



The importance of factors influencing elderly using of preventive services of traditional Chinese medicine



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ABSTRACT

Background: Traditional Chinese Medicine (TCM) has unique advantages in preventive services, particularly for chronic disease management and active aging. Primary care serves as a crucial platform for implementing and promoting preventive services of TCM. However, elderly individuals' using of these services remains suboptimal. **Objective:** This study aims to explore the factors influencing elderly individuals' using of preventive services of TCM in primary care facilities based on Andersen model and dual model of Social Cognitive Theory (SCT), and to assess the importance of these factors by dominance analysis. **Methods:** A multi-stage stratified cluster random sampling method was used to conduct face-to-face surveys with elderly individuals in 12 communities across six cities in Zhejiang and Guangxi provinces from July to September 2022. The survey collected data on participants' demographics, using of preventive services of TCM, and the influencing factors. A binary logistic regression model identified independent predictors of preventive services of TCM utilization, leading to the development of an optimal predictive model. These predictors were then grouped into four dimensions based on the dual model: predisposing factors, needs-based factors, enabling factors, and individual factors. Dominance analysis was used to evaluate the contribution of each dimension to the total variance in service utilization. **Results:** Among 2,081 elderly participants, only 369 (17.7 %) used preventive services of TCM in the past year, with most utilizing the services 1–2 times annually. Combined analysis of the logistic regression and dominance analysis revealed that individual factors (cognitive status, self-control) were the most important predictors, followed by enabling factors (perceived service environment), predisposing factors (education level), and needs-based factors (self-reported chronic conditions, pain, or discomfort). **Conclusion:** Individual factors lay a decisive role in the elderly's decision to use preventive services of TCM. Enhancing cognitive abilities and self-management skills, alongside improving the primary care environment for preventive services of TCM, may encourage broader adoption of these services among the elderly.

Preventive services of Traditional Chinese medicine (TCM), including acupuncture, tui na (Chinese therapeutic massage), cupping (a therapy that involves applying suction cups to the skin to stimulate circulation and relieve muscle tension), gua sha (a scraping technique aimed at improving circulation and reducing inflammation), and qigong (a holistic practice combining movement, breathing, and meditation), are characterized by their simplicity, low cost, and notable efficacy. These methods have become valuable supplements to healthcare systems in many countries and regions beyond China.^{1,2} As the population ages and the prevalence of chronic diseases rises, China faces the dual challenge of rapidly

increasing medical demand and a shortage of healthcare resources for the elderly.³

In response, the Chinese government initiated policies in 2006 to integrate TCM into the national basic health insurance system. This effort aimed to establish a preventive care framework within primary healthcare, with the goal of creating a low-cost, widely accessible, efficient, and convenient system for the population.⁴ Research indicates that TCM offers unique benefits in health maintenance and preventive treatment of diseases, which can be especially helpful for the elderly in managing chronic conditions and improving self-care.^{5,6} In 2013, TCM

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physical constitution identification services for the elderly were included in China's national basic public health service program. Furthermore, preventive services of TCM have been incorporated into family doctor contracted services and chronic disease management programs.^{5,7} In 2023, a joint initiative from ten government agencies, including the National Administration of TCM, released the "14th Five-Year Action Plan for Strengthening Primary Care TCM Services".⁸ This plan aims to achieve comprehensive coverage of TCM services while enhancing the capabilities of TCM services in primary care facilities.

