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Translation and validation of a Chinese version of the pancreatitis quality of life instrument (PANQOLI) in patients with chronic pancreatitis

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Abstract

Purpose Chronic pancreatitis (CP) is a chronic fibroinflammatory pancreatic disease that severely impacts patients' quality of life (QoL). The Pancreatitis Quality of Life Instrument (PANQOLI) is an 18-item measure specifically designed to assess QoL amongst patients with CP. This study aimed to develop a Chinese version of PANQOLI and assess its reliability and validity in the Chinese CP cohort.

Methods Translation was performed according to forward-backwards translation steps and transcultural adaptation. Five hundred Mandarin Chinese-speaking patients with CP were enrolled, 250 for the exploratory factor analysis (EFA) and 250 for the confirmatory factor analysis (CFA). Item analysis, reliability analysis (internal consistency, split-half reliability, test–retest reliability), and validity analysis (content validity, construct validity, and convergent validity) were performed.

Results Item analysis of the Chinese version of PANQOLI revealed that the absolute t values of all items were > 3. Reliability analysis showed that Cronbach's α coefficient was 0.868, split-half coefficient was 0.934, and intraclass correlation coefficient was 0.859, demonstrating excellent reliability. For content validity, item level content validity index (I-CVI) ranged from 0.8 to 1.0, and average of I-CVI scores across all items (S-CVI/Ave) was 0.91. In construct validity analysis, EFA produced four dimensions after rotation, and results of CFA showed $\chi^2/df = 2.346$, comparative fit index (CFI) = 0.929, Tucker–Lewis index (TLI) = 0.915, and root-mean-square error of approximation (RMSEA) = 0.074. The analysis of convergent validity indicated that the Chinese version of PANQOLI was moderately correlated with the physical ($r = 0.436$, $P < 0.001$) and mental component summary ($r = 0.518$, $P < 0.001$) of the 36-Item Short Form Health Survey.

Conclusion The Chinese version of PANQOLI appears to be culturally appropriate, reliable, and valid for assessing the QoL amongst Chinese patients with CP.

Keywords Chronic pancreatitis · PANQOLI · Translation · Reliability · Validity

Introduction

Chronic pancreatitis (CP) is a fibroinflammatory disease of the pancreas, which presents as abdominal pain, pancreatic calcification, and deterioration of exocrine and endocrine

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pancreatic function [1, 2]. The prevalence of CP ranges between 42 and 73 per 100,000 adults, steadily increasing during the past two decades, and becoming a significant global disease burden [3–5]. Inducing chronic pain, diabetes, steatorrhea, malabsorption, multiple complications, and increased risk of developing pancreatic cancer, patients with CP suffer from severely reduced quality of life (QoL) [6, 7]. Approximately one-third of patients with CP experience depression or anxiety. Those experiencing psychiatric comorbidities were associated with reduced global health and role function, further burdening the patients and the health care system [8]. Therefore, a disease-specific instrument for assessing the QoL of patients with CP is warranted to clearly and accurately evaluate the effectiveness of clinical management.

Previously, studies have utilised generic QoL instruments such as Short Form-36 (SF-36) [9], Short Form-12 (SF-12) [10, 11], European Organization Research Therapy for Cancer (EORTC QLQ-C30/QLQ-PAN26) [12], and Gastrointestinal Quality-of-Life Index (GIQLI) [13, 14] to assess QoL of patients with CP. Notably, these instruments lacked issues unique to the CP patient group and were not explicitly designed to evaluate the QoL of patients with CP [15]. Thus, a new disease-specific instrument, Pancreatitis Quality of Life Instrument (PANQOLI), was developed and validated for evaluating QoL in CP patients by a multi-centre study with 159 participants [16]. The PANQOLI contained four domains: physical, role, and emotional functions, as well as self-worth [16]. The "self-worth" is a unique subscale that addresses issues including overall health, economic health, body image, and stigma. This novel scale exhibited high reliability (Cronbach's alpha = 0.869, 0.849, 0.914, and 0.704, respectively) in all domains and showed excellent construct validity, with good correlations to generic quality of life instruments (SF-12PH and SF-12MH [$r = 0.574$ and 0.569, $P < 0.0001$]) [16]. Since then, it has been further used for QoL evaluation of CP patients with sleep disturbances and telephone-based mindfulness therapy intervention [17, 18].

