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Research article

Development of a medication experience scale for patients with chronic disease in primary care facilities

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ABSTRACT

Background: Understanding patients' medication experience is crucial for improving adherence, health outcomes, and medical safety. Currently, there is a lack of measurement tools for the medication experience of patients with chronic diseases in primary care facilities in China, which seriously restricts the research and practice of pharmaceutical service and management in primary care facilities.

Objective: This study aims to develop the Medication Experience Scale For Patients with Chronic Disease in Primary Care Facilities tailored to China's chronic disease management practices. The scale is intended to support research and practice in medication management for chronic disease patients.

Methods: A preliminary item pool for the scale was constructed through literature review, semi-structured interviews, and focus group discussions. The Delphi Method was employed to consult experts and refine the scale. A pilot survey was conducted with 313 chronic disease patients from primary care facilities, selected via random sampling. The reliability and validity of the scale were tested, and iterative adjustments were made to optimize its content.

Results: The finalized scale consists of 3 primary dimensions, 7 secondary dimensions, and 28 measurement items. Item analysis yielded *P*-values < 0.05. The Cronbach's α coefficients for the overall scale and all dimensions exceeded 0.8, with split-half reliabilities above 0.7 and intra-class correlation coefficients above 0.8, indicating high reliability. Post-rotation factor loadings for all items exceeded 0.5. The confirmatory factor analysis demonstrated excellent model fit: CMIN/DF = 1.485, GFI = 0.902, RMSEA = 0.039, RMR = 0.03, CFI = 0.981, NFI = 0.945, IFI = 0.981. Composite reliability values were above 0.7, and average variance extracted values exceeded 0.5, demonstrating strong validity.

Conclusion: The Medication Experience Scale For Patients with Chronic Disease in Primary Care Facilities developed in this study exhibits better reliability and validity. Its adaptability to local contexts make it a suitable tool for investigating the medication experiences of chronic disease patients in primary care facilities.

In 2019, approximately 390 million people aged 15 and older in China suffer from chronic diseases, including 270 million with hypertension and 97 million with diabetes. By 2020, chronic diseases contributed for 88.5 % of total mortality, with their associated disease burden comprising nearly 70 % of the total disease burden in China.[1-3] These conditions impose substantial economic and psychological burdens on patients and their families, emerging as a significant public health challenge that impacts China's economic and social development.[3] Since the initiation of healthcare reform, primary care facilities in China have taken on dual responsibilities: providing basic medical services and public health services, making them the cornerstone of chronic disease prevention and management.[4]

The medication experience in primary care facilities refers to the cumulative medication experiences(perceptions of benefits and burden of medication) of patients receiving care in community health centers, township health centers, and village clinics. This includes perceptions of medication effectiveness, adverse reactions, ease of use, affordability, and the quality of guidance provided by healthcare professionals.[5-9] It functions as both an outcome of pharmaceutical policies and services and a predictor of medication adherence. Furthermore, it plays

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a critical role in shaping disease outcomes and enhancing quality of life.[10]

Therefore, developing a scientific tool to measure the medication experience of chronic disease patients is essential for accurately assessing their current experiences. Although similar tools exist in other countries, cultural differences render these tools less applicable to the needs and practices of Chinese patients.[11-13] This study aims to develop a medication experience scale specifically tailored to the chronic disease management practices within primary care system in China, grounded in the theory of perceived value. By aligning the tool with local practices, it seeks to offer a reliable basis for evaluating and improving pharmaceutical services and management in primary care facilities.

Materials and methods

Initial development of the Medication Experience Scale For Patients with Chronic Disease in Primary Care Facilities

Identification of measurement dimensions and items based on literature review

A systematic literature search was conducted using keywords such as "patients with chronic diseases," "medication experience," "chronic patients," and "experience with medication." The search spanned multiple databases, including CNKI, Wanfang Data, VIP Journals, Web of Science, PubMed, and Embase, without any restrictions on publication dates.

The identified articles were reviewed to select studies focusing on tools for measuring patients' medication experiences. Based on the review, eight common tools related to medication experience were included in the analysis. Details are as follows: (1)The Treatment Satisfaction Questionnaire for Medication (TSQM)[14] consists of 4 dimensions, 11 items; (2)Treatment Satisfaction with Medicines Questionnaire (SATMED-Q)[15] consists of 6 dimensions, 17 items; (3)Patient Satisfaction with Medication Management Instrument (PSMMI)[16] consists of 3 dimensions, 9 items; Satisfaction with Information about Medicines Scale (SIMS)[17] consists of 2 dimensions, 17 items; The Living with Medicines Questionnaire (LMQ)[18] consists of 8 dimensions, 41 items; The Medication-Related Burden Quality of Life Scale (MRB-QoL)[19] consists of 5 dimensions, 31 items; The Patient-Reported Outcomes Measure of Pharmaceutical Therapy for Quality of Life (PROMPT-QoL)[20] consists of 8 dimensions, 40 items; The Experience of Patients with Chronic Diseases Questionnaire[21] consists of 3 dimensions, 10 items.