Despite significant efforts by the Chinese government to develop and promote preventive services of TCM, previous studies indicate that the utilization of these services among the elderly remains suboptimal.^{9,10} Research on the factors influencing the use of preventive services of TCM, particularly using established theoretical models, is still limited and calls for further exploration. Among the most widely recognized frameworks is Andersen's Behavioral Model, proposed by Ronald M. Andersen in 1968 based on national survey findings.¹¹ This multi-level model combines individual factors (patient demands) and environmental factors (availability of healthcare services) to determine healthcare service utilization.^{11,12} The model identifies three key categories that influence an individual's healthcare-seeking behavior: predisposing factors, enabling factors, and need-based factors. Predisposing factors refer to background factors influencing an individual's likelihood to use healthcare services, such as age, gender, marital status, educational level, and residence.^{11,12,15} Enabling resources reflect an individual's capacity to access healthcare services and the availability of these resources in their environment,^{12,15} serving as indirect influencers or constraints on healthcare utilization.^{11,12,15} Common indicators of enabling resources include personal or family income [11,12,15], type of health insurance,^{15,16} community resources,^{12,15} healthcare accessibility,^{12,15} and social support networks.¹⁷ Need-based factors pertain to an individual's perceived and professionally assessed need for healthcare services. Perceived need involves the individual's perceived health care demand (the individual's subjective experience and assessment of their own health status, illnesses, and pain levels) and assessment of health care demand (professional assessment and objective measurement of patients' health status and medical needs).¹³ These factors are the most direct influences on healthcare utilization, with indicators commonly including self-reported health conditions,¹⁸ the number of chronic diseases,^{15,19} and disability status.²⁰

Unlike Andersen's model, which focuses on structural factors (such as demand and supply) in healthcare utilization, Social Cognitive Theory (SCT) is rooted in behavioral psychology, and emphasizes the significant influence of cognitive processes, self-regulation, and self-efficacy, alongside environmental and social support factors, on individual health care using behaviors.²¹ SCT outlines health promotion strategies that include observational learning, self-efficacy, behavioral capabilities, reinforcement, and self-control, providing a new perspective for evaluating factors affecting healthcare utilization.^{22,24} Research has demonstrated significant associations between self-efficacy, cognitive factors, self-regulation, outcome expectations, and environmental factors (such as external conditions and social support) with healthcare decision-making and health-promoting behaviors. For example, the importance of self-efficacy in accessing primary care for children²⁴ and women's health services utilization²⁵ has been validated. Additionally, social support,²⁶ self-control,^{26,27} and outcome expectations²⁷ have been confirmed to influence decision-making regarding physical activity. Cognitive factors and outcome expectations are also closely linked to the use of telemedicine technologies, where a reciprocal relationship existing between outcome expectations and the use of these technologies.²⁸

Current research in the mainstream paradigm of TCM service utilization lacks effective integration of theoretical perspectives. The Andersen's model has been preliminarily applied in studies investigating the determinants of acupuncture using rates²⁹ and the willingness to seek TCM services.³⁰ However, only one study based on SCT has analyzed the relationship between the TCM education environment and residents'

using behaviors.³¹ Thus, there remains a significant gap in research exploring the factors affecting the utilization of preventive services of TCM in primary care from a theoretical model perspective. This study aims to comprehensively analyze and explore the factors influencing elderly individuals' decisions to utilize preventive services of TCM by employing both Andersen's and SCT models. Additionally, this study utilizes dominance analysis to assess the relative importance of these factors, providing valuable insights for the development of targeted policies.

Participants and methods

Participants

A multi-stage stratified random sampling method was employed to select elderly participants from community health centers in Hangzhou, Jinhua, Lishui (Zhejiang Province), and Guilin, Nanning, Liu Zhou (Guangxi Province) from July to September 2022. The inclusion criteria were: (1) age \geq 60 years; (2) local residents (living in the community for at least one year); (3) clear awareness and ability to communicate effectively with researchers; (4) informed consent obtained. Exclusion criteria included: (1) cognitive impairments, severe psychological disorders, or mental illnesses; (2) unwillingness to participate; (3) participation in other research project within the past 30 days. A total of 2206 questionnaires were distributed, resulting in 2081 valid responses after excluding invalid questionnaires, yielding a response rate of 94.3%. Informed consent was obtained from all participants prior to data collection.

