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ORIGINAL RESEARCH

Validation of the Chinese Patient Participation Scale (PPS-C) in Internal Medicine Patient: A Psychometric Study

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Objective: To translate the Patient Participation Scale (PPS) into Chinese and evaluate its psychometric properties among internal medicine patients in a tertiary hospital in China, providing a reliable tool for enhancing patient participation in healthcare decisions.

Background: Patient participation is critical for patient-centered care, widely proven to enhance healthcare quality and improve health outcomes. While China increasingly recognizes the importance of patient participation in clinical decision-making, evidence-based interventions remain limited, partly due to the lack of validated measurement tools. The original PPS has demonstrated promise in assessing patient participation, but its application in China requires cultural adaptation to ensure conceptual and linguistic equivalence.

Design: A cross-sectional study.

Methods: The Brislin's translation model was followed to translate the PPS. A convenience sample of 457 internal medicine patients in a tertiary hospital was recruited. Validity was calculated by content validity, construct validity, concurrent validity, and convergence validity. Reliability was analyzed through internal consistency reliability and test–retest reliability.

Results: The content validity index was 0.914. The confirmatory factor analysis indicated a significantly good fit for a four-factor model (χ^2/df = 3.826, RMSEA = 0.079, CFI = 0.922, GFI = 0.862, AGFI = 0.825, NFI = 0.897, SRMR = 0.043, TLI = 0.910). The Cronbach's alpha was 0.953, and the dimensions ranged from 0.759 to 0.910. The positive correlation between the Chinese version of the Patient Participation Scale (PPS-C) and Inpatients Involvement in Medication Safety Behavior Scale indicated acceptable convergent validity (r = 0.454). The positive correlation between the PPS-C and Health Literacy Management Scale indicated acceptable concurrent validity (r = 0.217). Scores differed significantly by household income and marital status. Test–retest reliability was 0.906.

Conclusion: The PPS-C has good reliability and validity, which can be applied to the assessment of the participation levels of internal medicine patients in China.

Keywords: cross-cultural adaptation, quality of life, patient participation, reliability, validity

Introduction

Patient participation refers to the patients' rights and opportunities to influence and participate in their healthcare through an attuned dialogue that takes into account their preferences, potential, experience, and knowledge of health providers.[1] Studies showed that patient participation improves quality of care,[2] promotes recovery,[3] improves therapy adherence,[4] increases patient satisfaction,[5] achieves better health outcomes,[6] reduces medical errors and adverse events,[3] improves drug management quality,[7] saves medical resources,[8] and positively affects patient safety.[9] In recent years, China has increasingly emphasized patient-centered care as part of ongoing healthcare reforms aimed at improving patient outcomes and satisfaction. However, prevailing hierarchical relationships between healthcare providers and patients, coupled with varying levels of health literacy, pose challenges to patient engagement, particularly among internal

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medicine patients who often have chronic and complex conditions requiring sustained involvement. Thus, assessing patient participation accurately within this specific clinical population is crucial for informing targeted interventions and aligning with national healthcare improvement strategies, such as the "Healthy China 2030" initiative.

Encouraging patient participation in healthcare has become a current trend with the increasing number of chronically ill and elderly patients and the gradual popularization of remote medical services.[10,11] The World Health Organization (WHO) has emphasized the role of patients in the improvement of healthcare through actively partaking in their own treatment and care.[12,13] Meanwhile, a strong motivation to be involved in healthcare exists among patients as well.[14,15] Implementations strategies have been developed to promote the participation of patients by improving their skills and knowledge,[16] providing social support,[17] and strengthening practices.[18] The China Health Statistics Yearbook reported that approximately 128 million internal medicine patients in the year of 2021, and this figure represented 21% of the total number of patients.[19] Developing intervention strategies for this type of patient is urgently needed. Understanding their degree of participation and related factors, however, is of high priority in ensuring the success of the interventions.

A previous study has shown a low degree of participation in healthcare among Chinese internal medicine patients, but its implications for practice were limited due to the use of a self-developed instrument and a focus on patients' attitudes.[20] It is necessary to measure the degree of participation among Chinese internal medicine patients, thus tailoring the intervention content accordingly, by using a comprehensive, valid, and reliable Chinese instrument.

Previous studies have identified several common attributes of patient participation. These include sharing information and knowledge, shared decision-making, engagement in self-management activities, and establishing relationships between patients and health providers.[21,22] Research has shown that sharing information and knowledge between patients and health providers can narrow the knowledge gap between them.[23] Moreover, it is a prerequisite to shared decision-making.[24,25] Shared decision-making means patients are encouraged to make the final decision after sharing knowledge and power with health providers.[23] Engagement in self-management activities is often mentioned in conceptualizations of patient participation.[26] Respect, trust, mutual relationship,[27] and partnership[28] are all terms used to describe the relationship between patients and health providers.

