Research Square

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Psychometric Validation of the PROISCD-CG Scale in Patients With Chronic Gastritis: A Structural Equation Modeling Approach

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Abstract

Background:

Chronic gastritis (CG) is a common gastrointestinal condition that adversely affects patients' physical, psychological, and social functioning. With increasing emphasis on patient-centered care, patient-reported outcomes (PROs) have become essential for evaluating disease burden and treatment effectiveness. Compared with conventional quality-of-life (QOL) instruments, PRO scales offer superior sensitivity, symptom specificity, and clinical interpretability. This study assessed the reliability and validity of the Patient-Reported Clinical Outcome Scale for Chronic Gastritis (PROISCD-CG) using structural equation modeling (SEM).

Methods:

A total of 174 outpatients and inpatients diagnosed with CG between September and December 2022 were surveyed using the PROISCD-CG scale. Internal consistency, split-half reliability, and criterion validity (with SF-36 as the external criterion) were evaluated. SEM was applied to examine and refine factor structures, assess model fit, and evaluate convergent and discriminant validity.

Results:

The total scale demonstrated strong reliability (Cronbach's α = 0.87; split-half = 0.77). Criterion validity against SF-36 was acceptable, with moderate correlations across corresponding domains. The initial SEM model showed suboptimal fit, but modifications—removing low-loading items and adding error covariances—substantially improved fit indices (CFI, IFI, GFI approaching 0.80; RMSEA = 0.082). Convergent validity (AVE) and composite reliability (CR) generally met recommended thresholds, and discriminant validity was acceptable.

Conclusions:

The PROISCD-CG scale exhibits good psychometric properties and can serve as a reliable and valid tool for assessing patient-centered outcomes in CG. Items with low factor loadings require refinement and further testing in larger cohorts. PRO-based evaluation provides advantages over traditional QOL metrics by more precisely capturing symptom burden, functional impairment, and treatment responsiveness.

Introduction

Chronic gastritis (CG) is one of the most prevalent gastrointestinal disorders worldwide and is characterized by persistent inflammatory changes of the gastric mucosa resulting from multiple etiologies[1]. Owing to its chronic and recurrent nature, CG is frequently accompanied by long-term

gastrointestinal symptoms that substantially impair patients' physical functioning, psychological well-being, social participation, and overall quality of life[2–4]. As healthcare paradigms continue to evolve from a purely biomedical model toward a biopsychosocial and patient-centered approach, greater emphasis has been placed on outcomes that reflect patients' subjective experiences of disease and treatment.

Patient-reported outcome (PRO) refer to health-related information directly reported by patients without interpretation by clinicians or researchers. PRO instruments commonly encompass symptom burden, functional status, activity limitation, health-related quality of life, and treatment perceptions[5]. In chronic digestive diseases such as CG, objective clinical indicators alone often fail to capture the complexity and variability of patient experiences. Consequently, PRO measures provide indispensable complementary information for evaluating disease burden, treatment effectiveness, and long-term management outcomes.

Compared with generic quality-of-life (QOL) instruments, disease-specific PRO scales offer several important advantages. Widely used tools such as the SF-36 are designed to assess general health status and may lack sensitivity to disease-specific symptoms or subtle clinical changes[6]. In contrast, PRO instruments tailored to specific conditions directly quantify patients' perceptions of symptom severity and functional impairment, reduce information bias, and improve the clinical interpretability of outcomes[7]. These advantages make PRO measures particularly valuable for chronic gastritis, where symptom fluctuation and treatment response are highly individualized.

Structural equation modeling (SEM) is a powerful multivariate analytical approach that integrates factor analysis and path analysis, allowing for explicit modeling of latent constructs and measurement error[8]. SEM has been increasingly applied in psychometric research due to its superiority over classical test theory in evaluating complex measurement structures and construct validity[9,10]. However, SEM-based validation studies of PRO instruments for chronic gastritis remain limited, particularly in the Chinese population.

To address this gap, the present study applied SEM to evaluate the psychometric properties of the Patient-Reported Clinical Outcome Scale for Chronic Gastritis (PROISCD-CG), a modular instrument comprising both generic and disease-specific domains. By systematically assessing reliability, validity, and factor structure, this study aims to provide robust evidence supporting the clinical and research utility of the PROISCD-CG scale and to inform further refinement of patient-centered outcome measures in gastroenterology.

Methods

1.1 Study Design and Participants

This cross-sectional study was conducted between September and December 2022 at the Department of Gastroenterology of the Second Affiliated Hospital of Kunming Medical University and Qujing People's

Hospital. A total of **174 patients** diagnosed with chronic gastritis (CG) were consecutively recruited through outpatient and inpatient clinics. Participants were eligible if they: (1) met the diagnostic criteria for CG; (2) were able to communicate normally; and (3) were cognitively capable of independently completing the survey. Exclusion criteria included: (1) history of psychiatric disorders; (2) unwillingness to participate; (3) severe comorbidities such as COPD, severe pulmonary infections, heart failure, or liver/kidney dysfunction; and (4) recent use of medications with gastrointestinal side effects (e.g., oral contraceptives, weight-loss drugs) that might interfere with symptom evaluation.

The diagnosis of CG is based on the **2022 Chinese Guidelines for the Diagnosis and Treatment of Chronic Gastritis**, combining endoscopic findings and histopathology results, with the latter serving as the definitive diagnostic basis[11].