Research methods and tools

This study used a self-designed questionnaire, refined through literature review, expert consultations, and pilot surveys to finalize its content. The questionnaire consists of three sections: (1) Demographic information: including gender, age, education level, marital status, and duration of local residency; (2) Utilization of preventive services of TCM in primary care facilities: capturing elderly participants' engagement in TCM health education, body constitution identification, appropriate TCM techniques, chronic disease management, and continuity of preventive services provided by contracted family doctors over the past year, based on the "Community Health Center Service Capacity Evaluation Guidelines (2019 Edition)";¹⁵ (3) Influencing factors: ①Need-based factors: self-reported chronic diseases, pain, or discomfort, ②Enabling factors: personal monthly income and type of health insurance, ③Social cognitive factors: measured using a social cognitive factors scale,³² which includes 22 items rated on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree), to quantify respondents' attitudes and perceptions. The scale encompasses six dimensions: (1)Perceived service environment: awareness of preventive services of TCM resources and environment, covering three items related to medical technology, equipment, and services; (2)Social support: expected support from family and friends, comprising of three items; (3)Cognitive awareness: awareness of preventive services, knowledge of TCM, and understanding of local service projects and policies, consisting three items; (4)Self-efficacy: confidence in utilizing preventive services of TCM, consisting of four items; (5)Outcome expectations: perceived health benefits from using preventive services of TCM, comprising four items; (6)Self-regulation: intentions and action plans for participation, consisting of five items. The dimensions of perceived service environment and social support are classified as structural factors in the SCT model and correspond to enabling factors in the Andersen's model.^{12,15,17} Therefore, these two variables were combined into the enabling resource dimension for binary logistic regression analysis. Cognitive awareness, self-efficacy, outcome expectations, and self-regulation were categorized as individual factors in the SCT model. Higher total scores reflect higher levels of social cognition. The scale demonstrated strong reliability and validity in preliminary studies.³² In this study, the overall scale's Cronbach's α was 0.95,

with the Cronbach's α for each dimension ranging from 0.891 to 0.963. Regarding validity, the CMIN/DF was 4.15, AGFI was 0.915, GFI was 0.936, TLI was 0.970, CFI was 0.975, and RMSEA was 0.059.

Covariates

This study considered 15 covariates, including gender, age, marital status, education level, personal monthly income, health insurance status, duration of local residency, self-reported chronic diseases, pain or discomfort, perceived service environment, social support, cognitive awareness, outcome expectations, self-efficacy, and self-regulation.

The variable coding for the binary logistic regression model was as follows: gender was coded as male = 0 and female = 1; education level was coded as elementary school or below = 0, middle school = 1, and high school or above = 2; self-reported chronic disease status was coded as no = 0 and yes = 1; pain or discomfort was assigned as none = 0, slight = 1, and moderate or higher = 2; personal monthly income was coded as <2000 Yuan (CNY) = 0, 2000–3999 CNY = 1, 4000–5999 CNY = 2, and ≥ 6000 CNY = 3. Other variables, such as perceived service environment (mean = 3.41, standard deviation = 0.84), social support (mean = 3.74, standard deviation = 0.84), cognitive awareness (mean = 2.47, standard deviation = 0.98), outcome expectations (mean = 3.37, standard deviation = 0.95), self-efficacy (mean = 3.07, standard deviation = 1.01), and self-regulation (mean = 3.23, standard deviation = 1.00), were treated as continuous variables, with scores ranging from 1 to 5.

Statistical methods

Data were entered using EpiData 3.1 software with double-entry validation, and statistical analysis was conducted with SPSS 26.0. Categorical data were presented as frequencies and/or percentages, and group comparisons were made using the Chi-square test. Continuous data were expressed as means \pm standard deviation ($\bar{x} \pm s$), with *t*-tests or non-parametric tests applied for comparisons between groups. A binary logistic regression model was used to analyze the independent variables influencing elderly individuals' choices for preventive services of TCM in primary care facilities. Logistic regression coefficients were used to calculate the relative importance weights of factors, including predisposing factors, need-based factors, enabling factors, and individual factors. The weight of each factor indicates how much influence it has on the elderly's decision to use preventive services of TCM. The calculation process for the weights of these influencing factors^{33–35} is as follows: (1) Model selection: A binary logistic regression model was used to identify independent variables with statistical significance, and only those significant variables were included in the final logistic model to build the optimal predictive model. (2) Variable classification: Independent variables were categorized based on the dimensions of Andersen's model and SCT. For example, "self-reported chronic disease" and "pain or discomfort" were grouped into the "need-based factors" dimension and defined as independent variable X_2 .

