TRADITIONAL CHINESE MEDICINE MEDICAL-PREVENTIVE INTEGRATION EVALUATION SCALE BASED ON THE DELPHI METHOD：DEVELOPMENT AND VALIDATION

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Abstract

This study aims to develop an evaluation scale for the integration of Traditional Chinese Medicine (TCM) in medical-preventive care, based on the Rainbow Model of Integrated Care. It thoroughly explores six key dimensions: System Integration, Organisational Integration, Professional Integration, Clinical Integration, Functional Integration, and Normative Integration. Initially, a two-round Delphi expert consultation was conducted (with effective response rates of 100% and 94.74%, expert authority coefficients of 0.90 and 0.91, and Kendall's coordination coefficients of 0.23 and 0.82, respectively), resulting in the screening and confirmation of an evaluation system comprising 17 secondary indicators and 57 tertiary indicators. Subsequently, a questionnaire based on this indicator system was designed and distributed to 120 practitioners engaged in TCM medical-preventive integration. Statistical analysis was employed to validate the scale's reliability and validity. The results showed that the overall Cronbach's α coefficient of the scale was 0.976, the KMO value was 0.902, and the cumulative variance contribution rate of common factors reached 70.88%, indicating high internal consistency and structural validity. The conclusion demonstrates that the constructed indicator system exhibits good coordination, with concentrated and highly positive expert opinions. The reliability and validity test results of the scale are ideal, providing a scientific basis for the systematic evaluation of TCM medical-preventive integration efforts and supporting policy formulation and practice optimization.

Keywords: Integration of TCM in Medical-Preventive Services, Evaluation Scale, Delphi

Introduction

In April 2023, the Opinions on Further Improving the Medical and Healthcare Service System issued by the CPC Central Committee and the State Council further emphasized the integration of prevention and treatment, as well as innovating mechanisms for coordination and integration between medical care and prevention, indicating that the integration of medical care and prevention at the grassroots level has become a significant task during the 14th Five-Year Plan period. The World Health Organization (WHO) also pointed out in 2015 that health services should prioritize primary healthcare institutions and achieve a shift from treatment to prevention (Sun & Lang, 2021). Thus, it is evident that both international organizations and the

Chinese government stress the close relationship between the integration of medical care and prevention and the construction of an integrated service system.

Chinese scholars have further proposed that integrated services promote collaborative development and improve residents' health levels by integrating medical institutions and personnel at different levels. By optimizing the integrated medical and healthcare service system, the connection between prevention and treatment services can be enhanced, driving the transformation of the medical and healthcare system from being "disease-centered" to "health-centered".

In recent years, China has formed integrated medical service models represented by medical consortia and medical communities. However, the rift between the medical system and the public health system still exists, and the prevalent phenomenon of "emphasizing medical treatment over prevention" hinders the integration of medical care and prevention. Therefore, how to promote the integration of medical care and prevention at the grassroots level has become an urgent issue to be addressed.

Traditional Chinese medicine (TCM) emphasizes the holistic concept and "preventive treatment of disease", which is highly compatible with the integration of medical care and prevention. Applying TCM techniques in clinical practice within hospital specialties can leverage the complementary advantages of Chinese and Western medicine. Therefore, integrating TCM techniques into clinical work within hospital specialties is more conducive to improving the effectiveness of disease diagnosis and treatment and promoting patients' overall health (Zhu & Cui, 2024).

However, how to scientifically and systematically evaluate the actual effects of TCM in the integration of medical care and prevention, and construct a comprehensive and feasible evaluation scale, remains a research gap. Existing studies mostly focus on the application of TCM in disease treatment, lacking systematic evaluation of its role in prevention and health promotion. Therefore, this study aims to construct an evaluation scale for the integration of TCM in medical care and prevention through the Delphi method, providing a scientific basis for further optimizing such services. Through this research, we hope to fill the current research gap, promote the widespread application of TCM in the integration of medical care and prevention, and provide Chinese experience for the global transformation of the medical and healthcare system from being "disease-centered" to "health-centered".