Ethical approval was obtained from the Ethics Committee of Kunming Medical University (KMMU2021MEC031), and all participants provided written informed consent.

1.2 Research Instruments

The **Patient-Reported Clinical Outcome Scale for Chronic Gastritis (PROISCD-CG)** was developed by Prof. Wanchonghua's research team in China, using a modular framework consisting of a **generic module** (four domains: physical health, psychological health, social health, and spiritual/belief health; 30 items) and a **disease-specific module** (11 items). All items were rated using a **five-point Likert scale** (1–5). Negative items were reverse-scored using the formula *6 – original score*.

The PROISCD-CG is a copyrighted instrument (Chinese Copyright Registration No. Guozuo Dengzi-2023-A-00286360). The full scale, scoring manual, and translation report are provided as **Supplementary File A** (Scale), **Supplementary File B** (Scoring Rules), and **Supplementary File C** (Translation and Cultural Adaptation), respectively.

To evaluate criterion validity, the **SF-36 Health Survey** was used as an external reference scale, as it comprehensively reflects physical, emotional, and social dimensions of health.

A full description of dimensions and their item composition is shown in Fig. 1.

1.3 Survey Procedure

Before data collection, all interviewers received standardized training. Eligible patients were approached by trained investigators who explained the study purpose and obtained informed consent. Participants independently completed the PROISCD-CG questionnaire; investigators provided neutral clarification for misunderstood items when necessary. Completed questionnaires were checked immediately to ensure no missing responses and were returned for retrieval and verification. The development and validation process of the PROISCD-CG scale is shown in Fig. 2.

1.4 Statistical Analysis

Double data entry and consistency checking were performed using **EpiData 3.1**. Statistical analyses were carried out using **SPSS 26.0** and **AMOS 26.0**.

Analyses included:

Reliability Testing

Internal consistency was assessed using Cronbach's α coefficients with α > 0.70 considered acceptable[12].

Split-half reliability was calculated to evaluate structural stability.

Validity Testing

Criterion validity was assessed by correlating PROISCD-CG domain scores with SF-36 domain scores using Pearson correlation coefficients. Sampling adequacy for factor analysis was assessed with KMO values and Bartlett's sphericity test[13,14].

Structural Equation Modeling (SEM)

Following the hypothesized factor structure, a confirmatory factor analysis (CFA) model was developed in AMOS. Model fit was evaluated using conventional indices: χ^2/df, RMSEA, GFI, CFI, IFI. Interpretation followed recommended thresholds[15,16].

Modification indices (MI) were used to guide model refinement, including item deletion and covariance adjustments.

Convergent & Discriminant Validity

Convergent validity was assessed via **factor loadings**, **composite reliability (CR)**, and **average variance extracted (AVE)**[17].

Discriminant validity was evaluated by comparing the square roots of AVE with inter-domain correlations.

Results

2.1 General Characteristics of the Study Participants

A total of 174 valid questionnaires were collected in this study. The age of participants ranged from 13 to 85 years, with a mean age of 50.38 ± 15.42 years. Individuals aged 40–60 years accounted for the largest proportion (48.3%). Most respondents were married (89.7%) and of Han ethnicity (89.7%).

Regarding educational level, 35.6% had completed primary school, 17.8% junior high school, and 18.4% high school or technical secondary school; 13.2% reported an associate degree, while 14.9% held a bachelor's degree or above.

In terms of occupation, farmers represented the largest group (44.3%), followed by retirees (23.0%), workers (10.3%), and self-employed individuals (6.9%). Concerning household economic status, 62.6% reported a moderate level, 19.5% good, and 17.8% poor.

Diagnostic subtypes of chronic gastritis included chronic non-atrophic gastritis (43.7%), chronic non-atrophic gastritis with erosion (26.4%), chronic atrophic gastritis (12.1%), chronic atrophic gastritis with erosion (4.0%), and other conditions (13.8%). Furthermore, 60.9% of participants reported at least one comorbidity.

2.2 Reliability analysis

Reliability reflects the internal consistency and stability of a measurement instrument. In this study, Cronbach's α coefficients were calculated for the overall scale and its subdimensions. As shown in Table 1, the total scale demonstrated high internal consistency with a Cronbach's α of **0.87**, indicating excellent reliability.

For the subdimensions, all domains except Physical Health (PHD) exhibited Cronbach's α values greater than 0.70. Within the PHD domain, item PHD3 ("Has your illness or treatment affected your sexual function?") substantially reduced internal consistency. After removing this item, Cronbach's α for the PHD domain increased to **0.64**, meeting the minimum requirement for structural equation modeling and therefore PHD3 was excluded from the structural validity testing.

Split-half reliability is another important indicator of measurement stability. The split-half reliability coefficient for the total scale was **0.77**, close to the commonly accepted threshold of 0.80. Taken together, these findings suggest that the PROISCD-CG scale demonstrates **good internal consistency and acceptable reliability** across most dimensions.