The full model included four predictors: X_1 (predisposing factors, including education level), X_2 (need-based factors, including chronic disease and pain or discomfort), X_3 (enabling factors, i.e., perceived service environment), and X_4 (individual factors, including cognitive awareness and self-regulation). (3) Submodel calculation: The number of submodels was calculated using the formula $2^P - 1$ (where P is the number of predictors in the full model). With four predictors, the total number of submodels is $2^4 - 1$, resulting in 15. (4) Incremental contribution calculation (ΔR^2): The contribution of each predictor was assessed by the change in R^2 when the predictor was added to a submodel that did not previously include it, calculated via hierarchical regression analysis in SPSS. (5) Final model determination: The final model's coefficient was the sum of the average contributions of the four predictors. (6) Weight calculation: The weight for each predictor was calculated using the formula: Weight (%) = Incremental Contribution (ΔR^2) / Final Model Co-

efficient * 100 %. This weight also represents the average contribution of variable X in explaining or predicting variable Y as a percentage of known variance. Statistical significance was set at $P < 0.05$.

Results

General characteristics of the participants

Among the 2081 elderly individuals surveyed, 58.7 % were female, and the average age was 70.7 ± 7.6 years. Most participants (80.8 %) were married, and the overall educational level was low, with 45.7 % having completed elementary school or below. A significant majority (94.9 %) were long-term residents, having lived in the same area for at least five years. Most participants reported a personal monthly income between 4000 and 6000 CNY. Additionally, 79.6 % of the elderly participants were covered by Urban resident basic medical insurance (URBMI) or Urban employee basic medical insurance (UEBMI), and 66.6 % reported having chronic diseases (see Table 1).

Use of preventive services of TCM in primary care facilities

Of the 2081 elderly participants, only 369 (17.7 %) reported using preventive services of TCM in primary care facilities over the past year. Among these 369 individuals, 53.1 % used services 1 to 2 times, 26.6 % used them 3 to 4 times, 10.6 % used them 5 to 6 times, and 9.7 % used them 7 or more times. The highest usage rates were for TCM health education (70.2 %), followed by TCM appropriate technology for chronic disease prevention and treatment (63.7 %), TCM health guidance for chronic diseases (60.4 %), TCM constitution identification services (46.9 %), and TCM family doctor contracted services (24.1 %).

Univariate analysis of elderly individuals' use of preventive services of TCM based on the Andersen's model and SCT model

Chi-square tests, *t*-tests, and non-parametric tests revealed significant associations between various factors and the use of preventive services of TCM among the elderly (as shown in Table 1). Specifically, female participants were more likely to use these services than male participants ($P < 0.05$). Those with an educational level of elementary school or below showed lower usage rates compared to those with higher education ($P < 0.001$). Elderly individuals with a monthly income exceeding 6000 yuan reported higher usage rates than those with lower incomes ($P < 0.001$). Furthermore, participants who reported having chronic diseases had higher usage rates than those who did not ($P < 0.01$). Similarly, those experiencing moderate to severe pain were more likely to use preventive services of TCM compared to those with mild or no pain ($P < 0.05$). Additionally, higher levels of perceived service environment, social support, cognitive status, outcome expectations, self-efficacy, and self-control correlated with increased use of preventive services of TCM ($P < 0.001$).