Previous studies have used a variety of instruments to evaluate patient participation. However, a systematic review[29] suggests that most instruments such as the Patient Health Engagement (PHE) Scale,[30] the Decisional Engagement Scale (DES-10),[31] and the shared decision-making questionnaire (SDM-Q)[32] included only some of the common attributes. Patient Participation Questionnaire (PPQ)[21] and Patient Participation Scale (PPS)[22] are newly developed instruments, which include all the attributes. The PPS was preferred because it evaluates patient participation from the perspective of Korean patients, whose socio-cultural practices are similar to Chinese patients. The 21-item Patient Participation Scale (PPS) is developed by Song et al in 2023 based on a literature review, interviews with patients and health providers, and expert opinions. This instrument aims to measure the participation levels that patients experience throughout the entire care process, both inpatient and outpatient. Besides, the PPS not only assesses the participation levels of patients but also helps generate evidence to identify influencing factor that is specific to internal medicine patients and not found in the PPQ. Based on the PPS assessment, factors that promote patient participation were predicted and tailored intervention contents were identified.[24]

According to previous reports, no measures have been developed for patient participation in Chinese settings. Currently, only the PPS includes all the attributes and has been validated in internal medicine patients. A valid instrument for a given situation must be based on empirical evidence, as Nunnally said, and validation is a never-ending process.[33] Hence, this study aimed to translate and validate the PPS for use by Chinese internal medicine patients. It is the first Chinese-language instrument to evaluate patient participation in the hospital context. It can serve as a starting point for further research to promote active participation among internal medicine patients.

Methods

Study Design

An evaluation of the psychometric properties of the Chinese version of the PPS (PPS-C) was conducted through a cross-sectional survey. This study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement.[34]

Participants and Setting

Internal medicine patients were recruited using consecutive convenience sampling across fifteen different outpatient and inpatient departments in a tertiary hospital in China, including cardiology, nephrology, endocrinology, gastroenterology, hematology, and general internal medicine. The recruitment period was November 2023 to February 2024, chosen to align with stable patient flow and minimize seasonal variations in clinical workload, ensuring optimal participant availability and a 2-week interval for test–retest reliability. The inclusion criteria were: (a) aged 18 or older; (b) currently receiving treatment in an internal ward or outpatient clinic; (c) experienced in both inpatient and outpatient care within the past 12 months (defined as ≥1 hospitalization and ≥1 outpatient visit during this period to ensure familiarity with both care settings). The exclusion criteria were: (a) with terminal illness; (b) with mental illness; (c) unable to communicate; (d) difficulty in filling out the questionnaires. Sample size estimation was guided by the confirmatory factor analysis (CFA) rule with 150 to 500 participants.[35] Finally, 468 questionnaires were collected, of which 11 were invalid due to unidentifiable information.

Measures

Questionnaire forms containing a demographic questionnaire, the Chinese version of PPS (PPS-C), the Inpatients Involvement in Medication Safety Behavior Scale (IIMSS), and the Health Literacy Management Scale (HeLMS).

Demographic Questionnaire

Socio-demographic and clinical characteristics hypothesized to be associated with patient participation were collected, including age, sex, education, marital status, family income, occupation, place of treatment, number of diseases, way of payment, reason for the visit, and number of hospitalizations.

Patient Participation Scale (Chinese Version, PPS-C)

The Patient Participation Scale (PPS) is a 21-item instrument to assess patient participation during the entire process of hospitalization and ambulatory care.[22] The 21 items covered four factors: 1) Sharing of information and knowledge (8 items), which includes items such as "I tell the healthcare provider(HCP) about my current condition and symptoms in detail"; 2) Performing autonomous self-management activities (seven items), such as "I check my vital signs or test results and compare them with previous results"; 3) Establishing a mutual trust relationship (four items), including "I trust and follow the expertise and experience of the HCP"; 4) Partaking in the decision-making process (two items), which includes items such as "I decide the treatment method among recommendations from the HCP after referring to my current condition and the opinions of my family or acquaintances". Patient participation is measured using a 5-point Likert scale (from "strongly disagree" to "strongly agree"), where higher scores indicate a higher level of participation. This instrument showed reasonable internal consistency, with Cronbach's α ranging from 0.64 to 0.88 for subscales and 0.92 for the entire scale.

Inpatients Involvement in Medication Safety Behavior Scale (IIMSS)

The 23-item IIMSS was used to assess inpatients' participation behavior in medication safety.[36] It has three dimensions: decision-making participation, care-giving participation, and appealing participation. A 5-point Likert scale from "never" to "always" is used, with higher scores indicating higher levels of participation in medication safety. It showed good fit indices, with Cronbach's α ranging from 0.78 to 0.86. Considering the construct of this scale is similar to those of the PPS-C, it was used for assessing the convergent validity of the PPS-C.