Based on a review of measurement tools related to patients' medication experiences, 14 dimensions were identified. These include the impact on daily life or functional and role limitations, the doctor-patient relationship and communication regarding medications, medication effectiveness, behaviors and attitudes toward medication use, side effects, practicality or challenges in usage, cost-related burdens, patient self-management, convenience, satisfaction with healthcare services, potential issues or safety concerns related to medication, medication information or knowledge, the psychological impact or burden of medications, and their availability or accessibility.

Development of the preliminary item pool based on semi-structured interviews

Semi-structured interviews were conducted with patients diagnosed with various chronic diseases to investigate their medication experiences at primary care facilities. These findings were used to expand and refine the preliminary item pool for the scale. The interview guide was designed based on prior literature analysis and focused group discussions, with the following key questions: (1)What is your primary method of medication use currently? (2)How do you perceive your experience with using these medications? Can you explain why? (3)What challenges have you faced when acquiring or using medications at primary care facilities? What has been the most significant difficulty? (4) Do primary care practitioners influence your medication experience? If so, how? (5)What suggestions would you offer for improving your medication experience, and why?

The interviews were collaboratively conducted by two team members well-acquainted with the study content. Each participant was assigned a unique code (N1–N17) for identification. Before the interviews, participants provided informed consent, and the sessions were audio-recorded. The recordings were transcribed into text, with file names corresponding to the participant codes.

Participants were recruited from primary care facilities based on the principle of information saturation, considering factors such as gender, age, and type of chronic disease.[22] To ensure diversity and representativeness, the inclusion criteria included: (1)individuals with varying demographic and clinical characteristics; (2)individuals with prior medication use experience who were capable of independently managing their medication regimen; (3)individuals who could clearly and accurately articulate their medication experiences and express their perspectives. The exclusion criteria included: (1)patients with severe health conditions that prevented effective participation in the interview process; (2)patients unwilling to voluntarily participate in the study; (3)individuals with hearing or cognitive impairments that hindered independent participation; (4) participants whose interviews were interrupted and could not be completed. Seventeen participants who met the inclusion and exclusion criteria were ultimately enrolled in the study. Detailed demographic and clinical information for the participants is presented in Appendix Table 1.

During the interviews, some chronic disease patients on long-term medication reported experiencing side effects. Most of these side effects were described as tolerable, and patients expressed a strong dependency on the medication. Even when aware of the side effects, they were willing to continue their treatment. A commonly reported approach to mitigating side effects was to introduce additional medications, potentially leading to a vicious cycle. Some participants noted that although their medication was initially effective, its efficacy diminished over time with prolonged use, negatively impacting their medication experience. Part of patients reported difficulties with swallowing or carrying their medications, which affected their overall convenience and adherence. Additionally, while some patients expressed trust in primary care practitioners, they rarely engaged in communication with these practitioners. As a result, they felt a lack of proper guidance on medication usage.

Based on the interview results, key nodes were identified by text coding. The following six themes emerged: (1)side effects from long-term medication; (2)medication can relieve symptoms, but long-term drug resistance occurs, and drug efficacy varies greatly; (3)economic burden caused by medication; (4)inconvenience in obtaining and usage of medicine; (5) impact on daily life and activities by medication; (6)insufficient guidance from primary care practitioners and lack of humanistic care. The themes were summarized into measurement dimension to supplement and adjust the scale item pool (Appendix Table 2).

Based on the literature review, interview findings, and the practical context of chronic disease medication use in China's primary care facilities, a thematic group discussion was conducted to develop the initial item pool for the scale. The preliminary selection included eight dimensions and a total of 40 measurement items: medication convenience (9 items), medication affordability (5 items), medication safety (3 items), medication effectiveness (6 items), adequacy of medication guidance (4 items), humanistic aspects of medication guidance (5 items), impact of medications on daily life (3 items), social impact of medications (4 items). Of these, 15 items were newly developed by the research team based on insights from interviews, while the remaining 25 were adapted from existing scales used in China and abroad.

Perceived value refers to patients' and their families' subjective evaluations during the healthcare process, comparing the perceived quality of care to the return on their investment.[23] This concept provides a structured and systematic perspective for assessing medication experiences. In this study, the scale's primary dimensions were categorized based on

Table 1
Classification and interpretation of scale dimensions.