Objective of the study

1. Identify Key Indicators for Evaluating TCM Medical-Preventive Integration. Through a systematic review of the literature, key areas and indicators related to the integration of traditional Chinese medicine (TCM) in medical care and prevention were identified, and a preliminary framework was constructed. Subsequently, the Delphi method was adopted to clarify the scientific, comprehensive, and operable key indicators of the system.

2. Validate the Reliability and Validity of the TCM Medical-Preventive Integration Evaluation Scale. First, Cronbach's α is used to assess the internal consistency of the evaluation scale, and then Exploratory Factor Analysis (EFA) is employed to verify its structural validity, ensuring that the indicators reflect the core elements of the integration of traditional Chinese medicine in medical care and prevention.

Scope of the study

The scope of this study is Nanchang City, Jiangxi Province, China.

Literature Review

Relevant studies by domestic and international scholars on the six dimensions of the Rainbow Model are summarized in Table 1.

Table 1: Key Research Findings on the Six Dimensions of the Rainbow Model by Domestic and International Scholars

Item no.	Authors (Year)	Finding	Variables
1	Huang et al., (2021)	Medical-preventive integration necessitates optimizing management, processes, and incentives to seamlessly blend medical treatment with prevention, boosting service efficiency.	System Integration
2	Yang, L. H., & Chen, Y. (2021)	Institutional integration entails optimizing and coordinating organizational structure and cooperation, breaking down barriers between medical and public health institutions, and establishing a unified, cross-departmental, and cross-level management framework.	Institutional Integration
3	Yoshino et al., (2023)	Resource integration necessitates coordinated management of human, medical, financial, and information resources, breaking barriers, optimizing allocation, and enhancing service delivery through shared platforms.	Resource Integration
4	Gao, Y., & Kou, X. J. (2022)	Technological integration requires promoting business sharing and research collaboration, developing new technologies, and enhancing precision and service efficiency.	Technological Integration
5	Tan et al., (2022)	Service integration aims to optimize accessibility, comprehensiveness, continuity, and coordination, integrating medical and preventive services to expand coverage, improve quality, blend treatment with prevention, and elevate residents' health levels.	Service Integration
6	Tesema et al., (2021)	Standardization integration requires unifying service and quality standards, optimizing operational processes, and enhancing service standardization and quality safety.	Standardization Integration

Methodology

This study employs the Delphi method to construct an evaluation index system for the integration of TCM in medical-preventive care. Initially, a preliminary framework pool was established through literature analysis, policy summarization, and expert interviews. An expert consultation questionnaire was designed, inviting experts from fields such as TCM, public health, and medical management to rate the importance of indicators using a 5-point Likert scale. Indicators with a mean score of <3.5 or a coefficient of variation >0.25 were removed. Multiple rounds of surveys were conducted until expert consensus was reached, resulting in a

reliable index system. The Delphi method integrates expert opinions through multiple rounds of anonymous surveys, reducing individual biases. It is suitable for exploratory research involving multidisciplinary intersections, incorporating insights from experts across various fields to ensure the comprehensiveness and scientific rigor of the index system, providing methodological support for this study.

Expert Selection Criteria： (1) Professionalism: Candidates should have >10 years' experience in medical-preventive integration research, teaching, or management. (2) Authority: Candidates must be associate senior professors or have specialized healthcare management expertise.(3) Enthusiasm: Candidates must agree to participate and engage responsively.

Potential Biases or Limitations：(1) Expert Selection Bias: Rigorous criteria may still result in uneven expert distribution, potentially causing biased opinions. (2) Conformity Pressure: Multiple survey rounds may lead experts to conform to group opinions, reducing independent judgment diversity.(3) Anonymity Limitations: Anonymity can reduce biases but may also decrease experts' sense of responsibility, affecting response quality.

Statistics

1. Descriptive statistics include percentages, means, standard deviations, coefficients of variation, and Kendall's coefficient. A P-value <0.05 is considered statistically significant.

2. SPSS 20.0 was used for multivariate analysis to test reliability, validity, and perform EFA. Cronbach's α (>0.7) ensures internal consistency. KMO (>0.6) checks data suitability for factor analysis, validating structural validity. High cumulative variance contribution rate (>60%) further confirms scale's structural validity.