Health Literacy Management Scale (HeLMS)

The 29-item HeLMS was used in this study to measure health literacy of patients.[37] Eight themes are included in this scale, with five themes focusing on individual's ability to obtain, understand, and utilize health information and services, and three themes focusing on factors that influence these abilities. The dimensions are rated using a 5-point Likert scale (from "no difficulty" to "totally impossible"), with higher scores indicating greater health literacy. It has been validated

and used in Chinese patients with good fit indices (Cronbach's α = 0.894).[38] Considering that the HeLMS was commonly used for measuring health literacy in Chinese, the PPS-C was assessed with it for the concurrent validity in this study.

Translation

The PPS was translated into Chinese following the modified Brislin's translation model, including forward translation, back translation, and semantic equivalence evaluation.[39] At first, two bilingual nurses with postgraduate nursing qualifications and fluency in both English and Chinese translated the English version into Chinese. Then, two other bilingual translators with overseas experience retranslated the Chinese version into English. We held a meeting with all translators and a researcher in the field of internal medicine nursing in order to evaluate item clarity, with consensus reached on idiomatic expressions to ensure alignment with Chinese patient-provider interaction norms. Finally, a native English speaker who is proficient in Chinese assessed the semantic equivalent of the PPS-C and the back-translated English version, confirmed no major semantic discrepancies were identified.

Pilot Test

We conducted a pilot test by recruiting 20 patients conveniently. Each patient completed the PPS-C and provided feedback during this test. Patients were interviewed about the scale's comprehensibility and readability after completing it. No further revisions were needed since all patients reported that the items were understandable and not confusing.

Data Collection

Ten clinical nurses underwent a 2-hour workshop on standardized data collection procedures, including maintaining neutrality during item clarification (eg, avoiding leading questions) and respecting patient autonomy in response choices. Potential participants were given information sheets explaining the study and a questionnaire form, including a demographic questionnaire, the PPS-C, the IIMSS, and the HeLMS. Questionnaires were de-identified, with no personal identifiers recorded. Participants were informed that responses would be aggregated and reported in anonymized form to address or mitigate potential respondent bias. Any misunderstandings were handled by investigators, with investigators only providing language clarification without influencing responses. It took about 15–20 minutes for participants to complete the questionnaire form. For test–retest reliability, 30 participants were invited to complete the PPS-C again after two weeks.

Ethical Considerations

The study received approval from the author's hospital ethics committee (ethics review document number: Research Ethics Review No. 19, 2023), and all participants gave written informed consent. Participants could withdraw at any time. All procedures complied with the Helsinki Declaration.

Statistical Analysis

All data were analyzed using IBM SPSS version 23.0 and AMOS (IBM Corporation). Descriptive analysis was used to describe demographic data. Categorical variables were calculated using frequencies and percentages; continuous variables were calculated using means and standard deviations.

Content validity was assessed through the Item-level content validity index (I-CVI) and the Scale-level content validity index (S-CVI) by expert consultation. Five experts with over 5 years' experience in different fields (one in clinical medicine, one in psychology, one in public health, and two in nursing) were invited in our study. Each item was rated on a 4-point scale, from 1 (not relevant) to 4 (very relevant). I-CVI is calculated as the number of experts who gave 3 or 4 divided by the total number of experts. S-CVI is calculated by averaging the I-CVI. I-CVI ≥ 0.78[40] and S-CVI ≥ 0.90[41] can indicate a satisfactory content validity.

We assessed construct validity using known-groups comparison, discriminant analysis, and confirmatory factor analysis (CFA). The contrasted-groups comparison was performed to determine the initial discrimination ability. The high and low score groups for PPS-C were drawn from the top and bottom 27% of participants, respectively. Studies indicated that high score groups would demonstrate significantly higher levels of medication safety participation and

health literacy than low score groups. Model fit is considered adequate when the chi-square/degree of freedom ratio (χ^2/df) is between 1 and 3 (acceptable 3–5 for exploratory research), comparative fit index (CFI) > 0.80, root mean square error of approximation (RMSEA), Tucker–Lewis index (TLI) > 0.80, standardized root-mean-square residual (SRMR) < 0.08, goodness-of-fit index (GFI) > 0.80, adjusted goodness of fit index (AGFI) > 0.80, and normed fit index (NFI) > 0.80.

Hypothesis testing was used to determine concurrent validity. The hypothesis was that higher health literacy is related to active patient participation in healthcare.[24] Convergent validity was assessed by comparing PPS-C scores with those obtained from the IIMSS, and by calculating the average variance extracted (AVE) and composite reliability (CR). We tested all relationships using Pearson correlation coefficients, with positive correlations indicating good validity ($P < 0.05$).

Cronbach's α and item-total correlation were used to evaluate the internal consistency. Cronbach's α values > 0.70 indicate satisfactory results. A two-week retest interval was used for 30 participants to measure stability (a standard timeframe in psychometric studies to balance memory retention and behavioral stability); and the intraclass correlation coefficient (ICC) ≥ 0.7 indicates a satisfactory stability.

