subjects believe that they had the greatest access to rest needs (mean = 4.48, SD = 0.81) and access to supporting environmental needs (mean = 4.47, SD = 0.78).

Table 2 Detailed description of the aging transformation needs scale (n = 175)

The scale and its sub- scale	Mean	Standard deviation	Score range	The number of items
Import and export demand	4.29	0.71	1-5	12
Indoor activity needs	4.44	0.76	1-5	6
Toilet needs	4.41	0.79	1-5	3
Bathing needs	4.42	0.80	1-5	5
Modifying needs	4.41	0.88	1-5	3
Rest needs	4.48	0.81	1-5	5
Meal needs	4.40	0.86	1-5	6
Laundry needs	4.35	0.92	1-5	4
Supporting environmental needs	4.47	0.78	1-5	11
Total scale	26.84	4.59	9-45	55

The aging transformation needs scale and its various factor correlation scales presented a high correlation with the nine factors (both $P < 0.01$). The specific results are shown in Table 3.

Table 3 Correlation between the aging transformation needs scale and its various factors (r)

	Import and export demand	Indoor activity needs	Toilet needs	Bathing needs	Modifying needs	Rest needs	Meal needs	Laundry needs	Supporting environmental needs
Scale	0.897**	0.921**	0.906**	0.962**	0.941**	0.953**	0.948**	0.936**	0.973**
and export demand		0.905**	0.765**	0.834**	0.794**	0.790**	0.766**	0.765**	0.800**
Indoor activity			0.784**	0.867**	0.856**	0.863**	0.780**	0.831**	0.838**
Toilet needs				0.859**	0.808**	0.851**	0.918**	0.835**	0.901**
Bathing needs					0.952**	0.911**	0.911**	0.894**	0.932**
Modifying needs						0.928**	0.860**	0.911**	0.914**
Rest needs							0.905**	0.900**	0.951**
Meal needs								0.912**	0.977**
Laundry needs									0.922**
Supporting environmental									

The internal consistency coefficient (Cronbach's alpha) was 0.99 for the total questionnaire and varied between 0.95 and 0.99 for the nine sub-scales. In the item analysis, the correlations ranged from 0.40 to 0.99. The items of the supporting sub-scale had the highest correlations. All of the 55 items had a corrected item-total correlation >0.40 (Table 4).

Table 4 Reliability and correlations between the items and the total aging transformation needs scale (n = 175)

Items	Cronbach' s α	Item-to-total correlation
Import and export demand	0.94	0.40
Indoor activity needs	0.95	0.84
Toilet needs	0.99	0.99
Bathing needs	0.98	0.89
Modifying needs	0.98	0.98
Rest needs	0.96	0.84
Meal needs	0.99	0.96
Laundry needs	0.98	0.97
Supporting environmental needs	0.98	0.76
Total scale	0.99	0.47

Discussion

Current status of the aging transformation needs scale

Table 1 shows that the number of entries that are very relevant and that are relevant but still need to be changed is 97.82% (269/275), and the “one-point irrelevant” entry is 0. This result indicates that the home environment is suitable. The aging transformation demand scale therefore has a good surface validity.

The CVI of the Home Environment Adaptation Requirement Scale is 0.965, which meets the requirements of $CVI \geq 0.80$. The results prove that the self-made items of this scale basically meet the requirements for suitable aging transformation requirements, but there is also a “must be modified to be relevant” item with a proportion of 2.18% (6/275). This result prompted us to further analyze the data and to pay attention to the individual differences of the patients themselves.

Table 2 shows that the care needs of the subjects were focused on resting and the presence of a supporting environment and indoor activity space. The subjects in this study had the highest proportion (64.2%) based on the MMSE evaluation. The ability to perform daily life activities is based on self-care. In most cases, people with mild dementia can eat, wear, wash, etc. These patients are able to take care of them themselves in their daily life and reduce their dependence on others. Therefore, there is a high demand for the transformation of the supporting environment and the indoor activity space, with the hope to have a broader and safe space for activities. There is often a request to switch the lights on the bed, the indoor lighting light can allow the elderly to see the indoor environment. Additionally, phone and doorbell sounds should be loud and the ground should be equipped with anti-skid flooring to prevent falling. This is consistent with the research results of An Haoyuan [5]. A large number of studies at home

and abroad [29-30] found that the home environment of the elderly is very important to improve their quality of life. In addition, the aging transformation of the home environment can also help prevent falls, delay functional decline, and save manpower costs. Therefore, in home care services, it is necessary to attach great importance to the needs of environmentally-friendly aging transformations. Demand assessment is the basis for this transformation. It is hoped that the government and relevant personnel will pay close attention and support these needs.