Result

Results of Constructing Key Indicators for the Evaluation System

1. Basic Information of Experts. This study included 21 experts, with 19 ultimately participating in the consultation. The gender ratio was 12 males to 7 females, and the average age was 51.26±6.65 years. Among them, 18 held senior or higher professional titles, including one mid-level title holder who is familiar with medical-preventive integration services at the grassroots level. All participants held master's degrees or higher, and 78.9% had over 20 years of work experience, with comprehensive coverage of various fields.

2. Expert Enthusiasm and Authority. For the two rounds of expert consultation, 19 inquiry questionnaires were sent out each time. In the first round, 20 valid questionnaires were collected, with an effective recovery rate of 100%. In the second round, 18 valid questionnaires were collected, with an effective recovery rate of 94.74%.

3. Expert Authority Degree. For the first round of consultation, the Ca, Cs, and Cr values for all experts were 0.89, 0.91, and 0.90, respectively. For the second round of consultation, the Ca, Cs, and Cr values for all experts were 0.88, 0.93, and 0.91, respectively.

Degree of Consensus Among Experts. The Kendall's coefficient of concordance for the overall indicators and indicators of each dimension in the two rounds of expert consultation are shown in Table 2.

Table 2: Results of the Degree of Coordination Among Various Indicators in Two Rounds of Expert Consultation

Round	Indicator	Kendall's W	X^2	df	P Value
First Round	Overall Indicator	0.23	428.99	109	<0.001
	Primary Indicators	0.06	4.79	5	0.442
	Secondary Indicators	0.04	17.61	21	0.673
	Tertiary Indicators	0.28	408.34	81	<0.001
Second Round	Overall Indicator	0.82	1319.63	91	<0.001
	Primary Indicators	0.88	79.21	5	<0.001
	Secondary Indicators	0.79	256.60	18	<0.001
	Tertiary Indicators	0.81	955.41	66	<0.001

1. Degree of Centralization of Expert Opinions. The first round of consultation showed that the mean importance of indicators ranged from 1.89 to 4.53, with 13 tertiary indicators scoring below 3.50; the coefficient of variation ranged from 0.15 to 0.50, with 18 indicators exceeding 0.25. Based on these findings, the questionnaire was adjusted. After the second round of consultation, the mean importance of indicators ranged from 1.06 to 5.00, with 12 tertiary indicators scoring below 3.50; the coefficient of variation ranged from 0.00 to 0.28, with 1 indicator exceeding 0.25. The final evaluation indicator system for the integration of traditional Chinese medicine in medical care and prevention was established, consisting of 6 primary indicators, 17 secondary indicators, and 57 tertiary indicators, as detailed in Table 3 and Tables 4.

Table 3: The first-level and second-level indicators of the final evaluation index system

First-level indicator factors	Second-level indicator factors
1. sysem integration	1.1 Management systems
	1.2 Operational systems
	1.3 Assessment and Incentive System
2. Institutional Integration	2.1 Organizational Structure
	2.2 Organizational Coordination
3. Resource integration	3.1 Human resources
	3.2 Medical resources
	3.3 Financial resources
	3.4 Information resources
4. Technical integration	4.1 Business Collaboration
	4.2 Research Collaboration
5. Service Integration	5.1 Service Accessibility
	5.2 Comprehensive Service
	5.3 Service Continuity
	5.4 Service Coordination
6. Standards Integration	6.1 Quality Control
	6.2 Service Standards