Currently, the PANQOLI is only limited to English-speaking patients and has not been translated and validated in Chinese and other languages. Considering the large volume of patients and distinct cultures between the Eastern and the Western, this study aims first to develop the Chinese version of PANQOLI, and then assess its reliability and validity in the Chinese CP cohort.

Methods

Phase 1: translation and transcultural adaptation

Translation of the PANQOLI

This study has obtained the official and personal authorisation and English version of the PANQOLI (License Number: 5171180431103). The forward-backwards translation was performed according to the multistep method proposed by Brislin's model [19]. First, the original version was forward translated into the Chinese language by two bilingual native translators independently. Translator 1 was a Chinese native gastroenterologist fluent in English with rich clinical experience (YYQ) who adapted the scale from a clinical perspective. Translator 2 was an English teacher in higher education with more than ten years of service (JLC), translated from a language perspective. Second, a Chinese native nursing researcher (YQP) compared the two translated versions with the original version of PANQOLI and discussed the discrepancies, mediating with the two translators to reach a consensus. The product of this phase was generated only with a unanimous agreement between the above three medical and language experts. The third step involved two consultants with a bicultural background who are Mandarin Chinese-speaking translators not aware of the content of the original scale [one was a gastroenterologist who engaged in pancreatic disease research (XJ). The other was an associate professor of medical English and a master of British Literature (YZ)], invited to back-translate the Chinese product. Finally, a Chinese native Master of nursing (JYC), fluent in English, compared the back-translated version with the original version and conducted harmonisation to ensure at least 90% consistency with the original PANQOLI. This process produced the first draft of Chinese version.

Transcultural adaptation

An expert committee consisting of one psychometric expert (XQM), two nursing experts (YQP, HPY), and three pancreatic disease experts (LX, WBZ, HLH), with an experts' authority coefficient of 0.9, was formed. All experts were invited to refine and modify each item of the first draft Chinese version, considering Chinese language habits and cultural background. The semantic equivalence was established using a 4-point rating scale: 1 'not relevant', 2 'must be modified to be relevant', 3 'relevant but still needs to be modified', and 4 'very relevant'. Any item rated ≤ 2 by more than 2 experts was amended. The expert committee made appropriate adjustments to form the prefinal Chinese version of PANQOLI.

Pre-testing

Forty Chinese patients with CP in Changhai Hospital who were Mandarin Chinese speaking and eligible for inclusion criteria were involved in the pre-testing. The time for completing the scale of each patient was recorded. Then, the patients were interviewed for cognitive testing to assess whether the contents conformed to Chinese language habits or were difficult to understand. After discussion and correction with the expert committee, considering consistent patient feedback, the final Chinese version of PANQOLI was produced. Forty questionnaires were handed in for pre-testing, and all were effectively returned.

Phase 2: testing procedure of the Chinese version of PANQOLI

Participants

According to the requirements of exploratory factor analysis (EFA), analysis is acceptable when the quantity of respondents is ten to fifteen times as many as the number of analysis items. Therefore, this study requires at least 180 to 270 participants for EFA. Considering different sample sources of EFA and confirmatory factor analysis (CFA), the minimum effective sample size of CFA was 200 participants [20, 21]. Allowing for the possibility of missing data, 517 in-patients with a diagnosis of CP in Changhai Hospital were recruited, using a convenience sampling method between April and August 2020. This study was approved by the Ethics Committee of Changhai Hospital. All the participants provided written informed consent.

Inclusion criteria were Chinese-speaking adult patients (> 18 years) diagnosed as CP according to the Asia–Pacific consensus report and Cambridge classification [22, 23], and with sufficient capacity to understand and answer the questionnaires. The exclusion criteria included: (1) individuals that could not communicate in Mandarin Chinese, (2) patients that refused to participate in the study, (3) patients with severe comorbidities such as advanced malignant tumours (estimated survival period < 6 months), Acquired Immune Deficiency Syndrome, congestive heart failure, chronic obstructive pulmonary disease, decompensated liver cirrhosis, and renal failure[16].