Multivariate logistic regression analysis of elderly individuals' using of preventive services of TCM in primary care facilities

A binary logistic regression analysis was conducted using the statistically significant indicators from the univariate analysis, with the dependent variable being whether individuals used preventive services of TCM in primary care facilities in the past year. The results showed that educational level (predisposing factor), self-reported chronic conditions and pain or discomfort (need-based factors), perceived service environment (enabling factors), cognitive status, and self-control (individual factors) were key determinants of service utilization among the elderly ($P < 0.05$) (see Table 2). Specifically, elderly individuals with a junior high school education were 1.506 times more likely (OR = 1.506, $P = 0.018$) to use preventive services of TCM compared to those with elementary school education or below, while those with a senior high school education or higher had a 1.967 times higher likelihood

Table 1
Comparison of the utilization of preventive services of traditional Chinese medicine in primary care facilities for the elderly with different characteristics.

Factors	Total sample	Utilization of preventive services of traditional Chinese medicine in primary care facilities			
		Utilization	No utilization	$\chi^2/t(Z)$ value	<i>P</i> value
Predisposing Factors					
Gender					
Male	860 (41.3)	135 (15.7)	725 (84.3)	4.158	0.041
Female	1 221 (58.7)	234 (19.2)	987 (80.8)		
Age (Years)					
60–69	967 (46.5)	159 (16.4)	808 (83.6)	4.978	0.083
70–79	819 (39.4)	164 (20.0)	655 (80.0)		
≥ 80	295 (14.2)	46 (15.6)	249 (84.4)		
Marital status					
Married	1 682 (80.8)	301 (17.9)	1 381 (82.1)	0.161	0.688
Divorced/Widowed/Single	399 (19.2)	68 (17.0)	331 (83.0)		
Educational level					
Elementary and Below	951 (45.7)	114 (12.0)	837 (88.0)	39.687	0.000
Middle School	619 (29.7)	138 (22.3)	481 (77.7)		
High School and Above	511 (24.6)	117 (22.9)	394 (77.1)		
Length of Residence					
≤5 years	107 (5.1)	19 (17.8)	88 (82.2)	0.000	0.994
>5 years	1 974 (94.9)	350 (17.7)	1 924 (82.3)		
Enabling factors					
Monthly income (CNY)					
<2 000	153 (7.4)	23 (15.0)	130 (85.0)	26.242	0.000
2 000–3 999	1 327 (63.8)	205 (15.4)	1 122 (84.6)		
4 000–5 999	420 (20.2)	87 (20.7)	333 (79.3)		
≥6 000	181 (8.7)	54 (29.8)	127 (70.2)		
Health insurance coverage					
No insurance	66 (3.2)	11 (16.7)	55 (83.3)	0.053	0.818
With insurance	2 015 (96.8)	358 (17.8)	1 657 (82.2)		
Environmental factors					
Perceived service environment	3.41 ± 0.84	3.84 ± 0.81	3.33 ± 0.82	-10.859	0.000
Social support	3.74 ± 0.84	3.98 ± 0.77	3.68 ± 0.85	-6.707 ^a	0.000
Needs-based factors					
Chronic diseases					
No	696 (33.4)	81 (11.6)	615 (88.4)	26.622	0.000
Yes	1 385 (66.6)	288 (20.8)	1 097 (79.2)		
Pain or discomfort					
None	1 056 (50.7)	165 (15.6)	891 (84.4)	12.268	0.002
Mild	692 (33.3)	124 (17.9)	568 (82.1)		
Moderate or above	333 (16.0)	80 (24.0)	253 (76.0)		
Individual factors					
Cognitive status	2.47 ± 0.98	3.28 ± 0.96	2.29 ± 0.90	-18.922	0.000
Outcome expectations	3.37 ± 0.95	3.83 ± 0.75	3.27 ± 0.96	-10.445 ^a	0.000
Self-efficacy	3.07 ± 1.01	3.69 ± 0.86	2.94 ± 1.00	-13.020 ^a	0.000
Self-control	3.23 ± 1.00	3.92 ± 0.79	3.08 ± 0.98	-14.488 ^a	0.000

Note: ^a indicates Mann-Whitney U test.