The data were of normal distribution according to Skewness and Kurtosis values. Therefore, we used student's t tests and variance analyses to examine the differences between demographic characteristics and the mean scores.

Results

Demographic Characteristics

This survey included 457 participants, the mean age was 52.07 ± 18.31 years (range 19–97), and most were female (53.8%). Of the participants, 78.6% were married, and 75.3% had high school or lower education levels. Further, 66.1% had one kind of chronic disease, 68.3% were hospitalized once within a year.

Content Validity

It was found that the I-CVI ranged from 0.80 to 1.00, and the S-CVI was 0.914, which met the acceptance criteria.

Confirmatory Factor Analysis (CFA)

The factor loadings of questions ranged from 0.503 to 0.859, and those of four factors were between 0.858 and 0.945. Items and subdimensions were found to be well correlated (see Figure 1). The dataset conforms to a normal distribution according to its values for skewness and kurtosis (see Table 1).

The CFA was computed and the primary model was identified with χ^2/df = 4.036, RMSEA = 0.082, SRMR = 0.044, CFI = 0.915, GFI = 0.853, AGFI = 0.814, NFI = 0.891, TLI = 0.903. Then, a post-hoc model modification was performed to improve the fit indices based on modification indices. A path was created between the residuals to adjust the model. The secondary model was identified with χ^2/df = 3.826, RMSEA = 0.079, SRMR = 0.043, CFI = 0.922, GFI = 0.862, AGFI = 0.825, NFI = 0.897, TLI = 0.910 (see Table 2), suggesting a reasonable fit. The values of CR and AVE were calculated for the secondary model. CR values ranged from 0.820 to 0.913, while AVE values ranged from 0.530 to 0.676. CR and AVE values confirmed that the modified four-factor model was appropriate for the data. Further, the t-statistics indicated significant relationships between the variables with $P < 0.001$ (see Table 1).

Known-Groups Comparison

According to the known-groups comparison, patients who were married had significantly higher PPS-C mean scores than those who were unmarried, divorced, or widowed ($P < 0.05$). PPS-C scores were higher among patients with higher household incomes than among patients with lower incomes ($P < 0.05$) (see Table 3).

Contrasted-Groups Comparison

Kelley's (1939) derivation of upper and lower 27% rules is commonly used in discriminant analysis.[42] Compared between the upper 27% of participants and the lower 27%, the scores of IIMSS and HeLMS significantly differed in the

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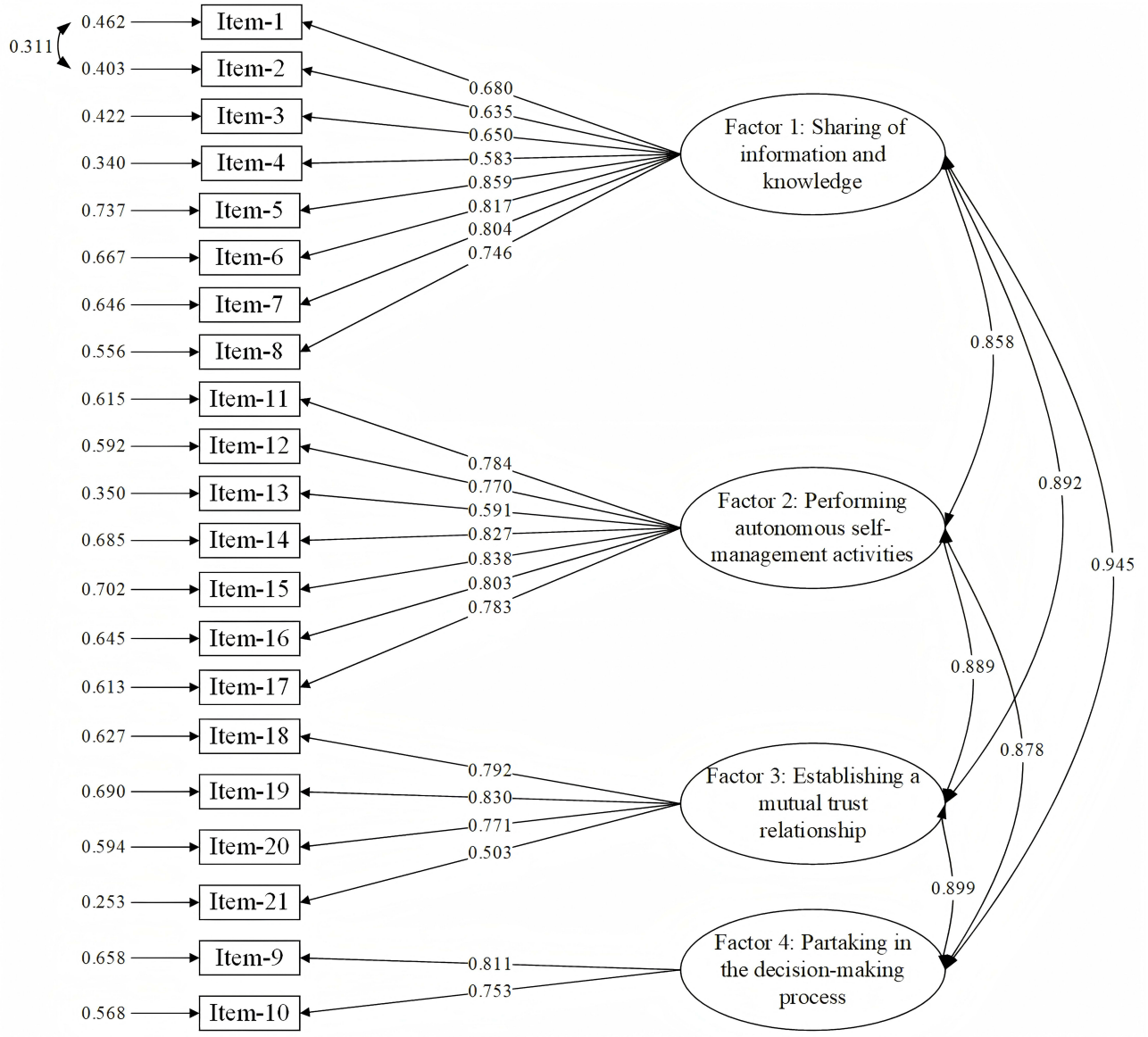