Table 4: The third-level indicator factors for the evaluation system

Third-level indicator factors
1.1.1 Local governments integrate TCM into medical and preventive healthcare plans.
1.1.2 Governments plan TCM integration into medical & preventive healthcare.
1.1.3Establish a coordination mechanism for TCM, Western medicine, & public health.
1.1.4 Formulate a supervision mechanism for TCM integration in healthcare.
1.2.1 Draft annual plan for TCM integration in healthcare.
1.2.2 Create service list for TCM healthcare integration projects.
1.2.3 Set up first-consultation system for TCM healthcare integration.
1.2.4 Formulate a system for TCM education and publicity
1.3.1 Develop appraisal system for TCM healthcare integration.
1.3.2 Regularly evaluate TCM healthcare integration.
1.3.3 Use TCM integration results for healthcare eval & resource allocation.
1.3.4Set up special fund for TCM healthcare integration, with subsidies/rewards for outstanding entities/individuals.
2.1.1Create leadership & coordination body for TCM healthcare integration.
2.1.2 Gov't departments engage in TCM healthcare integration.
2.1.3Social orgs join TCM healthcare integration efforts.
2.1.4Medical institutions engage in TCM healthcare integration.
2.2.1 TCM institutions sign collaboration agreements with other healthcare entities.
2.2.2 Establish joint prevention & control mechanism between TCM & Western medicine.
2.2.3 Formulate emergency plans for public health emergencies, involving TCM.
3.1.1 Situation of jointly training public health pros in TCM & modern medicine.
3.1.2 Formation of multidisciplinary teams for joint diagnosis & treatment.
3.1.3 Personnel mobility between TCM & modern medical institutions.
3.1.4 Continuing education & training for TCM personnel.
3.1.5 Training & education for public health & Western medical pros in TCM.
3.1.6 Proportion of TCM personnel in family doctor teams.
3.2.1 Equipment sharing between TCM & modern medical institutions.
3.2.2 Integration degree of drug resources, complementarity in treatment plans.
3.3.1 Establish special funds for TCM integration in healthcare.
3.3.2 Proportion of TCM investment in total investment.
3.3.3 Efficiency & benefit of TCM service funds.
3.3.4 Support of medical insurance policies for TCM integration.
3.3.5 Cross-departmental fund collaboration mechanism for TCM integration.
3.4.1 Shared platform for Chinese & Western medical info, interconnection & interoperability.
3.4.2 Application of IT in TCM integration, including telemedicine & intelligent diagnosis.

Table 4: (Continuation Table)

Third-level indicator factors
4.1.1 Participation of superior TCM pros in grassroots integration.
4.1.2 Regular guidance by superior public health personnel.
4.1.3 Joint establishment of chronic disease clinics by TCM & Western practitioners.
4.1.4 Proportion of TCM techniques in chronic disease treatment.
4.2.1 Government support for research collaboration in TCM integration.
4.2.2 Establishment of special research funding for TCM integration.
4.2.3 Formation of research teams for TCM integration.
5.1.1 Coverage rate of TCM integration in primary healthcare institutions.
5.1.2 Accessibility & convenience for patients to obtain TCM services.
5.1.3 Fulfillment rate of family contract services with TCM practitioners.
5.2.1 Integration of TCM services in healthcare continuum.
5.2.2 Responsibility of TCM institutions in public health emergencies.
5.2.3 Responsibility of TCM institutions in chronic disease risk screening.
5.3.1 Renewal rate of TCM service contracts among residents.
5.3.2 Continuous visit records & seamless transitions in care.
5.3.3 Follow-up rate of TCM in chronic disease health management.
5.4.1 Tracking Upward Referral Rate for TCM Contract Patients
5.4.2 Follow-up Rate for Downward Referral of TCM Contract Patients
6.1.1 SOPs for TCM & Medical/Preventive Care Integration
6.1.2 Tech Supervision & Mgmt System for TCM & Medical/Preventive Care
6.1.3 Patient Feedback System for TCM & Medical/Preventive Care Institutions
6.2.1 Service Standards for TCM & Medical/Preventive Care Integration
6.2.2 Patient Satisfaction Survey on TCM Medical/Preventive Services

Results of Reliability and Validity Verification of the Evaluation Indicator System

This study employed the Cronbach's α coefficient to test the reliability of the indicator system and conducted exploratory factor analysis to examine its construct validity. The results showed that the overall Cronbach's α coefficient was 0.98, with coefficients for each dimension exceeding 0.85. TheKaiser-Meyer-Olkin (KMO) value was 0.90, indicating that the obtained dimensions were consistent with the six primary indicator frameworks determined through the Delphi method. The cumulative variance explanation rate after rotation was 70.88%.