Table 1
Analysis of Internal Consistency Reliability (Cronbach's α))

Dimension	Item	Cronbach's α if Item Deleted	Cronbach's α of the Dimension
Physical Health Domain (PHD)	PHD1	0.418	0.559
	PHD2	0.536	
	PHD3	0.643	
	PHD4	0.554	
	PHD5	0.475	
	PHD6	0.518	
	PHD7	0.504	
	PHD8	0.454	
Mental Health Domain (MHD)	MHD1	0.787	0.775
	MHD2	0.781	
	MHD3	0.774	
	MHD4	0.732	
	MHD5	0.718	
	MHD6	0.710	
	MHD7	0.742	
	MHD8	0.748	
Social Health Domain (SHD)	SHD1	0.672	0.730
	SHD2	0.706	
	SHD3	0.692	
	SHD4	0.696	
	SHD5	0.680	
	SHD6	0.741	
	SHD7	0.745	
	SHD8	0.692	
Spiritual/Belief Health Domain (SBD)	SBD1	0.710	0.737
	SBD2	0.694	

Dimension	Item	Cronbach's α if Item Deleted	Cronbach's α of the Dimension
	SBD3	0.772	
	SBD4	0.699	
	SBD5	0.648	
	SBD6	0.649	
Specific Domain (SPD)	CG1	0.816	0.827
	CG2	0.826	
	CG3	0.804	
	CG4	0.804	
	CG5	0.816	
	CG6	0.828	
	CG7	0.802	
	CG8	0.823	
	CG9	0.807	
	CG10	0.811	
	CG11	0.805	
Total Scale	TOT	—	0.871

2.3 Validity Analysis

Validity refers to the extent to which an instrument accurately measures the construct it is intended to assess. In this study, we evaluated both **criterion validity** and **construct validity** of the PROISCD-CG scale.

2.3.1 Criterion Validity

Criterion validity was examined by correlating each dimension of the PROISCD-CG scale with the corresponding domains of the Short Form-36 Health Survey Questionnaire (SF-36), which served as the external criterion. As shown in Table 2, **all dimensions of the PROISCD-CG were positively correlated with SF-36 domains**, with correlation coefficients ranging from **0.158 to 0.691**.

Except for the associations between the **Spiritual Belief Dimension** and the **Emotional Role Function** domain, and between the **Specific Module** and the **Physical Function** domain, **the correlations between corresponding domains were stronger than cross-domain correlations**, indicating acceptable criterion validity.

This result is consistent with expectations, as SF-36 is a generic quality-of-life instrument and does not specifically target chronic gastritis. Currently, **no CG-specific generic PRO instrument is available**, thus the moderate level of correlation observed is reasonable and supports the criterion validity of the PROISCD-CG scale.

2.3.2 Pre-analysis Suitability Testing

Before conducting exploratory factor analysis, the **Kaiser–Meyer–Olkin (KMO) measure** and **Bartlett's test of sphericity** were performed to assess sampling adequacy.

- **KMO = 0.78 (> 0.70)** indicates that the sample is appropriate for factor analysis.
- **Bartlett's test was significant (P < 0.05)**, suggesting that the correlation matrix is not an identity matrix.

These findings confirm the suitability of the dataset for subsequent structural equation modeling and construct validity evaluation.

Table 2
Correlation Between the SF-36 Scale and the Chronic Gastritis PRO Scale (n = 174)

Dimension	PHD	MHD	SHD	SBD	General Module(GM)	SPD
Physical Function	0.426**	0.108	0.158*	0.057	0.232**	-0.066
Role-Physical	0.113	0.285**	0.209**	0.145	0.252**	0.192*
Bodily Pain	0.329**	0.370**	0.291**	0.115	0.362**	0.372**
General Health	0.379**	0.395**	0.282**	0.233**	0.423**	0.176*
Vitality	0.561**	0.653**	0.420**	0.352**	0.655**	0.308**
Social Functioning	0.410**	0.526**	0.367**	0.169*	0.486**	0.299**
Role-Emotional	0.089	0.308**	0.217**	0.070	0.231**	0.291**
Mental Health	0.315**	0.691**	0.363**	0.235**	0.542**	0.418**

Note: *P < 0.05; **P < 0.01.

2.4 Structural Validity Analysis

2.4.1 Model Fit Indices

Based on the predefined dimensional structure of the PROISCD-CG scale, a structural equation model (SEM) was constructed using the items belonging to each latent dimension. The initial model generated by AMOS demonstrated suboptimal fit. Although the chi-square to degrees-of-freedom ratio (χ^2/df) met

acceptable standards and the RMSEA value reached a marginally acceptable level, key incremental and absolute fit indices—including GFI, IFI, and CFI—did not reach the recommended thresholds.

These findings indicated that the hypothesized model required further refinement to better represent the underlying factor structure of the scale (Fig. 3).

2.4.2 Model Modification

Guided by modification indices (MI) provided by AMOS, several theoretically reasonable adjustments were made to improve model performance. First, items with factor loadings < 0.30 were removed, with the exception of PHD8 (loading 0.28), which was retained due to conceptual relevance. Subsequently, three residual correlations with high MI values—paths “e9→e20,” “e26→e27,” and “e37→e38”—were added sequentially to improve model fit.

Following these modifications, the chi-square value (χ^2) and χ^2/df were reduced, RMSEA approached 0.08, and GFI, CFI, and IFI increased, approaching the acceptable range, indicating that the revised model provided an improved representation of the data (Table 3, Fig. 4).