($OR = 1.967, P < 0.001$). This suggests that higher educational level increases the likelihood of using these services. Additionally, elderly individuals with chronic diseases were 1.599 times more likely ($OR = 1.599, P = 0.002$) to participate in these services compared to those without chronic diseases, while those experiencing moderate to severe pain or discomfort had a 2.025 times higher likelihood ($OR = 2.025, P < 0.001$) than those without pain or discomfort. Furthermore, those with higher levels of perceived service environment ($OR = 1.515, P < 0.001$), cognitive status ($OR = 2.197, P < 0.001$), and self-control ($OR = 1.637, P < 0.001$) were also more likely to use preventive services of TCM in primary care facilities.

Relative importance analysis of predisposing factors, needs-based factors, enabling factors, and individual factors in elderly individuals' choice of preventive services of TCM in primary care facilities

The logistic regression analysis results showed that the final model's coefficient of determination was 0.387, calculated as the sum of contributions from various factors: 0.045 (X_1 - predisposing factors), 0.044 (X_2 - needs-based factors), 0.066 (X_3 - enabling resources), and 0.232 (X_4 - individual factors). The relative contributions to the explained variance were as follows: X_1 (predisposing factors, including educational level) accounted for 11.55 % of the known variance (0.045/0.387); X_2

(needs-based factors, including chronic diseases and pain or discomfort) contributed 11.37 % (0.044/0.387); X_3 (enabling resources, specifically perceived service environment) contributed 16.98 % (0.066/0.387); while X_4 (individual factors, including cognitive status and self-control) accounted for 59.78 % (0.232/0.387). These results clearly demonstrate that, when predicting the use of preventive services of TCM among the elderly, individual factors (cognitive status and self-control) are the most significant, followed by enabling factors (perceived service environment). Predisposing (educational level) and needs-based factors (self-reported chronic diseases and pain or discomfort) are comparatively less important (see Table 3).

Discussion

Improving the health literacy and skills of elderly individuals in TCM preventive care is essential for increasing their awareness of health maintenance, enhancing their overall health, and promoting proactive health management. This has significant strategic implications for addressing population aging and advancing the Healthy China initiative. Community settings serve as a crucial platform for delivering and expanding preventive services of TCM. Although previous studies have in-

Table 2
Binary Logistics regression analysis of the utilization of preventive services of TCM in community health service centers for the elderly.

Variable	β	SE	Wald χ^2 value	P value	OR (95% CI)
X₁-Predisposing factors					
Gender (Ref: Male)					
Female	0.071	0.138	0.266	0.606	1.092 (0.832, 1.432)
Educational level (Ref: Elementary or below)					
Middle school	0.651	0.163	15.998	0.000	1.967 (1.424, 2.717)
High school and above	0.410	0.174	5.566	0.018	1.506 (1.072, 2.117)
X₂-Needs-based factors					
Chronic diseases (Ref: No)					
Yes	0.470	0.155	9.143	0.002	1.599 (1.180, 2.169)
Pain or discomfort (Ref: None)					
Mild	0.261	0.151	2.973	0.085	1.298 (0.965, 1.746)
Moderate or above	0.705	0.188	14.096	0.000	2.025 (1.401, 2.926)
X₃-Enabling factors					
Monthly income (Ref: < 2000 Yuan)					
2000–3999 Yuan	0.007	0.267	0.001	0.979	1.007 (0.597, 1.699)
4000–5999 Yuan	0.280	0.289	0.938	0.333	1.323 (0.751, 2.333)
≥6 000元	0.016	0.327	0.002	0.962	1.016 (0.535, 1.927)
Environmental factors					
Perceived service environment	0.416	0.097	18.514	0.000	1.515 (1.254, 1.831)
Social support	-0.157	0.106	2.176	0.140	0.855 (0.694, 1.053)
X₄-Individual factors					
Cognitive status	0.787	0.086	83.979	0.000	2.197 (1.857, 2.600)
Outcome expectations	-0.069	0.122	0.319	0.572	0.933 (0.735, 1.186)
Self-efficacy	0.011	0.115	0.009	0.924	1.011 (0.808, 1.266)
Self-control	0.493	0.095	26.788	0.000	1.637 (1.358, 1.973)

Table 3
Importance analysis of influential factors in the logistic regression model.