Table 3 shows that there is a significant correlation between the home environment aging transformation demand scale and the nine constituent factors, and the correlation coefficient r ranged from 0.897 to 0.973 (both $P < 0.01$); the nine constituent factors of the scale also had a good correlation, and the correlation coefficient r ranged from 0.765 to 0.977 (both $P < 0.01$). The results of this study suggest that if relevant departments actively explore the needs of the aging population, this will greatly improve the living environment of the demented elderly and improve their survival. Quality promotes the rapid development of China's pension unemployment.

Reliability of the aging transformation needs scale

Reliability is defined as the degree of reliability and stability of a scale, expressed in terms of reliability coefficients. This study uses internal consistency to reflect the degree of correlation between entries, often measured using Cronbach's alpha coefficient, where alpha represents the proportion of the total variation in the scale caused by different subjects. The larger the value of α , the better the correlation between the entries.

The results of Table 4 show that the Cronbach's α of the scale and its nine constituent factors are both higher than 0.90, indicating that the scale has high internal consistency. The correlation between the nine constituent factors and their corresponding contents was higher than 0.40 (both $P < 0.01$). This result indicates that the scale has a higher reliability. At the same time, repeatability was not assessed on this scale because it requires two measurements of the same object using the same scale in a short period of time. Considering the large sample size of this study and the special group analyzed, it was not appropriate to complete two measurements of the patients in a short period of time. Therefore, this study did not evaluate this aspect.

Validity of the aging transformation needs scale

Validity is validity, which is defined as the extent to which a measurement tool can measure the event it is measuring. The results of this study showed that the number of entries that are very relevant and relevant but still need to be changed was 97.82% (269/275), and the "one-point irrelevant" entry was 0, indicating that the scale has a good surface validity. The content validity CVI was 0.965, which meets the requirements of $CVI \geq 0.80$, indicating that the scale has good content validity. In the factor analysis, the cumulative contribution rate of the nine principal components reached 91.9%, and the entries of the 55 scales in the factor loading analysis had larger factor loads on their corresponding principal components (both ≥ 0.5), indicating that the scale had better structural validity.

Limitations and further research

The psychometric testing was limited by the use of a convenience sample and the fact that the data gathering sites were located in ten communities in one city in China. In the future, a test–retest procedure could be used to further establish the reliability of the long-term care needs questionnaire. As a result of the large sample, it was not feasible to examine the test–retest reliability. Therefore, further research is required to verify the relationships between the aging transformation needs and aging transformation needs outcomes such as life quality and cognitive status in the same way researchers have studied these relationships in Western countries. Further studies with elderly patients with dementia in China are also needed to evaluate the utility of the aging transformation needs scale.

Conclusion

Research on the aging of the home environment has just started in China, and the aging reform is very important to improve the quality of life of the elderly. However, there is a lack of understanding of the elderly themselves and most of the elderly professionals. The development of a home environment suitable aging transformation demand scale is imperative. The development and development of the self-evaluation home environment suitable aging transformation demand scale can help the elderly self-assess the degree of matching between the living environment and their own functional status, thus finding reasonable and scientific transformation needs. At the same time, community and home care services can also use this scale to more economically and conveniently assess the needs of the living environment, reduce the risk of falls, delay dysfunction, and improve the quality of life. With the continuous development of community and home care services and the gradual deepening of the aging process, higher requirements are placed on the development of composite professional skills of community nurses. Nurses should learn and use the assessment scale for the aging transformation of the home environment in order to assist builders in designing and implementing a safe home environment and contribute to the improvement of the quality of community care services.

Abbreviations

DSM-IV: American Diagnostic and Statistical Manual of Mental Disorders, 4th Edition; CVR: content validity ratio; PCA: principal component analysis; SD: standard deviation; KMO: Kaiser–Meyer–Olkin

Declarations

Competing interests

The authors declare that they have no competing interests.

Ethics approval and consent to participate

Permission to conduct the study and to obtain entry for the purpose of gathering the data was obtained from the researchers' academic institution at the Ningbo College of Health Sciences (NBWY-015). Written informed consent was obtained from study participants.

Consent for publication

Not applicable.

Availability of data and materials

The data sets generated and analyzed during the current study are not publicly available due to ethical restrictions and patient confidentiality but are available from the corresponding author on reasonable request. The aggregated data are provided in the tables.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

LY L and NS conception, design, analysis and interpretation of data, drafting the manuscript, revising manuscript, final approval; LB Y acquisition of data, project administration, revising manuscript, final approval; XX D & YC Y formal analysis, revising manuscript, final approval; HJ L conception, revising manuscript, final approval; LY L conception, design, funding acquisition, revising manuscript, final approval; NS conception, design, project administration, revising manuscript, final approval. All authors read and approved the final manuscript.

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