Table 3
Main Fit Indices Before and After Model Modification

Model	2	CMIN/DF	RMSEA	GFI	CFI	IFI
Original Model	1856.363	2.543	0.094	0.649	0.605	0.612
Modified Model	844.450	2.154	0.082	0.759	0.803	0.806

2.4.3 Convergent Validity and Composite Reliability

Convergent validity and composite reliability were assessed for each latent construct. Standardized factor loadings ranged from 0.29 to 0.95. Although several items (PHD1, PHD8, MHD8, SBD1, SBD2, CG6, CG8) demonstrated lower loadings, most exceeded the recommended threshold of 0.40.

Average Variance Extracted (AVE) values ranged from 0.30 to 0.51. Except for the physical health and specific module dimensions, all AVEs were > 0.40. Composite Reliability (CR) values ranged from 0.68 to 0.83, with all but the physical health dimension surpassing the 0.70 benchmark.

Overall, the revised model demonstrated acceptable convergent validity, satisfactory composite reliability, and alignment with psychometric expectations (Table 4).

Table 4
Convergent Validity and Composite Reliability Values of the Modified Scale

Dimension	Item	Standardized Factor Loading	AVE	CR
Physical Health Domain (PHD)	PHD1	0.38	0.39	0.68
	PHD8	0.28		
	PHD6	0.66		
	PHD7	0.95		
Mental Health Domain (MHD)	MHD8	0.34	0.51	0.83
	MHD4	0.64		
	MHD5	0.91		
	MHD6	0.94		
	MHD7	0.57		
Social Health Domain (SHD)	SHD3	0.49	0.42	0.78
	SHD1	0.64		
	SHD4	0.55		
	SHD5	0.77		
	SHD8	0.80		
Spiritual/Belief Health Domain (SBD)	SBD5	0.83	0.42	0.76
	SBD6	0.91		
	SBD1	0.29		
	SBD2	0.39		
	SBD4	0.59		
Specific Domain(SPD)	CG11	0.74	0.30	0.82
	CG10	0.69		
	CG9	0.69		
	CG8	0.40		
	CG7	0.62		
	CG6	0.31		
	CG5	0.45		
	CG4	0.56		

Dimension	Item	Standardized Factor Loading	AVE	CR
	CG3	0.53		
	CG2	0.42		
	CG1	0.42		

2.4.4 Discriminant Validity

Discriminant validity was evaluated by comparing the square roots of AVE values with the inter-construct correlation coefficients.

With the exception of the physical health and social health dimensions—whose correlation coefficient exceeded their internal correlations—the square roots of AVEs for all other dimensions were greater than their inter-factor correlations. This indicates adequate discriminant validity for most domains of the revised PROISCD-CG scale.

Overall, the discriminant validity of the scale was considered acceptable (Table 5).

Table 5
Discriminant Validity Analysis

Dimension	AVE	Physical Health	Mental Health	Social Health	Spiritual/Belief Health	Specific Domain
Physical Health	0.389	**0.624**				
Mental Health	0.512	0.120	**0.716**			
Social Health	0.424	0.785	0.353	**0.651**		
Spiritual/Belief Health	0.419	0.425	0.168	0.569	**0.674**	
Specific Domain	0.299	-0.024	0.482	-0.022	-0.128	**0.547**

Discussion

In this study, we conducted a comprehensive psychometric evaluation of the Patient-Reported Clinical Outcome Scale for Chronic Gastritis (PROISCD-CG) using both classical test theory and structural equation modeling (SEM). The results indicate that the scale demonstrates good overall reliability, acceptable validity, and a reasonably stable factor structure following SEM-guided refinement. These findings support the use of PROISCD-CG as a patient-centered measurement tool for assessing clinical outcomes in individuals with chronic gastritis.

Internal consistency analysis showed that the total scale achieved a Cronbach's α of 0.87, indicating strong overall reliability. Most subdomains met or exceeded commonly accepted thresholds for internal consistency. The physical health (PHD) domain initially exhibited relatively lower reliability; however,

removal of item PHD3 led to an improvement in Cronbach's α. This item addresses sexual function, a topic that may be culturally sensitive and prone to non-response or socially desirable responding, particularly among older or rural populations. Similar challenges have been reported in other patient-reported outcome studies involving sensitive health topics[18].

Aside from this domain, the remaining dimensions—psychological health, social health, spiritual well-being, and the disease-specific module—demonstrated satisfactory internal consistency, with the disease-specific module showing the strongest coherence. These findings suggest that symptom-focused items are particularly effective in capturing the clinical impact of chronic gastritis.

Criterion validity was assessed by examining correlations between PROISCD-CG domains and the SF-36, a widely used generic health-related quality-of-life instrument. Moderate correlations were observed between conceptually related domains, which is consistent with expectations. Because the SF-36 is not designed to assess disease-specific symptom burden, strong correlations are neither expected nor necessary to establish criterion validity[19].

Instead, the observed correlation pattern supports the conceptual overlap between general health status and patient-reported outcomes while highlighting the added value of a disease-specific PRO instrument. Notably, weaker correlations were observed in domains related to spiritual well-being and specific gastrointestinal symptoms, underscoring the limitations of generic instruments in capturing dimensions that are particularly relevant to chronic gastritis[20].

Structural validity was further examined using SEM. The initial hypothesized model did not achieve optimal fit across all indices, despite acceptable χ^2/df and RMSEA values. Incremental and absolute fit indices such as GFI, CFI, and IFI fell below recommended thresholds, indicating that the original factor structure required refinement. Guided by modification indices and theoretical considerations, items with low factor loadings were removed, and a limited number of correlated error terms were added between items with similar content. These modifications resulted in improved model fit, with fit indices approaching acceptable ranges. The revised model demonstrated generally satisfactory convergent and discriminant validity, as reflected by composite reliability and average variance extracted values.