Data collection instruments

General information questionnaire A self-made general information questionnaire was used to collect information regarding the demographic variables of CP patients (gender, age, marital status, employment status, education level) and CP-related variables (duration of disease, history of smoking, history of alcohol consumption, and the situation of drugs use).

PANQOLI The PANQOLI included four domains of 18 overall items; physical function (5 items), role function (5 items), emotional function (4 items), and self-worth (4 items). [16] Each item scored between 0 and 5, and those items (including items 1 to 6, 12 to 18) that negatively impacted QoL were reversed-scored—with the "0" or not applicable response options becoming a "6" or a very positive option, "1" becomes "5", "2" becomes "4", "3" becomes "3", "4" becomes "2", and "5" becomes "1". For the items 7–11, where higher scores already equal positive QOL—the "0" values are not applicable and were converted to a "3", which is equal to no change in that variable. Therefore, the scoring here is as follows: "0" becomes "3", "1" remains as "1", "2" remains as "2", "3" remains as "3", "4" remains as "4", and "5" remains as "5". After calculation, the minimum possible final score was 18, and the maximum possible final score was 90, with a higher final score reflecting better QoL.

Medical outcomes study 36-item short form health survey (SF-36) The SF-36 was developed by RAND corporation in the USA to measure health-related quality of life [24]. The survey contains 8 domains and includes 36 total items: vitality, physical functioning, bodily pain, general health perceptions, emotional and social functioning, and mental health. The eight scales form two distinct clusters based on their relation to the physical or mental health; these are summarised as the physical component summary (PCS) and the mental component summary (MCS). Possible scores range from 0 to 100, with higher scores representing better health status. The Cronbach's α of all scales of Chinese version of SF-36 were above 0.70, indicating this scale was satisfied to use [25].

Data collection

The purpose and precautions (including voluntary participation, data confidentiality, and informed consent) for filling in the electronic questionnaire were outlined to all individuals during this study. Patients completed the final scale independently using electronic questionnaires on the WeChat platform. A total of 517 electronic questionnaires were distributed, of which 500 were effectively returned, with an effective response rate of 96.7%. Of these, 250 respondents were collected for EFA, and 250 were recruited to conduct CFA. For test–retest reliability, 30 patients were randomly selected to complete the scale again two weeks after their first questionnaire was submitted.

Psychometric evaluation

In item analysis, we compared item responses between the highest 27% and lowest 27% of the questionnaire scores of the Chinese version of PANQOLI [26]. After independent samples for the *t*-test, the items' absolute *t* values were analysed [27]. The correlation coefficient between each item and the total scale scores was also calculated [27].

Reliability was tested by internal consistency, split-half reliability, and test–retest reliability. Internal consistency was assessed by Cronbach's α coefficient, split-half reliability was analysed by Guttman split-half reliability coefficient, and 30 patients were randomly selected for test–retest reliability [28], which was assessed using intraclass correlation coefficients (ICC) and Pearson's correlation coefficient.

Content validity was evaluated by five pancreatic-related experts using the content validity index (CVI), including the item level CVI (I-CVI) and the average of I-CVI scores across all items (S-CVI/AVE). Experts were asked to score the whole scale and each item on a 4-point Likert scale: 1 not relevant, 2 somewhat relevant, 3 relevant, 4 fully relevant. The CVI was calculated based on the number of fully relevant responses divided by the total number of questions [29]. Construct validity was assessed using EFA and CFA. Since the SF-36 is one of the most early used scales in evaluating QoL of patients with CP [9, 30], the convergent validity was assessed by evaluating the relationship between the Chinese version of PANQOLI and SF-36 using the Pearson correlation coefficients.

Statistical analysis

SPSS 26.0 (Chicago, IL, USA) was used for statistical analysis. Categorical data were expressed as frequency (%), and descriptive data were reported as mean and standard deviation (SD). A P value < 0.05 was considered statistically significant.