Primary dimension	Definition	Secondary dimension	Definition
Functional value	Value that meets the functional needs of patients	Effectiveness	Measures patients' experiences with the symptom-relieving effects of medication
		Safety	Measures patients' experiences with the side effects of medication
		Affordability	Measures patients' experiences with the economic affordability of medication
Emotional value	Value that meets the emotional needs of patients	Convenience	Measures patients' experiences with the ease of obtaining and using medication
		Adequacy of medication guidance	Measures patients' experiences with the clarity and adequacy of information provided by healthcare professionals
		Humanity of Medication Guidance	Measures patients' experiences with the methods, privacy protection, and humanistic care provided during medication guidance
Social value	Value that meets the emotional needs of patients	Impact of Medication on Daily Life	Measures patients' evaluations of how medication affects their daily activities
		Social impact of Medication	Measures patients' evaluations of how medication affects their daily activities.

the theory of perceived value into functional value, emotional value, and social value: (1)functional value dimension captures the value derived from fulfilling patients' functional needs during the medication experience. It encompasses three secondary dimensions, including effectiveness, safety and affordability; (2)emotional value dimension addresses the emotional needs of patients, including three secondary dimensions(convenience, adequacy of medication guidance and humanistic aspects of medication guidance); (3)social value dimension reflects the sense of social recognition or the broader implications of medication use, It incorporates two secondary dimensions(impact of medications on daily life and social Impact of medications). Details of these dimensions are outlined in Table 1.

Scale validation and refinement using the Delphi method

(1) Experts selection criteria

Inclusion criteria: primary care practitioners, pharmaceutical service professionals, health administrators, and academic experts with professional experience in clinical medicine, general practice, health service management, public health, or related disciplines; a minimum educational qualification of a bachelor's degree.

Exclusion criteria: individuals unwilling to participate voluntarily or those who failed to respond within two weeks were excluded.

(2) Expert consultation form

Introduction: This section includes the background of the scale development, core concepts, and the selection process for initial dimensions and items. It also explains the objectives and requirements of this consultation process.

Consultation Form for the Medication Experience Scale for Chronic Disease Patients in Primary Care facilities: Experts are asked to evaluate the importance and sensitivity of the initial scale's dimensions and measurement items using a Likert 5-point scale, where higher scores indicate greater importance and sensitivity. For each dimension or item, experts are encouraged to provide suggestions for improvement along with brief explanations for their recommendations.

Expert Background Information: This section collects detailed information about the participating experts, including gender, age, job category, position, educational level, professional title, specialties, years of work experience, familiarity with the subject matter and the primary basis for making judgments.

A total of 19 experts participated in two rounds of consultation for the scale development process. Among the experts, 11 (57.9 %) were female, and 8 (42.1 %) were male, with an average age of 43.11 ± 1.67 years. Six experts (31.6 %) specialized in clinical medicine, three (15.8 %) in pharmacy-related fields, and five (26.3 %) in management science. The average duration of their involvement in pharmaceutical management practice and research was 15.21 ± 2.40 years. Regarding professional titles, 2 (10.5 %) held senior titles, 11 (57.9 %) held associate senior titles, and 6 (31.6 %) held intermediate titles.

In the first round of consultation, 20 questionnaires were distributed, with 19 completed and returned, resulting in a response rate of 95 %. All returned questionnaires were fully completed, yielding a 100 % valid response rate. In the second round, 19 questionnaires were distributed to the same experts, all of which were completed and returned, achieving a 100 % valid response rate. Both rounds of expert consultation achieved effective response rates exceeding 90 %, reflecting strong interest and active engagement by the participating experts in the study.

The data analysis of the expert consultation questionnaires showed a mean authority coefficient (Cr) of 0.86 for the first round and 0.88 for the second round. Both values exceeded 0.80, indicating a high level of authority among the participating experts. These results suggest that the consultation process was highly reliable and that the experts provided credible input.

During the first round of expert consultation, the average importance scores for primary dimensions ranged from 3.947 to 4.895, while the average sensitivity scores ranged from 3.474 to 4.368. For secondary dimensions, the mean importance scores ranged from 3.736 to 4.894, and the mean sensitivity scores ranged from 3.316 to 4.737. For individual items, the average importance scores ranged from 3.052 to 4.947, and the average sensitivity scores ranged from 2.894 to 4.894.

A total of 16 revision suggestions were collected, necessitating modifications to five dimensions: effectiveness, convenience, adequacy of medication guidance, the impact of medication on daily life, and the social impact of medication. Based on the suggestions, nine items were removed, two items were revised and adjusted, one item was merged and refined, the dimensions of the impact of medication on daily life and the social impact of medication were combined into a single dimension: the impact of medication on daily life.

In the second round of expert consultation, the average importance scores for the primary dimensions ranged from 4.368 to 4.947, while the average sensitivity scores ranged from 3.947 to 4.684. For secondary dimensions, the average importance scores ranged from 4.421 to 4.947, and the average sensitivity scores ranged from 3.316 to 4.737. For individual items, the average importance scores ranged from 3.789 to 4.947, and the average sensitivity scores ranged from 3.158 to 4.737.