Submodel	R ²	Incremental contribution ΔR^2			
		X ₁	X ₂	X ₃	X ₄
K=0, Average contribution	—	0.032	0.026	0.089	0.26
X ₁	0.032	—	0.03	0.089	0.237
X ₂	0.026	0.036	—	0.082	0.253
X ₃	0.089	0.032	0.019	—	0.181
X ₄	0.26	0.009	0.019	0.010	—
K=1, Average contribution	—	0.027	0.024	0.045	0.233
X ₁ X ₂	0.062	—	—	0.080	0.229
X ₁ X ₃	0.121	—	0.021	—	0.160
X ₁ X ₄	0.269	—	0.022	0.012	—
X ₂ X ₃	0.108	0.034	—	—	0.179
X ₂ X ₄	0.279	0.012	—	0.008	—
X ₃ X ₄	0.270	0.011	0.017	—	—
K=2, Average contribution	—	0.019	0.020	0.033	0.189
X ₁ X ₂ X ₃	0.142	—	—	—	0.246
X ₁ X ₂ X ₄	0.291	—	—	0.097	—
X ₁ X ₃ X ₄	0.281	—	0.107	—	—
X ₂ X ₃ X ₄	0.287	0.101	—	—	—
K=3, Average contribution	—	0.101	0.107	0.097	0.246
X ₁ X ₂ X ₃ X ₄	0.388 ^a	—	—	—	—
Total average contribution	—	0.045	0.044	0.066	0.232
Percentage of explained variance	—	11.55	11.37	16.98	59.78

indicated that elderly individuals express a high demand for these services, with perceived demand rates ranging from 61 % to 75 %, ³⁶⁻³⁸ actual utilization remains comparatively low, between 38 % and 45 %, ^{10,38,39} highlighting a clear gap between perceived need and service usage. Our findings reveal that only 17.7 % of elderly participants had used preventive services of TCM within the past year, and most accessed them only once or twice during that period. This finding contrasts with prior research, ⁴⁰⁻⁴² which may be due to differences in the types of services surveyed or variations in sampling locations. Further investigation is needed to explore these variations. The low utilization of preventive services of TCM among the elderly suggests that current offerings are not effectively engaging this demographic, failing to meet their needs and underutilizing available service functions. It is essential to further investigate the underlying reasons for this trend.

The Andersen’s model helps explore factors influencing elderly individuals’ choices regarding community-based preventive services of TCM by focusing on predisposing factors, needs-based factors, and enabling factors. ^{11,12} Educational level is a key predisposing factor, ^{13,14} and our study found that elderly individuals with higher educational level are more likely to choose preventive services of TCM. This may be because those with higher education tend to have better knowledge of TCM health culture, which enables them to understand the benefits and mechanisms of TCM preventive care, leading to more informed health-care decisions. ¹⁸

Regarding needs-based factors, our study found that elderly individuals with chronic diseases and those experiencing moderate to severe pain are more likely to seek community-based preventive services of TCM. According to the Health Belief Model, individuals’ healthcare utilization behaviors are influenced by their perceptions of disease severity and their expectations of service effectiveness. ¹⁹ Elderly patients with chronic diseases and significant pain are more likely to recognize the seriousness of their health problems and seek effective treatments. Given TCM’s established efficacy and unique advantages in managing chronic diseases and pain, these individuals may be particularly inclined to choose TCM services. ²⁰ In terms of enabling factors, the perceived service environment—such as accessibility, the variety of available services, the quality of medical expertise, and waiting times—emerged as a key factor in influencing the elderly’s choice of community-based preventive services of TCM. This finding suggests that the capacity, quality, and reputation of current preventive services of TCM may limit their development. Improving the infrastructure and technical capacity of community-based preventive services of TCM, optimizing service processes, and reducing waiting times may be crucial measures to enhance service attractiveness and increase utilization rates. ^{43,44}