The absolute t values above 3 were considered statistically significant for item analysis [27]. Correlation of items with a coefficient $r > 0.4$, 0.3–0.4, and 0.2–0.3 related to the total score of the scale was considered excellent, good, and acceptable, respectively [27]. In reliability analysis, coefficient > 0.70 was considered acceptable, and above 0.90 were indicative of excellent reliability [31, 32]. As for the validity assessment, I-CVI of content validity should be above 0.78, and S-CVI/AVE should be 0.90 or higher [29]. Construct validity was evaluated as follows: EFA was performed through the Promax rotation method. Additionally, a Kaiser–Meyer–Olkin index (KMO) > 0.80 and statistically significant results of the Bartlett χ^2 test indicated eligibility to perform EFA [33]. The CFA was analysed by using covariances data matrix, maximum likelihood estimation method for continuous data, and four correlated factors model, which was conducted by AMOS 24.0 of SPSS to test the fitness of the total scale. The model fit of CFA was considered as very good when $1.0 <$ the ratio of chi-square and degrees of freedom (χ^2/df) < 3.0, comparative fit index (CFI) > 0.95, Tucker–Lewis index (TLI) > 0.95, and root-mean-square error of approximation (RMSEA) < 0.06 [34, 35].

Results

Phase 1: translation and transcultural adaptation

The forward-backwards translators were able to reach a consensus for translation. After comparing the differences between the forward-translated version, the backwards-translated version, and the original scale, the expert committee considered that the statements are clear. Some inconsistencies were found, primarily due to the semantic differences between the Chinese and English languages. First, "slightly" has three different expressions in Chinese, so this study translated it to "a little", which ensured the conceptual and semantic equivalence with the original scale. Second, in item 9, the researchers were doubtful about the meaning of "role as a parent/caregiver". After further discussion, it was modified to "the ability to fulfil the social responsibilities as parents/caregivers". Finally, the questions in the original scale are declarative, which is unsuitable for Chinese expressions. A "how" was added before each sentence, more in line with the Chinese language habits. For example, item 1, "Over the last 4 weeks, the severity of your pain has been…" was revised as "Compared with 4 weeks ago, how about the severity of pain you suffer from in the last 4 weeks?". After minor modifications to the above items, a coordinated version was produced.

In pre-testing, 30 native Chinese patients were invited to assess the comprehensibility of the prefinal Chinese PANQOLI version. The recovery rate of questionnaires was 100%, and the mean time for completing the scale was 4.57 min (ranging from 3.40 to 7.50 min). In the evaluation of "weight loss" of item 5, participants mistakenly considered that the grade of "much more" was equivalent to "gain weight". As a result, the grade of this item was revised to "0 no weight loss, 1 weight loss was much alleviated, 2 weight loss was slightly alleviated, 3 weight loss was no change, 4 weight loss was slightly exacerbated, 5 weight loss was much exacerbated". For item 7, the expression "participate in activities with your family" was not specific, so it was modified to "participate in housework and family life". We further invited 10 participants to fulfil the revised version, and all participants considered the questionnaire straightforward and easy to understand. Finally, the Chinese version of PANQOLI was produced, and the items and their expression are illustrated in Supplementary Table 1.

Phase 2: testing procedure of the Chinese version of PANQOLI

General information of participants

The general information of the 500 participants is presented in Table 1. The majority of patients were male (64.0% in EFA participants and 68.0% in CFA participants), and middle-aged patients between 30 and 49 years old are the largest group (48.4% in EFA, 54.4% in CFA). The vast majority were married (76.8% in EFA, 88.0% in CFA) and had a full-time job (53.6% in EFA, 64.4% in CFA). Approximately two-thirds of patients had completed high school/special school or above education levels. More than 60% of participants lived less than five years with CP. In the EFA group, 28.4% and 13.2% of participants had a history of smoking and alcohol consumption, respectively. In the CFA group, 36.8% and 27.6% of patients were smoking and drinking, respectively. Most participants used pancreatic enzyme replacement therapy (64.8% in EFA, 83.6% in CFA).

Table 1 General information of the included participants ($n=500$)