As expert opinions reached consensus, the consultation process was concluded. The refined Medication Experience Scale For Patients with Chronic Disease in Primary Care Facilities, developed through expert consultation and validation, includes seven dimensions and 29 items: effectiveness (4 items), affordability (4 items), convenience (4 items), adequacy of medication guidance (4 items), humanity of Medication Guidance (4 items), safety (4 items) and impact of medication on daily life (5 items)

Language adjustment of the scale

Using the preliminary version of the chronic disease patients' primary care medication experience scale, a random sampling method was employed in October 2023 to conduct an on-site survey at primary healthcare institutions. A total of 30 chronic disease patients partici-

Table 2
Refined medication experience scale for patients with chronic disease in primary care facilities.

Dimension	Item
Effectiveness	1. I am satisfied with the therapeutic effects of my medication
	2. I am satisfied with the speed at which my medication takes effect
	3. My medication can alleviate the symptoms of my illness
	4. My medication can prevent the progression of my illness
Affordability	5. I have experienced situations where I cannot afford my medication
	6. I have had to choose between buying daily necessities and medication
	7. I have had to purchase medication beyond my financial means
	8. Daily medication imposes a financial burden on me
Convenience	9. It is very convenient for me to obtain medication
	10. Using my medication (e.g., oral, injection, topical application, etc.) is very convenient
	11. Storing my medication (e.g., avoiding light, low temperature, moisture-proof, etc.) is very convenient
	12. I find it difficult to accept the taste, size, or texture of my medication
Adequacy of medication guidance	13. I can obtain detailed information about my condition from healthcare professionals
	14. Healthcare professionals explain how to take medication properly
	15. Healthcare professionals inform me about potential side effects of the medication and how to manage them
	16. Healthcare professionals follow up with me regarding my medication
Humanity of medication guidance	17. Healthcare professionals listen to my personal opinions about medication
	18. I fully trust healthcare professionals in making medication choices
	19. Healthcare professionals protect my privacy during medication guidance
	20. Healthcare professionals provide medication guidance in ways I prefer (e.g., written instead of verbal)
Safety	21. I have experienced side effects after taking medication (e.g., nausea, fatigue, dizziness, etc.)
	22. Taking medication has caused me physical dysfunction (e.g., reduced strength, weakness in limbs, etc.)
	23. Taking medication has caused me mental dysfunction (e.g., reduced thinking ability, impaired judgment, etc.)
	24. My medication has negatively affected my emotions (e.g., anxiety, depression, sadness, anger, etc.)
Impact of medication on daily life	25. My medication has negatively affected my diet (e.g., decreased appetite, dietary restrictions, etc.)
	26. I have had to adjust or reduce my work because of my medication
	27. I have fewer friends because of my medication
	28. My relationship with my family has worsened because of my medication
	29. My social activities (e.g., gatherings, entertainment, etc.) have decreased because of my medication

pated, with each questionnaire taking approximately 8–10 min to complete.

Based on the survey results, the language of the scale was adjusted to enhance clarity and accessibility. Specific revisions included the following:

Item 12: The original statement, "I find it difficult to accept the characteristics of the medication I am taking," was revised to "I find it difficult to accept the taste, size, or texture of the medication I am taking."

Item 22: The original statement, "The medication I am taking has caused physical functional damage," was revised to "Taking medication has led to physical issues such as decreased energy or weakness in my limbs."

Item 23: The original statement, "The medication I am taking has caused cognitive functional damage," was revised to "Taking medication has led to issues such as reduced thinking ability or impaired judgment."

These adjustments, detailed in Table 2, aimed to simplify the language and make the items easier for participants to understand while preserving the intended meaning.

Study participants and research tools

Study participants and research tools

A random sampling method was employed in October 2023 to conduct an on-site survey at primary care facilities in Shandong Province.

Inclusion criteria were as follows: (1)chronic disease patients at primary care facilities; (2)with a history of medication use; (3)able to understand instruction and questions of the survey. Patients with cognitive impairments or unwilling to cooperate with the survey were excluded.

In line with the principle that the sample size should be 5–10 times the number of scale items,[24] and accounting for the 29 items on the scale, 330 participants were distributed to account for potential invalid responses. A total of 325 questionnaires were returned, resulting in a response rate of 98 %. After excluding 12 invalid questionnaires, 313 valid questionnaires remained, representing a validity rate of 96 %. This study received approval from the Medical Ethics Committee of the Second Medical University of Shandong (Approval No 2021YX-066).

The research instrument for this study was a self-designed questionnaire utilizing a Likert 5-point scale. The first section covered general demographic and clinical information about the participants, including gender, age, current residence, household registration, marital status, educational level, and self-reported chronic conditions. The second section was the Medication Experience Scale For Patients with Chronic Disease in Primary Care Facilities, which included 7 dimensions and 9 items of the revised version.