Although several items retained relatively low factor loadings after model modification, most constructs achieved acceptable levels of reliability and validity. Items with low loadings may reflect conceptual overlap, ambiguous wording, or cultural factors influencing patient interpretation[21]. Rather than indicating fundamental flaws in the scale, these findings highlight opportunities for further optimization. Future revisions of the PROISCD-CG may benefit from qualitative item refinement, such as cognitive interviewing, to improve clarity and cultural adaptability while preserving conceptual coverage[22].

The application of SEM represents a methodological strength of this study. Compared with traditional psychometric approaches, SEM allows for explicit modeling of latent constructs and measurement error, providing a more rigorous assessment of construct validity[10,15]. By combining SEM with classical

reliability and validity analyses, this study offers a robust evaluation of the internal structure of the PROISCD-CG scale. To our knowledge, this is among the few studies in China to apply SEM in the validation of a chronic gastritis–specific patient-reported outcome instrument, thereby contributing methodological insight to the field of gastroenterology outcomes research.

Limitations

Several limitations of this study should be acknowledged. First, the sample size was relatively modest. Although the number of participants met the minimum requirements for SEM analysis, larger samples—ideally five to ten times the number of measured variables—are recommended to enhance model stability and parameter precision. The limited sample size may have contributed to borderline fit indices in the initial model.

Second, the cross-sectional study design precluded evaluation of test–retest reliability and responsiveness, both of which are essential for assessing the temporal stability and sensitivity of PRO instruments. Longitudinal studies are needed to determine whether the PROISCD-CG scale can reliably detect changes in patient status over time or in response to treatment.

Third, the study population was recruited from two hospitals within a single region, which may limit the generalizability of the findings. Cultural, socioeconomic, and healthcare-system differences could influence patient responses to certain items, particularly those related to sensitive topics. Future multicenter studies involving more diverse populations are warranted.

Finally, several items exhibited relatively low factor loadings even after model modification, suggesting potential redundancy or conceptual ambiguity. These items should be further reviewed and refined through qualitative methods, such as cognitive interviewing, to improve clarity and cultural adaptability.

Despite these limitations, the present findings have important clinical and public health implications. Chronic gastritis is a highly prevalent condition that imposes a substantial burden on physical, psychological, and social functioning. Disease-specific PRO instruments provide a structured and patient-centered approach to capturing this burden, complementing objective clinical indicators. In clinical practice, the PROISCD-CG scale may facilitate more comprehensive patient assessment, support individualized treatment planning, and enable monitoring of treatment effectiveness. At the population level, standardized PRO measures can inform health services evaluation and resource allocation.

Conclusion

In conclusion, the PROISCD-CG scale demonstrates good reliability, acceptable validity, and a refined factor structure following SEM-guided modification. The scale provides a practical and interpretable tool for assessing patient-reported outcomes in chronic gastritis. Further validation in larger, more diverse populations and longitudinal settings is warranted to enhance its applicability and establish its responsiveness to clinical change.

This study demonstrates that the PROISCD-CG scale exhibits good internal consistency, acceptable validity, and an improved factor structure following structural equation modeling–guided refinement. The finalized model provides a reliable and clinically interpretable tool for assessing patient-reported outcomes in individuals with chronic gastritis. With further validation in larger and longitudinal studies, the PROISCD-CG scale has the potential to support patient-centered evaluation, treatment monitoring, and outcome assessment in both clinical practice and research settings.

Abbreviations

CG
Chronic gastritis
PRO
Patient-reported outcome
QOL
Quality of life
PROISCD-CG
Patient-Reported Clinical Outcome Scale for Chronic Gastritis
SEM
Structural equation modeling
CFA
Confirmatory factor analysis
χ^2/df
Chi-square to degrees of freedom ratio
RMSEA
Root mean square error of approximation
GFI
Goodness-of-fit index
CFI
Comparative fit index
IFI
Incremental fit index
MI
Modification indices
CR
Composite reliability
AVE
Average variance extracted
KMO
Kaiser–Meyer–Olkin
PHD

Physical health domain
MHD
Mental health domain
SHD
Social health domain
SBD
Spiritual/Belief health domain
SPD
Specific domain

Declarations

Ethics approval and consent to participate

The study was performed in strict accordance with the Declaration of Helsinki and was approved by the Ethics Committee of Kunming Medical University (approval number: KMMU2021MEC031). Adhering to the principle of voluntary participation, all potential participants were given the opportunity to make an informed decision on their participation in the study. All subjects were clearly informed of their right to withdraw from the study at any time without facing adverse consequences. To ensure transparency, the purpose and procedures of the study were fully explained to the subjects before signing the informed consents. Individually identifiable information, such as name and telephone number, was deliberately omitted from the recorded data during the data collection phase to ensure anonymity. Finally, Information collected was subjected to appropriate coding procedures and kept strictly confidential throughout the research process.

Consent for publication

Written informed consent for publication was obtained from all individual participants included in the study.

Availability of data

The data supporting this study cannot be made publicly available due to patient privacy concerns. Data are available from the corresponding author upon reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Author contributions

PingGuang Lei and Xin Li contributed equally.