Figure 1 Confirmatory factor analysis of the PPS-C.

two groups (all $P < 0.05$). Those with higher scores demonstrated a higher degree of participation in medication safety (IIMSS, mean = 107.45 vs 85.08) and higher health literacy (HeLMS, mean = 113.41 vs 107.17), as expected.

Concurrent Validity and Convergent Validity

There was a positive correlation between the PPS-C and the HeLMS, indicating that the PPS-C has a moderate concurrent validity (r = 0.217, $P < 0.001$). Similarly, the PPS-C and the IIMSS showed significant positive correlations, indicating a moderate to strong convergent validity (r = 0.454, $P < 0.001$), in line with the CR and AVE values (see Table 4).

Internal Consistency

The internal consistency analysis showed a Cronbach's α of 0.953 for the overall scale (0.759–0.910 for the scale factors). These indicate high internal consistency. After removing any item, the coefficients were 0.950–0.953 for the total PPS-C, indicating that no single item had a significant impact on the consistency. The item-total correlation values

Table 1 Measurement Model Results (n = 457)

Factor Number	Item	Factor Loadings	Skewness	Kurtosis	t-Statistics	CR	AVE
Factor 1						0.899	0.530
	1	0.680	−1.542	5.983	N/A[a]		
	2	0.635	−1.267	4.230	15.225***		
	3	0.650	−1.096	3.105	12.980***		
	4	0.583	−0.803	2.685	11.683***		
	5	0.859	−0.607	0.025	16.599***		
	6	0.817	−0.548	0.161	15.832***		
	7	0.804	−0.553	1.372	15.626***		
	8	0.746	−0.480	0.132	14.719***		
Factor 2						0.912	0.600
	11	0.784	−1.012	1.730	N/A[a]		
	12	0.770	−0.331	−0.300	18.028***		
	13	0.591	−0.159	−0.118	13.091***		
	14	0.827	−1.203	3.236	19.454***		
	15	0.838	−1.556	5.217	19.774***		
	16	0.803	−0.790	1.144	18.820***		
	17	0.783	−1.036	1.681	18.218***		
Factor 3						0.820	0.541
	18	0.792	−0.467	0.009	N/A[a]		
	19	0.830	−0.194	−0.760	19.798***		
	20	0.771	−1.094	3.861	17.154***		
	21	0.503	−0.793	0.243	10.733***		
Factor 4						0.913	0.676
	9	0.811	−0.754	0.690	N/A[a]		
	10	0.753	−0.822	1.653	17.581***		

Notes: Skewness and kurtosis were used to determine the normality of data; ***$P < 0.001$. [a]One loading must be fixed to 1 in AMOS, so t-statistics cannot be calculated.
Abbreviations: CR, composite reliability; AVE, average variance extracted.

Table 2 Fit Indices of the Models

Items on the PPS-C	χ^2/df	RMSEA	CFI	GFI	AGFI	NFI	SRMR	TLI
Primary model	4.036	0.082	0.915	0.853	0.814	0.891	0.044	0.903
Secondary model	3.826	0.079	0.922	0.862	0.825	0.897	0.043	0.910

Abbreviations: d.f, degree of freedom; RMSEA, root mean square error of approximation; CFI, comparative fit index; GFI, goodness of fit index; AGFI, adjusted goodness of fit index, NFI, normed fit index; SRMR, standardized root mean square residual; TLI, the Tucker-Lewis Index.