Statistical methods

Statistical analyses were performed using SPSS 23.0 and AMOS 21.0 software. The critical ratio method was applied to analyze the scale's measurement items.[25] Reliability was assessed through internal consistency, split-half reliability, and test-retest reliability.[26] Validity metrics, including structural validity, convergent validity, and discriminant validity, were also evaluated and analyzed.[27,28]

Results

Demographic characteristics of study participants

Of the 313 chronic disease patients included in this study, 60.7 % were female (190 participants), and 39.3 % were male (123 participants). Most participants (94.6 %) were aged 50 years or older, and 94.9 % resided in rural areas. The majority were married (77.3 %, 242 participants), followed by divorced or widowed individuals (21.7 %, 68 participants). In terms of educational level, 74.1 % (232 participants) had an education level of elementary school or below, while 16.0 % (50 participants) had completed middle school. Employment status indicated that 72.8 % (228 participants) were unemployed or retired, and 19.5 % (61 participants) were employed.

Table 3
Reliability analysis results of medication experience scale for patients with chronic disease in primary care facilities.

Measurement Item	Cronbach's α	Split-Half Reliability	Test-Retest Reliability
Effectiveness	0.892	0.916	0.989*
Affordability	0.986	0.981	0.995*
Convenience	0.846	0.870	0.949*
Adequacy of medication guidance	0.894	0.907	0.883*
Humanity of medication guidance	0.903	0.881	0.969*
Safety	0.915	0.917	0.947*
Impact of medication on daily life	0.920	0.937	0.897*
Total	0.818	0.785	0.978*

*Note:** indicates $P < 0.001$

Results of item analysis

The analysis revealed that all 29 items in the Medication Experience Scale For Patients with Chronic Disease in Primary Care Facilities had a P value of <0.05. This result indicates that all items demonstrated strong discriminative ability. Detailed findings are presented in Appendix 3.

Results of reliability analysis

The Cronbach's α coefficient for the overall scale was 0.818, and all dimensions had coefficients exceeding 0.8—indicating good internal consistency reliability. The split-half reliability for both the overall scale and its dimensions surpassed 0.7, demonstrating satisfactory stability and consistency.

A random sample of 20 participants (approximately 6 % of the study population) was retested by the same investigator after completing all surveys. Intraclass correlation coefficients (ICCs) were calculated for this subsample. The ICCs for the overall scale and each dimension were all greater than 0.8, with P values <0.001, signifying strong external consistency. Details of these results are provided in Table 3.

Validity analysis results

Structural validity

The dataset was divided into two subsets for analysis. One subset underwent exploratory factor analysis using SPSS software with principal axis factoring and oblique rotation. The Kaiser-Meyer-Olkin (KMO) value was 0.799, and Bartlett's test of sphericity yielded $P < 0.001$, indicating suitability for factor analysis. Seven common factors were extracted, consistent with the scale's pre-established structure, accounting for a cumulative variance contribution rate of 79.19 %.

An item under the "Impact on daily life" dimension—"The medication I take negatively impacts my diet (e.g., loss of appetite, dietary restrictions)"—had a communality extraction value of 0.474 (< 0.5). Additionally, its factor coefficients in both the pattern and structure matrices were below 0.6, and it displayed cross-loadings. Consequently, this item was removed. Exploratory factor analysis was repeated on the remaining 28 items. The updated analysis yielded a KMO value of 0.795 and Bartlett's test $P < 0.001$. Seven common factors were again extracted, with a cumulative variance contribution rate of 80.195 %. Each factor was well-defined by its corresponding items, effectively explaining the underlying construct. Detailed results are presented in Appendices 4, 5, and 6.

The second portion of the data was analyzed using AMOS software to conduct confirmatory factor analysis (CFA) for validating the scale's structural validity. Based on the exploratory factor analysis results, correlations were identified among the scale's dimensions. Accordingly, a first-order seven-factor model was constructed. The initial model fit indices were suboptimal, prompting further adjustments. Modification indices suggested introducing correlations between the error terms of the following item pairs: e30–e31, e7–e8, e23–e24, and e31–e32. After these adjustments, the revised model achieved satisfactory fit indices. The finalized model structure and its fit indices are presented in Fig. 1 and Table 4.

Convergent validity

Convergent validity analysis was conducted on the adjusted scale, which comprised seven dimensions and 28 items. The results revealed that the composite reliability (CR) values for all dimensions exceeded 0.7, and the average variance extracted (AVE) values were greater than 0.5. These findings confirm that the scale demonstrates strong convergent validity. Detailed results are provided in Table 5.

Discriminant validity

The discriminant validity of this scale was evaluated by comparing the correlation coefficients between dimensions with the square root of the average variance extracted (AVE) for each dimension. Results demonstrated that for every pair of dimensions, the square root of the AVE was greater than their correlation coefficient. This finding indicates strong distinction and appropriate correlation between dimensions, confirming satisfactory discriminant validity for the scale. Detailed results are presented in Table 6.

Finalization of the Medication Experience Scale for Patients with Chronic Diseases at Primary Care Facilities

Based on the findings of this study, the final version of the Medication Experience Scale for Patients with Chronic Diseases at Primary Care Facilities has been developed. This scale includes seven dimensions: effectiveness (4 items), affordability (4 items), convenience (4 items), safety (4 items), adequacy of medication guidance (4 items), humanity of medication guidance (4 items), and impact of medication on daily life (4 items). Further details are provided in Table 7.