Discussion

The scientificity and systematicness of the indicator system

This study integrated policy documents, standards, guidelines, and literature, employing the Delphi method and conducting two rounds of expert consultation to establish six primary, 17 secondary, and 57 tertiary indicators, ensuring scientific rigor and normative compliance. Nineteen interdisciplinary experts participated, spanning clinical medicine, health management, and other fields, providing professional suggestions that enhanced the reliability of the system. During the two rounds of consultation, experts demonstrated high enthusiasm and authority (enthusiasm coefficient > 0.95, authority coefficient > 0.90). The Kendall W coefficient significantly increased from 0.23 in the first round to 0.82 in the second round ($P < 0.05$), indicating that expert opinions converged after multiple rounds of discussion, validating the effectiveness of the Delphi method. This improvement not only strengthened the credibility

of the system but also provided a consensus foundation for weight allocation and policy formulation. Additionally, it suggested that experts' understanding and evaluation of the indicators converged, ensuring the operability of the system in practical applications. In summary, the indicator system constructed in this study is scientific and reliable, providing strong support for the practice of integrating traditional Chinese medicine with medical prevention.

The reliability of the key indicators for final evaluation

The selection of consulting experts is crucial for the successful implementation of the Delphi method. To ensure the authority and representativeness of the selected experts, we followed a rigorous screening process: Firstly, candidates were chosen from traditional Chinese medicine, public health, and policy-making institutions based on their academic backgrounds, research fields, and practical experiences; secondly, the types of institutions where the experts worked were considered to ensure diversity and comprehensiveness of opinions. Ultimately, we assembled a consulting team of 19 outstanding experts. When distributing the questionnaires, the research team provided detailed introductions to the research background and objectives to ensure that each expert fully understood the research topic. After two rounds of consultation, the coordination coefficients of indicators at all levels significantly improved ($P<0.05$), indicating that expert opinions gradually converged. Compared with previous studies, such as Zhong et al. (2019) research on the framework of an integrated medical service system in the context of urban medical consortia, Yuan et al. (2022) study on the influencing factors of medical-preventive integration in primary health services, the evaluation indicator system constructed in this study is more comprehensive and operational. Although the Delphi method effectively reduces individual biases through multiple rounds of anonymous surveys, it still faces some limitations. For example, experts may have biased opinions due to uneven geographical or domain distribution; in multiple rounds of surveys, experts may be influenced by group opinions, thereby weakening the diversity of independent judgments; additionally, fatigue or time pressure may also affect the quality of experts' responses. Therefore, future research needs to further optimize the expert selection mechanism to ensure balanced and representative expert distribution, while taking measures to enhance the independence and reliability of experts' responses, in order to overcome the existing limitations of the Delphi method and improve the scientificity and accuracy of the research.

The rationality of the evaluation indicator system

The results of this study showed that the overall Cronbach's α coefficient for the evaluation indicators was 0.98, with coefficients for each dimension exceeding 0.85 and CITC values all greater than 0.4, indicating no need for item deletion and good correlation among questionnaire items. The KMO value was 0.902, and the p-value for the Bartlett's Test of Sphericity was 0.000, suggesting suitability for factor analysis. Exploratory factor analysis identified six factors with characteristic root values greater than 1 and a cumulative variance explanation rate of 70.877%, aligning with the six primary indicator frameworks determined by the Delphi method, with reliable factor analysis results. The commonality values of the measurement items were greater than 0.4, and the factor loading coefficients were greater than 0.5, consistent with the expected dimension classification, effective information extraction, and good validity.

Recommendations

1. Optimization of Expert Selection: Future research should further optimize the expert selection mechanism to ensure balanced and representative expert participation across regions, fields, and types of institutions, thereby reducing bias in opinions.

2. Enhancement of Answer Independence: In multiple rounds of surveys, measures should be taken to enhance the independence of experts' responses, such as implementing a stricter anonymity system to prevent experts from being influenced by group opinions.

3. Improvement of Answer Quality: Reasonably arrange the survey schedule to avoid experts' responses being compromised by fatigue or time pressure. Additionally, provide clear and concise questionnaires and instructions to help experts better understand the research topic and response requirements.

4. Strengthening Promotion and Advocacy: Increase the promotion of the integration of medical care and prevention in traditional Chinese medicine to enhance public awareness of the role of traditional Chinese medicine in disease prevention and treatment, thereby promoting its widespread application and heritage development.

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