Variables	*N* (%)	
	EFA participants ($n=250$) (%)	CFA participants ($n=250$) (%)
Demographic variables		
Gender		
Male	160 (64.0)	170 (68.0)
Female	90 (36.0)	80 (32.0)
Age		
18–29 years	62 (24.8)	35 (14.0)
30–49 years	121 (48.4)	136 (54.4)
50–65 years	67 (26.8)	79 (31.6)
Marital status		
Single	51 (20.4)	28 (11.2)
Married	192 (76.8)	220 (88.0)
Divorced	6 (2.4)	2 (0.8)
Widowed	1 (0.4)	0 (0.0)
Employment status		
Full-time job	134 (53.6)	161 (64.4)
Student	27 (10.8)	13 (5.2)
Part-time job/Unemployed	68 (27.2)	50 (20.0)
Retired	21 (8.4)	26 (10.4)
Education level		
Middle school or below	84 (33.6)	47 (18.8)
High school/Special school	62 (24.8)	79 (31.6)
College/University	99 (39.6)	117 (46.8)
Postgraduate	5 (2.0)	7 (2.8)
CP-related variables		
Duration of disease		
< 5 years	161 (64.4)	157 (62.8)
5–10 years	69 (27.6)	72 (28.8)
> 10 years	20 (8.0)	21 (8.4)
History of smoking	71 (28.4)	92 (36.8)
History of alcohol consumption	33 (13.2)	69 (27.6)
Drug use		
No	76 (30.4)	39 (15.6)
Pancreatin	162 (64.8)	209 (83.6)
Analgesics	16 (6.4)	2 (0.8)
Others	5 (2.0)	6 (2.4)

EFA exploratory factor analysis; *CFA* confirmatory factor analysis

Psychometric evaluation

Item analysis A total of 500 samples were finally included for item analysis, with no missing data for each item (see Table 2). The results showed that the absolute t values of all items are higher than 3 (ranging from 3.164 to 35.325, $P<0.01$), indicating that the questionnaire has good discrimination, and all 18 items remained. The scores of all items are significantly related to the total score (r ranged from 0.238 to 0.811, $P<0.01$), except for item 10 ($r=0.194$, $P<0.01$).

Reliability analysis The Cronbach's α coefficient of the Chinese version of PANQOLI is 0.868, and internal consistency estimated for the four subscales also provided acceptable to

Table 2 Items screening of the Chinese version of PANQOLI

Item	Critical ratio method		Item-total score correlation	
	t	*P*	*r*	*P*
1	15.802	< 0.001	0.583	< 0.01
2	6.901	< 0.001	0.451	< 0.01
3	7.933	< 0.001	0.519	< 0.01
4	10.064	< 0.001	0.443	< 0.01
5	10.988	< 0.001	0.467	< 0.01
6	13.260	< 0.001	0.526	< 0.01
7	4.471	< 0.001	0.238	< 0.01
8	4.715	< 0.001	0.255	< 0.01
9	5.098	< 0.001	0.319	< 0.01
10	3.164	< 0.001	0.194	< 0.01
11	5.122	< 0.001	0.321	< 0.01
12	17.186	< 0.001	0.604	< 0.01
13	26.964	< 0.001	0.705	< 0.01
14	35.325	< 0.001	0.794	< 0.01
15	27.236	< 0.001	0.789	< 0.01
16	31.458	< 0.001	0.811	< 0.01
17	24.953	< 0.001	0.735	< 0.01
18	20.235	< 0.001	0.710	< 0.01

PANQOLI Pancreatitis quality of life instrument

excellent reliability, with Cronbach's α coefficient of physical function, role function, emotional function, and self-worth as 0.715, 0.829, 0.931, and 0.702, respectively. The split-half Guttman coefficient of the total scale is 0.934, and the Guttman coefficient is 0.809, 0.764, 0.940, and 0.744 for four subscales, which further confirms the internal consistency.

For test–retest reliability, the results showed that both the ICC and Pearson coefficient amongst 30 patients at two weeks intervals were 0.859 ($P < 0.05$), with ICC and Pearson coefficient of physical function, role function, emotional function, and self-worth as 0.854 ($P < 0.05$) and 0.861, 0.812 ($P < 0.05$) and 0.814, 0.744 ($P < 0.05$) and 0.744, and 0.764 ($P < 0.05$) and 0.767, respectively. These results indicated adequate stability over time.

Validity analysis The results of content validity showed that I-CVI was higher than 0.78 (ranging from 0.8 to 1.0), and S-CVI/Ave was 0.91, indicating the importance of all items in the Chinese version of PANQOLI has reached an expert consensus.