Discussion

Feasibility of the Medication Experience Scale for Patients with Chronic Diseases at Primary Care Facilities

This study developed the Medication Experience Scale for Patients with Chronic Diseases at Primary Care Facilities based on perceived value theory, employing a combination of qualitative and quantitative methods. These included a literature review, semi-structured interviews, and focus group discussions to synthesize measurement dimensions and items systematically, thereby constructing the scale framework. The Delphi expert consultation method was then utilized to validate and refine the scale.

Over two rounds of expert consultations, the scale's dimensions and items were revised multiple times. Results from the expert consensus degree, enthusiasm, and authority coefficient analyses indicated a high level of scientific rigor in the scale's development. Field surveys and subsequent reliability and validity testing further refined the scale. The finalized version consists of 7 dimensions and 28 items: effectiveness (4 items), affordability (4 items), convenience (4 items),

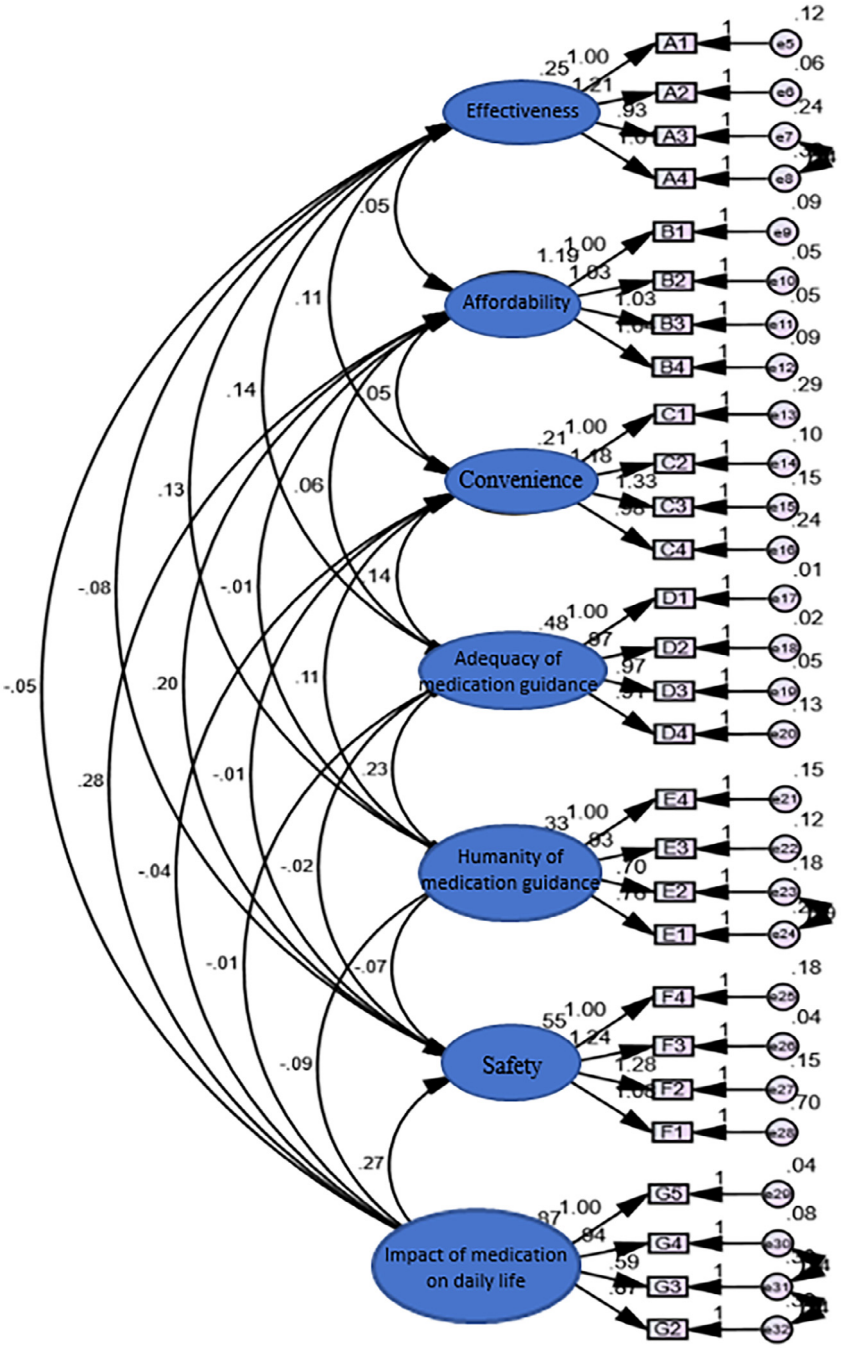

Fig. 1. Final revised model.