The SCT model offers valuable insights into the behavioral and psychological factors influencing elderly individuals’ choices of community-based preventive services of TCM. ²¹⁻²³ Our study highlights individual factors, such as cognitive status and self-control, as the most significant, accounting for 59.78 % of the explained variance. Currently, the implementation and promotion of community-based TCM services in China largely rely on national strategies and provider perspectives, often neglecting the preferences and cognitive characteristics of the demand side. Limited knowledge of TCM health practices and insufficient aware-

ness of community-based preventive policies and services significantly constrain elderly individuals' utilization of these services.^{11,21,22} Self-control also plays a critical role in health service utilization and other health behaviors through various mechanisms.^{45,46} Factors such as lack of motivation, unclear goal setting, weak social support systems, and declining cognitive abilities critically are major barriers to the use of health services.^{23,24} Specifically, elderly individuals often lack awareness of preventive care and struggle to establish clear health goals, which leads to reduced persistence and motivation when selecting preventive services of TCM. Additionally, insufficient social support, such as encouragement from family, peers, and community interaction, may hinder elderly individuals from seeking preventive services when facing health challenges. Declining cognitive abilities further affect their capacity to understand health information and make informed decisions.³²

In summary, elderly individuals' decisions to use community-based preventive services of TCM are influenced by predisposing factors (such as educational level), needs-based factors (self-reported chronic illnesses and the severity of pain or discomfort), enabling factors (perceived service environment), and individual factors (such as cognitive status and self-control). Therefore, when promoting preventive services of TCM, primary care facilities should address the intrinsic health needs of the elderly, including developing TCM specialties that focus on age-related diseases such as chronic conditions and pain, thereby enhancing targeted service capabilities.

Additionally, improving the quality and capacity of preventive services of TCM is essential for building a positive reputation, which can attract more elderly patients. It is also crucial to consider the social and cognitive behavioral characteristics of elderly individuals, enhancing their awareness of TCM preventive care and improving their self-control abilities. Promoting the unique advantages of TCM, service offerings, and favorable policies through health education and proactive outreach can help raise awareness. Furthermore, the use of behavioral change techniques, such as goal setting, action planning, and reward mechanisms, can help elderly individuals establish and maintain regular use of preventive services of TCM. Building a supportive social framework, including family involvement, peer education, and community interaction, will further strengthen their self-control. By implementing these strategies, elderly individuals can more fully accept, recognize, and trust preventive services of TCM, which will, in turn, promote greater utilization of these services. This approach can maximize the role and advantages of TCM in supporting self-care and managing chronic diseases in the elderly population.

This study has several limitations. First, the questionnaire-based method may have been subject to recall bias, which could result in respondents inaccurately reporting or omitting past service utilization. Second, the sample was drawn solely from urban communities in two provinces, limiting its geographic representativeness. As a result, the findings may not be generalizable to elderly individuals in other regions with respect to their use of community-based preventive services of TCM. To improve the external validity and generalizability of the results, future studies should expand the sample to include a wider range of regions and populations with diverse socio-economic backgrounds.

Declarations

Not applicable.

Authors' contributions

Conceptualization, C.Y.; Methodology, C.Y.; Data curation, C.Y. and S.Z.; Formal analysis, S.D., S.R. and D.J.; Funding acquisition, C.Y.; Project administration, Y.J.; Resources, not applicable; Supervision, W.D.; Validation, W.D.; Writing—original draft, C.Y.; Writing—review and editing, C.Y. and W.D. All authors have read and agreed to the published version of the manuscript.

Ethics approval and consent to participate

The study received approval from Hangzhou Normal University Ethics Committee (No. 2,019,016).

Consent for publication

Not applicable.

Availability of data and materials

Not applicable.

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Authors' other information

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Competing interests

All authors declare that there are no competing interests.

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