For the construct validity, the EFA shows that the KMO is 0.847, and Bartlett's test χ^2 is 2510.605 ($P < 0.001$), suggesting it is suitable for EFA. Factor analysis was used to extract the common factors with characteristic values after the axis greater than 1 and required factor loading of the items > 0.4 [36]. Results are shown in Table 3, and the characteristic values after the axis are 5.799, 2.938, 2.037, and 1.077. All are greater than 1. The cumulative variance contribution rate is 65.842%. The examination of the scree plot and parallel analysis demonstrated a break after the fourth component (Fig. 1), and that the first three factors should be retained as the main components. According to the low cumulative variance of the first three factors (< 60%) and the description of the original scale, we retained the fourth factor (self-worth subscale). The factor loading of each item is between 0.413 and 0.965, and all were higher than 0.4. Compared to the original instrument, item 18 is in the self-worth domain, whilst these data classified it as Factor 1 (emotional function). Four dimensions were set as latent variables, and 18 items were set as observation variables to form the basis for model testing. The results of CFA are acceptable: $\chi^2/df = 2.346$, CFI = 0.929, TLI = 0.915, and RMSEA = 0.074, indicating an acceptable fit. The standardised estimates of the model are shown in Fig. 2. The results of convergent validity indicate that the Chinese version of PANQOLI was moderately correlated with the PCS ($r = 0.436$, $P < 0.001$) and MCS ($r = 0.518$, $P < 0.001$) of SF-36.

Table 3 Factor loading of the Chinese version of PANQOLI

Items	I	II	III	IV	Characteristic values after the axis	Variance contribution rate	Cumulative variance
Factor 1 emotional function					5.799	32.216	32.216
17	.965						
15	.928						
16	.891						
14	.813						
18	.710						
Factor 2 role function					2.938	16.322	48.538
7		.849					
8		.848					
9		.798					
11		.749					
10		.657					
Factor 3 physical function					2.037	11.319	59.857
3			.898				
2			.873				
1			.599				
4			.578				
6			.413				
Factor 4 self-worth					1.077	5.985	65.842
5				.806			
12				.719			
13				.548			

PANQOLI Pancreatitis quality of life instrument

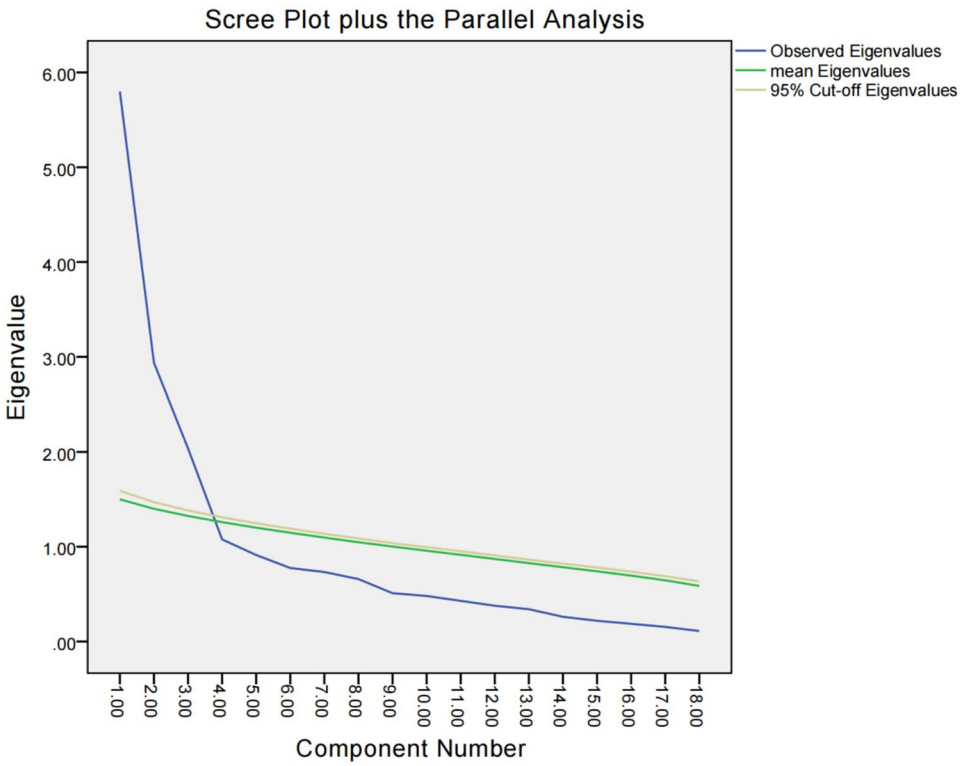

Fig. 1 Scree plot plus the parallel analysis illustrated the factor loadings of the Chinese version of PANQOLI. *PANQOLI* Pancreatitis quality of life instrument