Table 4
Overall fit metrics for the validated factor model.

Index name	Fit standard	Initial model fit index	Release e31-e32	Release e7-e8	Release e7-e8	Release e30-e31	Final model fit index
CMIN/DF	<3.0	1.992	1.736	1.627	1.555	1.522	Meets standard
GFI	>0.8	0.778	0.792	0.805	0.813	0.818	Meets standard
RMR	<0.1	0.038	0.038	0.038	0.037	0.037	Meets standard
RMSEA	<0.1	0.08	0.069	0.064	0.06	0.058	Meets standard
NFI	>0.9	0.869	0.886	0.893	0.898	0.901	Meets standard
TLI	>0.9	0.919	0.94	0.949	0.954	0.957	Meets standard
CFI	>0.9	0.929	0.948	0.956	0.961	0.963	Meets standard

Table 5
Aggregation validity results.

Dimension	AVE	CR
Effectiveness	0.630	0.872
Affordability	0.942	0.985
Convenience	0.603	0.856
Adequacy of medication guidance	0.678	0.893
Humanity of medication guidance	0.698	0.902
Safety	0.753	0.923
Impact of medication on daily life	0.749	0.922

adequacy of medication guidance (4 items), humanity of medication guidance (4 items), safety (4 items), and impact of medication on daily life (4 items). Preliminary testing showed the scale to have good internal consistency reliability, split-half reliability, and test-retest reliability, confirming its reliability and stability. Validity measures, including construct validity, convergent validity, and discriminant validity, also yielded favorable results, demonstrating the scale's accuracy and validity.

These findings suggest that the scale meets the requirements for scientific scale development. On one hand, the scale builds on prior research, ensuring theoretical robustness. On the other hand, it incorporates the practical realities of medication use among chronic disease patients in primary care facilities in China, ensuring operational feasibility. The final scale is user-friendly, with an average completion time of 5–8 min per respondent. Its concise design allows patients to provide accurate and authentic responses regarding their medication experience, underscoring its practical applicability in real-world settings.

Practical value of the Medication Experience Scale for Patients with Chronic Diseases at Primary Care Facilities

Compared to scales in other countries, Medication Experience Scale for Patients with Chronic Diseases at Primary Care Facilities developed in this study is specifically designed to reflect the medication experiences of chronic disease patients in China. The scale enables a comprehensive evaluation of patients' medication experiences, providing a foundation for targeted interventions and adjustments throughout the medication process. By addressing specific patient experiences, the scale facilitates improvements in medication adherence and enhances the precision of pharmaceutical services. This contributes to better health outcomes for chronic disease patients and supports improved quality of life.

Medication effectiveness dimension

Considering the characteristics of long-term medication use among chronic disease patients and the traditional belief among older individuals that medications should deliver immediate results, this scale incorporates measures for evaluating patients' perceptions of the speed of medication effectiveness and its ability to prevent disease progression.

Medication affordability dimension

Given the financial constraints some chronic disease patients face at primary care facilities, this scale adapts items from tools in other countries with culturally appropriate modifications. It specifically assesses the economic pressures patients experience when purchasing medications.

Medication convenience dimension

Reflecting the current realities of medication access for chronic disease patients in primary care and the varying characteristics of essential drugs, this scale evaluates the convenience of obtaining, using, and storing medications, along with patients' acceptance of medication attributes such as taste, size, and texture.

Adequacy and humanity of medication guidance dimensions

To address the realities of China's tiered medical system and family doctor contracted service model, this scale expands on frameworks of other countries by introducing dimensions for adequacy and humanity in medication guidance. These dimensions assess whether healthcare providers offer sufficient communication and guidance, including follow-ups, during the medication process. These measures reflect the extent to which healthcare personnel ensure safe medication use and meet patients' psychological expectations.

Medication safety dimension

To align with the specific needs of chronic disease patients in China, this scale consolidates issues related to medication use under the safety dimension. It includes localized assessments of how medication impacts physical functioning, emotional well-being, and cognitive abilities.

Impact of medication on daily life dimension

Drawing from scales in other countries and adapting for the lifestyle characteristics of Chinese residents, this scale evaluates the effects of medication use on work, friendships, family relationships, and social activities. It focuses on the broader impacts of medication on family and work dynamics to capture a comprehensive view of patients' medication experiences.

The dimensions and items of this scale are well-aligned with the practical realities of medication use among chronic disease patients at primary care facilities. In comparison to developed scales assessing medication experiences, this scale incorporates locally tailored features that enhance its clarity and applicability within the Chinese context. Its design ensures that patients can easily understand and use the scale, making it a practical tool for evaluating medication experiences. Furthermore, this scale provides robust measurement support for future research in related fields.

This study has certain limitations. The initial development of the scale involved a relatively fragmented and simplistic literature review

Table 6
Discrimination validity results.