Table 3 Known-Groups Analysis

Variable	Categories	n	%	*M* ± *SD*	t / F	*P*
Sex	Male	211	46.2	90.33 ± 10.47	t = −1.115	0.052
	Female	246	53.8	91.37 ± 9.35		
Age (years)	19–30	78	17.0	91.01 ± 13.58	F = 0.733	0.570
	31–40	58	12.7	92.48 ± 9.91		
	41–50	79	17.3	92.22 ± 10.15		
	51–60	85	18.6	89.58 ± 12.73		
	≥61	157	34.4	91.01 ± 11.70		

(*Continued*)

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Table 3 (Continued).

Variable	Categories	n	%	*M* ± *SD*	t / F	*P*
Education	Elementary school	112	24.5	90.49 ± 10.24	F = 0.818	0.514
	Middle school	119	26.0	91.09 ± 9.46		
	High school	113	24.7	90.54 ± 9.92		
	Bachelor degree	104	22.8	91.86 ± 9.71		
	Master's degree or above	9	2.0	86.33 ± 12.97		
Marital status	Unmarried	69	15.1	89.28 ± 8.84	F = 2.751	**0.042**
	Married	359	78.6	91.49 ± 10.02		
	Divorced	11	2.4	84.73 ± 7.17		
	widowed	18	3.9	88.89 ± 10.99		
Essential worker status	Employed	247	54.0	91.40 ± 9.90	F = 0.945	0.389
	Part time	30	6.6	89.17 ± 8.13		
	Unemployed or retired	180	39.4	90.47 ± 10.13		
Per capita family income, monthly (RMB)	<1000	31	6.8	85.35 ± 9.62	F = 3.209	**0.007**
	1001–3000	76	16.6	92.50 ± 8.92		
	3001–5000	98	21.4	90.00 ± 10.01		
	5001–7000	112	24.5	90.68 ± 9.16		
	7001–9000	64	14.0	91.02 ± 10.50		
	>9001	76	16.6	92.88 ± 10.54		
Payment	Urban workers' medical insurance	214	46.8	91.17 ± 9.49	F = 1.380	0.231
	Rural residents' medical insurance	111	24.3	91.93 ± 10.56		
	Rural cooperative medical insurance	124	27.1	89.66 ± 9.96		
	Commercial medical insurance	2	0.4	96.50 ± 12.02		
	Self-paying	1	0.2	N/A[a]		
	Others	5	1.1	86.60 ± 5.94		
Place of treatment	Outpatient	138	30.2	91.39 ± 10.14	t = 0.715	0.226
	Inpatient	319	69.8	90.67 ± 9.79		
Reason for the visit	Initial visit	164	35.9	91.12 ± 9.96	F = 0.489	0.744
	Chronic disease management	168	36.8	90.96 ± 10.24		
	Routine physical examinations	67	14.7	91.40 ± 8.94		
	Reexamination	22	4.8	90.45 ± 8.31		
	Others	36	7.9	88.78 ± 10.65		
No. of diseases	1	302	66.1	90.76 ± 9.78	F = 0.280	0.756
	2	105	23.0	91.49 ± 9.59		
	≥3	50	10.9	90.38 ± 11.27		
No. of hospitalizations	1	312	68.3	91.09 ± 10.10	F = 0.245	0.783
	2	83	18.2	90.24 ± 10.64		
	≥3	62	13.5	90.76 ± 7.61		

Notes: F, one-way ANOVA; t, Student's *t* test, Significant values are given in bold. [a]M ± SD cannot be calculated for this item.
Abbreviations: M, Mean; SD, standard deviation.

Table 4 Correlation Between the PPS-C, IIMSBS and HeLMS

Scale	Factor Name				
PPS-C	Overall score	Sharing of information and knowledge	Performing autonomous self-management activities	Establishing a mutual trust relationship	Partaking in the decision-making process
IIMSBS	0.454***	0.343***	0.467***	0.450***	0.401***
HeLMS	0.217***	0.171***	0.222***	0.203***	0.190***

Note: ***$P < 0.001$.
Abbreviations: PPS-C, Chinese version of the Patient Participation Scale; IIMSBS, Inpatients Involvement in Medication Safety Behavior Scale; HeLMS, Health Literacy Management Scale.

Table 5 Reliability and Item Analysis of the PPS-C (N = 457)