Discussion

This study aims to develop, for the first time, a translated, transculturally adaptive, and valid Chinese version of the PANQOLI. Following the strict standard process of Brislin's translation model, the translation and transcultural adaptations were successfully undertaken. The results demonstrated good reliability and validity of the Chinese version of the PANQOLI in patients with CP in the Mandarin Chinese-speaking subjects, with all four domains and 18 items being retained.

Despite some differences between the Chinese and Western cultures, there was little difficulty in translating PANQOLI. The application of the Chinese version to Chinese patients with CP was appropriate, which suggests that the Chinese version of PANQOLI could be used in surveys of general CP patients as well as in clinical practice or research. The item analysis results illustrated that all items' absolute *t* values were higher than 3 and statistically significant, which met the screening criteria and indicated that the items were valid [27]. All items were well identified and strongly correlated to the total score, except item 10, "Over the last 4 weeks, your ability to participate in sexual activity has been…", with $r = 0.194$. One possible explanation might be that, considering Chinese culture, the discussion of sexual activity-related topics is more conservative, and patients might avoid mentioning it during the filling process [37]. However, sexual behaviour has been considered one of the most important aspects of one's role function of QoL and dramatically impacts a patient's quality of personal relationships [38]. After discussion and reaching a consensus, this item remained in the final version of the Chinese version of PANQOLI.

The internal consistency of the Chinese version of PANQOLI, which reflects the reliability relations between the internal questions in the questionnaire, was used to examine whether the same contents were measured in the test [39]. The current study demonstrated that the values of Cronbach's α coefficient (0.868 in this study and 0.914 in the original PANQOLI), split-half Guttman coefficient, and ICC of the Chinese version of PANQOLI were all acceptable. Those results indicated high internal consistency and test–retest reliability of the Chinese version of PANQOLI. The Chinese version of PANQOLI also demonstrated good validity. The results of I-CVI values and S-CVI/Ave indicate an acceptable expert content validity. In construct validity, EFA produced four common factors, and the results of CFA were highly consistent with the results of the original scale. Additionally, for the convergent validity analysis, the data showed a moderate correlation between the Chinese version of PANQOLI and the PCS and MCS domains of SF-36, indicating acceptable similarity to the widely used QoL instrument.

Although factor loadings of items 12 (money) and 13 (overall health) were > 0.4 in both Factor 1 (emotional function) and Factor 4 (self-worth), they were grouped in the