PingGuang Lei,Xin Li,JinQing Ou,and Ying Chen conceived and designed the study. HuiMin Huang,GuiJin Luo,XiRan Xia,and KeYan Wan responsible for data collection. ZaiXue Mu ,Qiu Ju Miao and TianLe Fu performed the formal analysis. PingGuang Lei and Ying Chen developed the methodology. Xin Li and Ying Chen wrote the original draft, and all authors contributed to reviewing and editing the final manuscript.

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Authors' information

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Figures

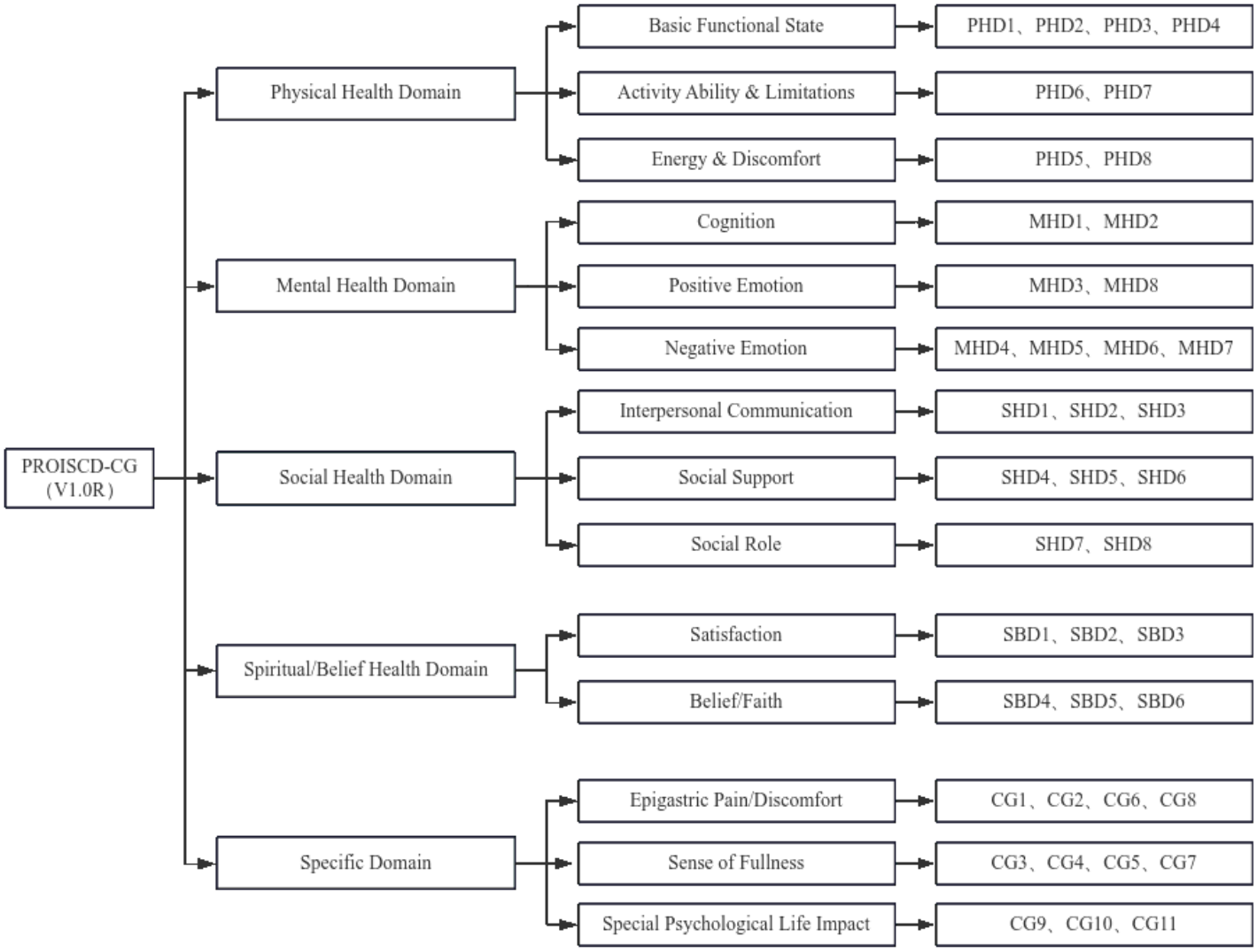


Figure 1

Items Corresponding to Each Dimension of the Scale

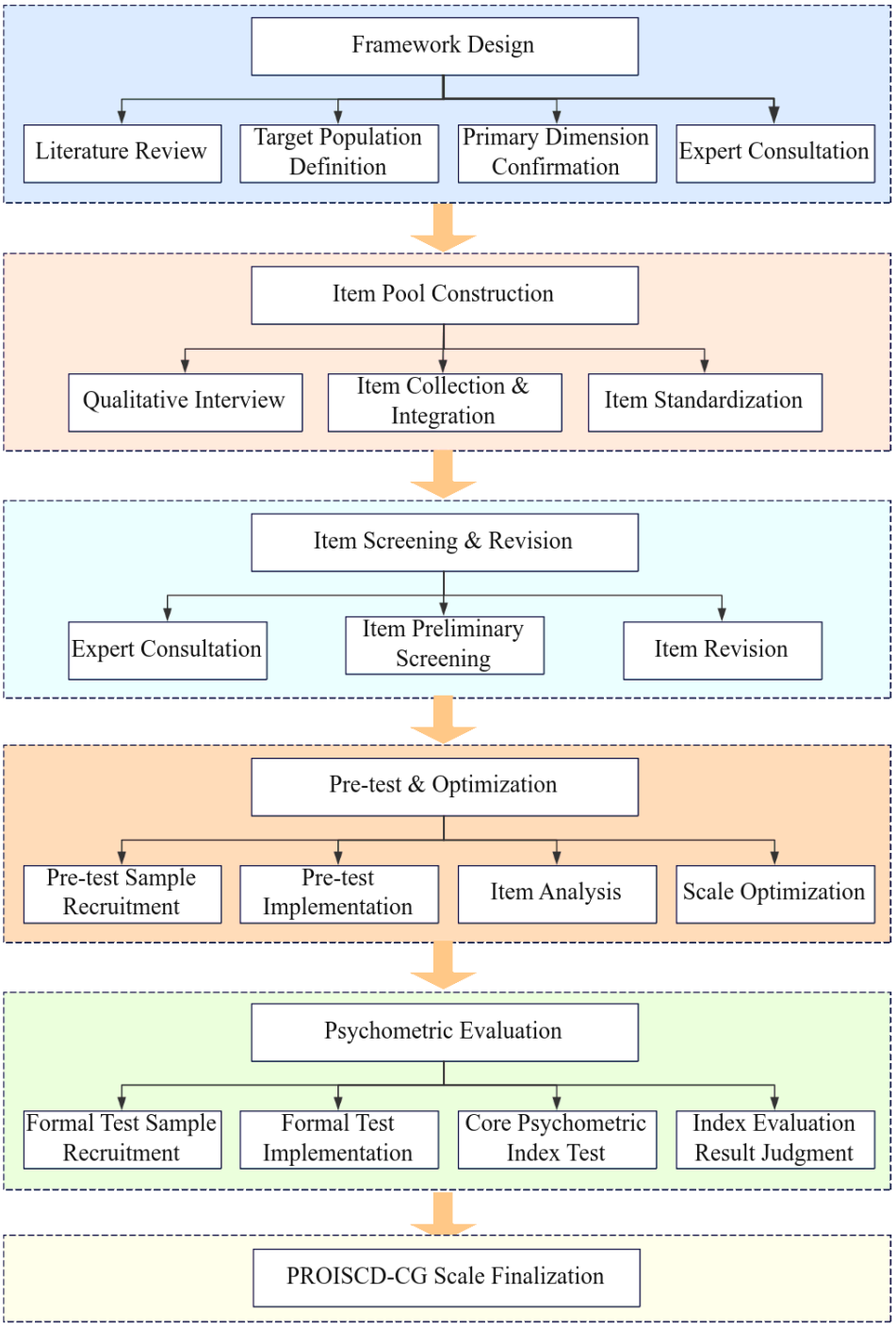


Figure 2

Development and validation process of the PROISCD-CG scale.