Factor Number	Item	*M* ± *SD*	Item-Total Correlation	Cronbach's α with Item Deletion	Cronbach's α
Factor 1					0.899
	1	4.45 ± 0.63	0.641***	0.952	
	2	4.41 ± 0.64	0.613***	0.952	
	3	4.27 ± 0.69	0.637***	0.952	
	4	4.23 ± 0.63	0.571***	0.953	
	5	4.39 ± 0.62	0.818***	0.950	
	6	4.44 ± 0.57	0.740***	0.951	
	7	4.37 ± 0.58	0.747***	0.951	
	8	4.42 ± 0.57	0.696***	0.951	
Factor 2					0.910
	11	4.28 ± 0.71	0.719***	0.951	
	12	4.36 ± 0.58	0.745***	0.951	
	13	4.19 ± 0.60	0.584***	0.952	
	14	4.32 ± 0.69	0.761***	0.950	
	15	4.38 ± 0.68	0.768***	0.950	
	16	4.35 ± 0.65	0.735***	0.951	
	17	4.21 ± 0.77	0.730***	0.951	
Factor 3					0.761
	18	4.35 ± 0.61	0.712***	0.951	
	19	4.37 ± 0.57	0.751***	0.951	
	20	4.44 ± 0.59	0.736***	0.951	
	21	3.96 ± 0.97	0.482***	0.953	
Factor 4					0.759
	9	4.36 ± 0.64	0.751***	0.950	
	10	4.35 ± 0.63	0.705***	0.951	
All items		4.33 ± 0.47			0.953

Note: ***$P < 0.001$.
Abbreviations: M, Mean; SD, standard deviation.

of the PPS-C were 0.482–0.818, meeting the suggested criteria (all ≥0.30) (see Table 5). Accordingly, all items in the scale align with the construct being measured. Notably, the high Cronbach's αpotentially indicating redundancy among some items. Future research might explore if the scale could be further streamlined without losing measurement quality.

Test–Retest Reliability

The reliability analysis was conducted on 30 participants. The ICC value for the PPS-C total score was 0.906 ($P < 0.001$), which indicated a high level of stability.

Discussion

The Patient Participation Scale (PPS) was translated and evaluated in a cohort of Chinese internal medicine patients in our study. It was found that the PPS-C has a stable four-factor structure, reasonable validity and reliability. With minor revisions, the PPS-C was found to be useful in assessing patient participation throughout the entire care process from admission to outpatient.

Clinical Significance of Known-Groups Comparisons

The known-groups comparison revealed that married patients and those with higher household incomes exhibited significantly higher PPS-C scores, highlighting the influence of social support and economic resources on patient participation. Married individuals may benefit from spousal involvement in care-related tasks, such as facilitating communication with healthcare providers, reinforcing treatment adherence, and providing emotional support, these

factors known to enhance patient participation in decision-making. Conversely, unmarried or financially disadvantaged patients might face barriers to participation, such as limited access to care coordination or health literacy resources, leading to lower engagement in care processes. Clinically, these findings underscore the need for targeted interventions to address disparities, ensuring vulnerable populations are not disadvantaged in care engagement.

Discussion of Validity of the PPS-C

According to the obtained I-CVI and S-CVI values, all items of the PPS-C measured the same construct as the overall scale. Studies conducted in Korea also confirmed the content validity of the PPS with an I-CVI of 0.78 and an S-CVI of 0.97. Despite having a similar I-CVI as the Korean study, our S-CVI value was lower. The number of experts and their expertise may cause this difference. The Korean study had 9 experts, and were from 3 different medical groups, while ours had 5 experts from 4 medical groups.

For psychometric evaluation, 457 patients were randomly selected. Our sample size is larger than that used to develop the original PPS (n = 312),[22] and meets the number recommended for CFA.[43] The CFA confirmed the original four-factor structure of the PPS in Korean patient sample,[22] which may indicate that the four-factor model of the PPS was stable in Asian cultures. As for the goodness-of-fit indices, the primary model did not fit well due to the unsatisfactory RMSEA (>0.08). Error covariance between item 1 and item 2 was established based on the model modification indices. This modification did result in a significantly lower RMSEA (<0.08) value. The similarity and overlap can be explained that a few patients reported that they did not know how to inform health providers of symptoms clearly, or that they could not understand some medical documents, such as illness notification form. These items were retained in their original form as the issues identified were primarily attributed to a deficiency in patients' understanding of fundamental medical terminologies rather than any ambiguity in the items.

All items of the PPS-C had factor loadings greater than 0.5, satisfying the threshold for acceptable construct validity. Discriminant analyses showed that the PPS-C demonstrated initial discrimination between groups with disparate health literacy and medication safety. In addition, the PPS-C has the capability of distinguishing the level of participation depending on patients' marital status and family income. Notably, the item 21 "I think the HCP listens to me" (factor loading = 0.503) and the item 13 "I check if my treatment proceeds according to the predefined schedule" (factor loading = 0.591) displayed relatively lower loadings compared to other items. The item 21 may reflect cultural norms in Chinese healthcare, where hierarchical patient-provider relationships often prioritize medical authority over explicit communication of patient-centered behaviors. Similarly, the item 12 may be influenced by healthcare system structures, which may overshadow individual monitoring behaviors among internal medicine patients with complex conditions. Despite these minor discrepancies, all items retained factor loadings above the 0.5 threshold, and the four-factor structure remained stable, indicating the PPS-C's overall suitability for measuring patient participation in this population.