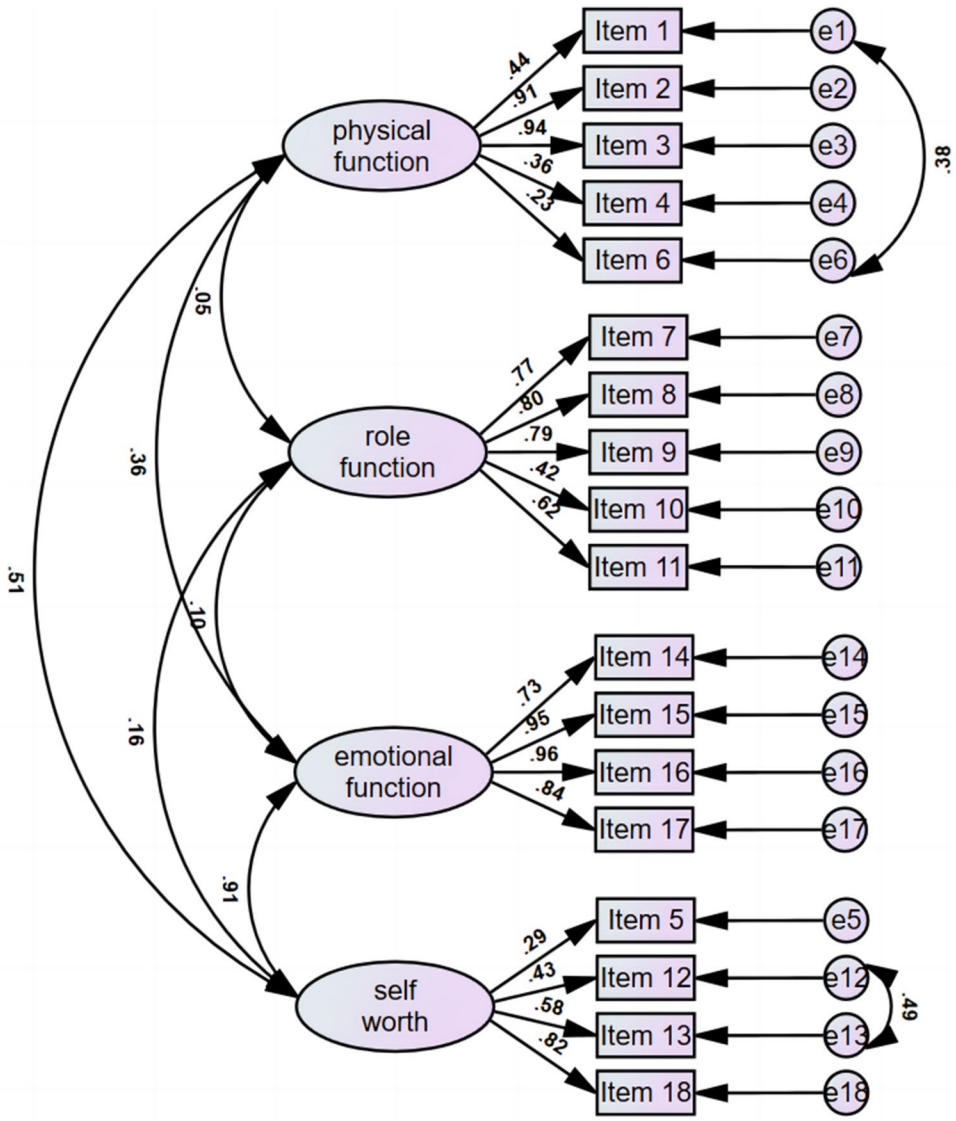

Fig. 2 CFA model for the Chinese version of PANQOLI. *CFA* confirmatory factor analysis; *PANQOLI* Pancreatitis quality of life instrument

self-worth domain due to higher values, which was consistent with the original scale. Although the personal economic level and overall health might impact the emotional health of CP patients, those two factors serve a self-evaluative function and directly contribute to the sense of self-worth [40]. Interestingly, our results classified item 18, "over the last 4 weeks, how often have you felt stigmatised because of your chronic pancreatitis?" as Factor 1 (emotional function). In contrast, it belonged to domain 4 (self-worth) in the original scale. Deeply ingrained in the Confucian ideology, people usually consider diseases as a sense of shame [41]. The use of disease-related "stigmatize" in Chinese culture is often interpreted as a negative emotional experience equivalent to stress, depression, frustration, and anger [42]. However, after experts carefully considered the original authors' philosophy and opinion, item 18 stayed in the self-worth domain in the Chinese version of PANQOLI. The classification of this item might be modified and adjusted in further large-scale studies.

There are several limitations of this study. First, this survey was only conducted in one centre, which might impact the universality of the Chinese version of PANQOLI. Secondly, more than 70% of recruited patients had high school/special school education levels or above. The results may not reflect the comprehension levels of patients from rural and remote areas. Third, in line with the inclusion and exclusion criteria of the original scale, we only included adult patients, and subgroup analysis in regard to different age were not performed since it was out of the scope of this article. Further studies need to be carried out in different groups to firmly confirm its applicability.

In conclusion, this study translated the PANQOLI into Chinese and undertook reliability and validity tests in Chinese patients with CP. The contents and items of the Chinese

version of PANQOLI are simple and easy to understand. High reliability and validity have been validated, ensuring it is suitable for evaluating the QoL of patients with CP in China. Future studies are required to be carried out to make further confirmation of the applicability of the Chinese version of PANQOLI in all CP groups.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s11136-023-03479-x.

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Data availability The data of the current study are available from the corresponding author on reasonable request.

Declarations

Conflict of interest The authors declared no conflict of interest.

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