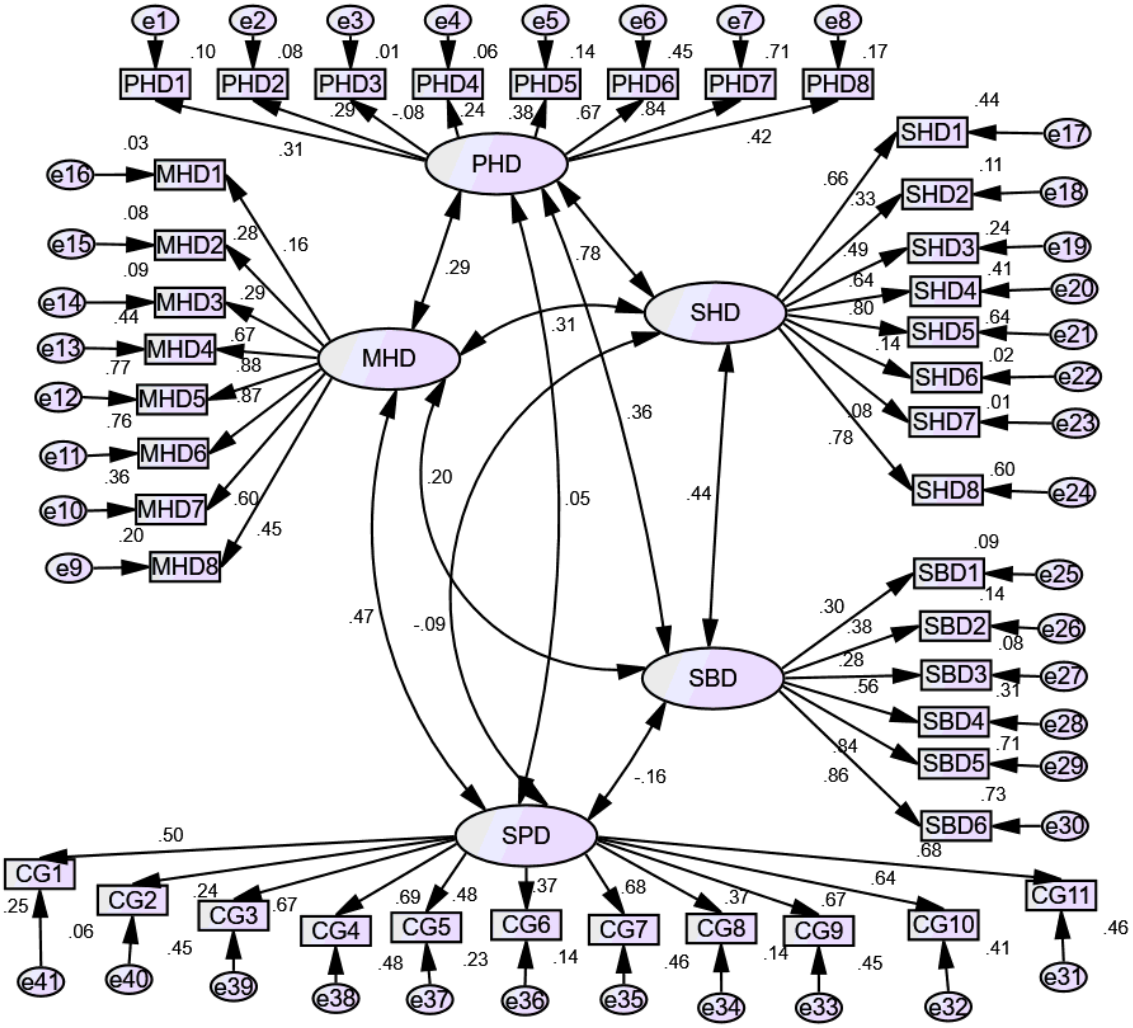


Figure 3

Structural Diagram of the Original Scale Model

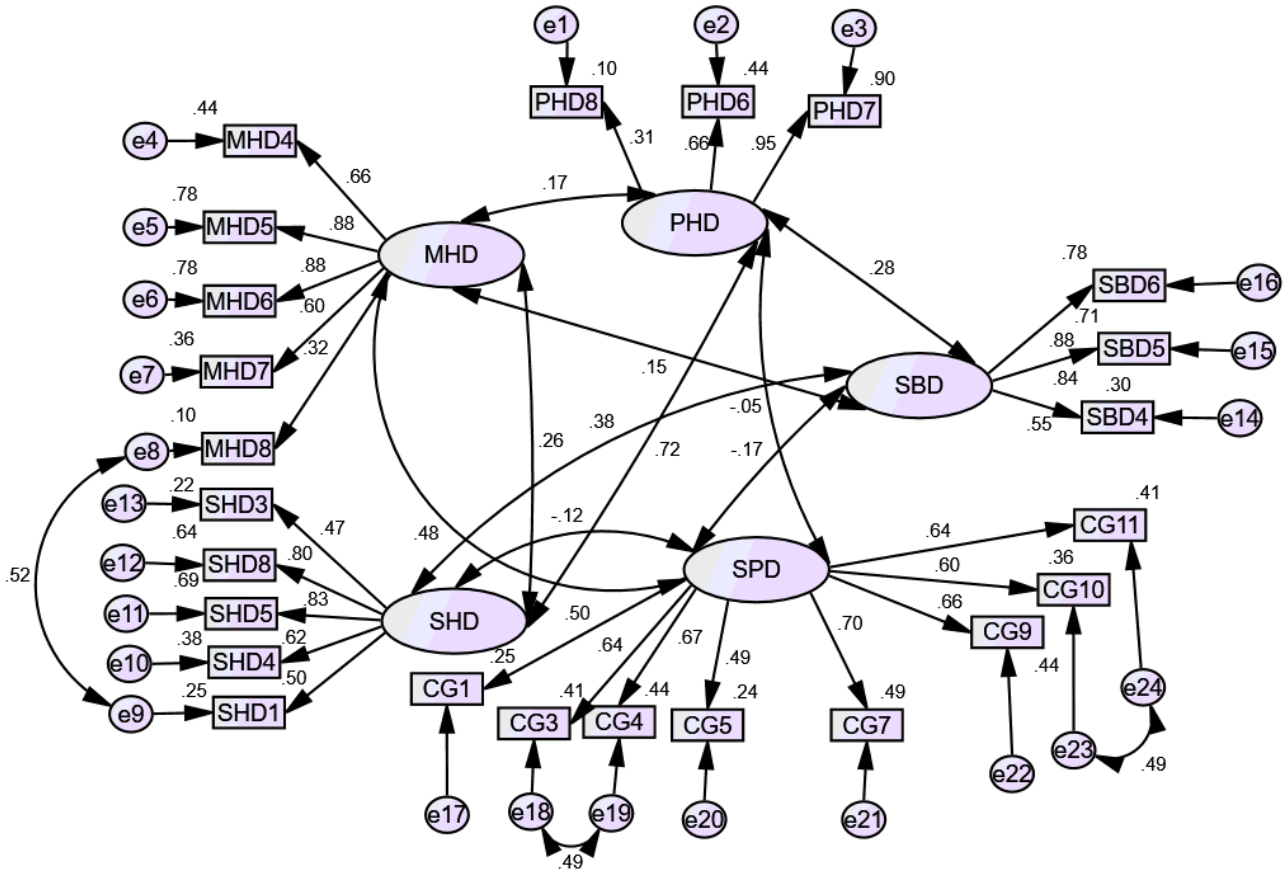


Figure 4

Structural Diagram of the Modified Model

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SupplementaryFileA.OfficialEnglishlanguageversionofthePROISCDCGscale.pdf
- SupplementaryFileB.ScoringAlgorithmandInterpretation.pdf
- SupplementaryFileC.TranslationandCulturalAdaptation.pdf