Dimension	Effectiveness	Affordability	Convenience	Adequacy of medication guidance	Humanity of medication guidance	Safety	Impact of medication on daily life
Effectiveness	**0.793**						
Affordability	0.049	**0.970**					
Convenience	0.117*	0.048	**0.776**				
Adequacy of medication guidance	0.157*	0.004	0.122*	**0.823**			
Humanity of medication guidance	0.14*	0.066	0.103*	0.215*	**0.836**		
Safety	0.08*	0.19*	0.019	0.033	0.076	**0.868**	
Impact of medication on daily life	0.08*	0.174*	0.037	0.089	0.123*	0.195*	**0.749**

Note: * indicates $P < 0.001$; the bold font indicates the AVE square root value of the column dimension

Table 7
Medication experience scale for patients with chronic disease in primary care facilities.

Primary dimension	Secondary dimension	Measurement items
Functional value	Effectiveness	I am satisfied with the therapeutic effects of my medication
		I am satisfied with the speed at which my medication takes effect
		My medication can alleviate the symptoms of my illness
		My medication can prevent the progression of my illness
	Affordability	I have experienced situations where I cannot afford my medication
		I have had to choose between buying daily necessities and medication
		I have had to purchase medication beyond my financial means
		Daily medication imposes a financial burden on me
	Convenience	It is very convenient for me to obtain medication
		Using my medication (e.g., oral, injection, topical application, etc.) is very convenient
		Storing my medication (e.g., avoiding light, low temperature, moisture-proof, etc.) is very convenient
		I find it difficult to accept the taste, size, or texture of my medication
Emotional value	Adequacy of medication guidance	I can obtain detailed information about my condition from healthcare professionals
		Healthcare professionals explain how to take medication properly
		Healthcare professionals inform me about potential side effects of the medication and how to manage them
		Healthcare professionals follow up with me regarding my medication
	Humanity of medication guidance	Healthcare professionals listen to my personal opinions about medication
		I fully trust healthcare professionals in making medication choices
		Healthcare professionals protect my privacy during medication guidance
		Healthcare professionals provide medication guidance in ways I prefer
	Safety	I have experienced side effects after taking medication
		Taking medication has caused me physical dysfunction
		Taking medication has caused me mental dysfunction
		My medication has negatively affected my emotions
Social value	Impact of medication on daily life	I have had to adjust or reduce my work because of my medication
		I have fewer friends because of my medication
		My relationship with my family has worsened because of my medication
		My social activities have decreased because of my medication

and qualitative research process, and the expert consultation phase also had constraints. Consequently, the scale is not yet fully robust and requires further refinement in the future. During the literature review phase, we identified and summarized dimensions and items by examining commonly used scales and studies related to the medication experiences of chronic disease patients. This effort provided the foundation for constructing the basic item pool and allowed for comparisons between findings in China and other countries. However, the literature search was limited to keyword restrictions without a formal search strategy, which may have resulted in a fragmented and overly simplistic review. In the expert consultation phase, although experts rated each dimension and item and provided revision suggestions, the rationale for their judgement was not systematically collected. This could have introduced a degree of subjectivity into the scoring process. In the qualitative research phase, semi-structured interviews were conducted with chronic disease patients seeking care at primary care facilities. However, potential regional differences in the medication experiences of chronic disease patients raise concerns about the scale's applicability across the entire country. Moreover, patients' medication experiences may be influenced by recall bias and social desirability bias, potentially impacting the accuracy of the findings. To address these limitations, future research should involve broader-scale studies to further test the scale. Ongoing qualitative and quantitative research, coupled with systematic expert validation, is essential for refining and improving the scale, ensuring its robustness and applicability.

Conclusion

This study, grounded in the theory of perceived value, integrates qualitative and quantitative methodologies, Delphi expert validation, and field surveys to thoroughly examine the medication experiences of chronic disease patients in primary care facilities in China. It developed the Medication Experience Scale For Patients with Chronic Disease in Primary Care Facilities, rigorously validated and evaluated the scale, and explored its practical applications, thereby ensuring its scientific rigor and feasibility. From a theoretical perspective, the study provides a valuable tool for subsequent research and enriches the research landscape in primary care management. Practically, it offers guidance for improving pharmaceutical services and management in primary care facilities, which is of great significance for enhancing the medication experiences of chronic disease patients and improving the efficiency of chronic disease management.

Declarations

Not applicable.

Authors' contributions

Conceptualization, S.J. and C.Z.; Methodology, S.J., C.Z., L.X., G.M., S.Y. and D.P.; Data curation, S.J., C.Z., L.X., G.M., S.Y. and D.P.; Formal analysis, C.H., S.Z. and Y.W.; Funding acquisition, not applicable; Project administration, not applicable; Resources, not applicable; Supervision, C.Z.; Validation, C.Z.; Writingoriginal draft, S.J.; Writingreview and editing, C.Z. All authors have read and agreed to the published version of the manuscript.

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The authors declare that they have no competing interests.

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Supplementary materials

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