CR and AVE values for all dimensions exceeded an accepted level of 0.50 and 0.70, respectively. The results align with the Pearson correlation coefficients of the IIMSS, supporting its utility as a valid instrument for assessing convergent validity. In our study, the PPS-C correlated well with the IIMSS, which indicated a high convergent validity. Patient participation behavior includes decision-making, self-monitoring, medication safety, feedback provision and chronic disease management.[23] In other words, patients' participation behavior in medication safety should therefore be considered as a sub-element of patient participation.[22,26] Participation in medication safety is a hotspot in China. In contrast, there is a lack of research on decision-making, self-monitoring, and feedback provision. Compared to the IIMSS, it may be beneficial to use the PPS-C because this scale incorporates medication safety and measures other attributes, which could bridge the research gap in patient participation in the Chinese settings.

The moderate positive correlation between PPS-C and HeLMS reflects the nuanced relationship between health literacy and patient participation. While health literacy is a foundational skill for understanding treatment information, patient participation involves additional dimensions like trust-building, self-management, and proactive communication, elements not fully captured by health literacy scales.[24] This moderate correlation is plausible in the Chinese context, where hierarchical patient-provider dynamics may limit patients' willingness to engage in decision-making even with adequate literacy, highlighting the need for interventions that both improve health literacy and foster a collaborative care culture.

Discussion of Reliability of the PPS-C

In our study, Cronbach's α ranged from 0.759 to 0.910 for the subscales, and 0.953 for the overall scale, exceeding the threshold of 0.70, which is considered adequate. It is worth noting that the Cronbach's α (0.953) in our study was higher than that in Korean study (0.92).[22] It is possible that this difference is caused by differences in data collection methods and participant numbers. There were 457 participants in our study who filled out questionnaires face-to-face, whereas 312 patients were interviewed face-to-face or using mobile devices in Korean study. The item-total correlations were all positive (all >0.30) and statistically significant ($P < 0.001$), indicating that the PPS-C has a high internal reliability. ICC core (0.906) in our study measured a higher value than 0.7, indicating good stability.

Limitations and Strength

This study had several limitations. Firstly, it is possible for participants to provide inaccurate answers to the PPS-C due to its subjective nature. Secondly, the convenience sample from a single tertiary hospital may limit generalizability, as patients from community clinics, rural areas, or other regions might exhibit different participation patterns. The PPS-C needs to be tested further with more diverse samples from other hospitals in different regions. Lastly, since it was a novel scale, it is challenging for researchers to find enough resources and research in this area to have a more comprehensive discussion.

While these limitations were present, this study provided the first psychometric evaluation of the PPS-C with a large sample size of Chinese internal medicine patients. The PPS-C is the first Chinese instrument to assess patient participation and is useful for identifying influencing factors in Chinese hospitals. In developed countries, patient participation has been shown to enhance quality of care. However, little research has been done in China on this topic. The PPS-C can be used in future research and allows us to better understand the relationship between patient participation and quality of care.

Future Research Directions

To build on these findings, future research could pursue several targeted avenues to further validate the PPS-C and explore its clinical utility. Firstly, cross-sectional studies in diverse areas and populations would help establish the scale's generalizability. Qualitative research exploring the lived experiences of patients with low participation scores could uncover contextual barriers and inform the development of culturally tailored interventions. Secondly, longitudinal studies could track how patient participation changes over the course of treatment and its association with clinical outcomes, such as readmission rates or quality of life, providing insights into the dynamic role of participation in care. Additionally, interventional trials might use the PPS-C to evaluate the effectiveness of strategies designed to enhance participation, such as shared decision-making training for patients and providers or the implementation of digital platforms to facilitate care engagement. These research directions would strengthen the PPS-C's utility as a tool to advance patient-centered care globally.

Implications for Practice

Considering the importance of patient participation in improving quality of care and patients' health outcomes, it is important to develop instrument to assess participation levels of patients in healthcare. The results of this study provide preliminary evidence that the PPS-C provides clinicians and researchers in China with an essential tool for systematically evaluating and potentially enhancing patient participation. Given China's ongoing healthcare reforms promoting patient-centered approaches, PPS-C can guide targeted interventions aimed at improving patient-provider communication, shared decision-making, and ultimately, patient outcomes across different internal medicine contexts.

Conclusion

In summary, the PPS-C is a reliable and valid instrument for assessing patient participation among internal medicine patients in Chinese hospitals. It fills a critical gap by providing a culturally appropriate tool for evaluating and enhancing patient engagement in healthcare settings. Future research should focus on multi-center validation studies to improve

generalizability across diverse regions in China and explore the clinical implications of PPS-C guided interventions aimed at optimizing patient-centered care practices.

Data Sharing Statement

The raw data supporting the conclusions of this article will be made available by the corresponding author on request.

Ethics Statement

This study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of The First People's Hospital of Lin'an District (ethics review document number: Research Ethics Review No. 19, 2023).

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Disclosure

The authors report no conflicts of interest in this work.

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