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Research paper

Patients' familiarity with, trust in and willingness to pay for traditional Chinese medicine in Chinese community health care centres

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ABSTRACT

Introduction: Throughout China, traditional Chinese medicine (TCM) is available alongside western medicine. The aim of this study was to investigate patients' familiarity with, trust in, and willingness to pay for traditional Chinese medicine services for disease prevention and health care in Chinese community health centres, and to identify strategies for service improvement.

Methods: A cross-sectional study was conducted, and a random sample of 599 patients were surveyed in community health care centres in five Chinese cities. Chi-square test, Kruskal-Wallis H test, and binary logistic analysis were used to identify factors associated with patients' familiarity with, trust in, and willingness to pay for TCM services for disease prevention and health care.

Results: Of the participants, 84.5 % were familiar with TCM prevention and health care services with 62.1 % expressing their trust in these services. This was associated with the number of services provided locally in communities. Patients' willingness to pay for TCM prevention and health care services was low and depended on patients' ability to pay. Those having higher monthly incomes were more likely to pay for local services.

Conclusions: Most patients were familiar with and trusted TCM prevention and health care services, but they were less willing to pay for them. The health policymakers and the community health centres may need to take more measures to encourage and improve uptake of local services.

1. Introduction

Complementary and alternative medicine (CAM) is a group of diverse medical and health care systems, practices, and products that are not a part of conventional medicine [1]. CAM therapies are classified into five categories: biological treatments, mind-body interventions, energy therapies, alternative medical systems and manipulative and body-based methods [2]. The global prevalence of CAM was reported to be 9.8–76.0 % [3]. Within the realm of CAM, TCM was defined by the National Centre for Complementary and Integrative Health as a complete health care system. It has been mainly used for disease prevention and health care with a diverse set of healing philosophies, therapies, and products both in China and many other countries [4–6]. TCM services for disease prevention and health care commonly include the acupuncture, cupping, moxibustion, tuina, herbal medicine, constitution identification, meridian conditioning and etc [7].

Many patients choose CAM over conventional medicine for various perceived benefits which include holistic care, health maintenance and promotion, and improvement of the life quality in a patient-centered and healing-oriented manner with fewer side effects [8,9]. Therefore, CAM is used to treat chronic diseases, like hypercholesterolemia, hypertension, obesity, diabetes, cancer, and cardiovascular disease [10–13], and also to reduce anxiety, distress, fatigue, nausea, and pain, and sleep problems [14,15]. Currently, CAM services are offered for both outpatients and inpatients for disease prevention and health care, and treatment of chronic conditions [15], demonstrating their effectiveness in minimizing hospitalized patients' anxiety and pain [15], reducing medical cost [16] and shortening hospitalization [15,17,18].

In China, TCM is widely accepted and has made tremendous contributions to health care. The Chinese government has implemented many policies to support TCM development, particularly for chronic disease prevention and health care, and its integration with western medicine into national basic public health systems [19]. The Outline of the Strategic Plan for the Development of Traditional Chinese Medicine (2016–2030) and the Chinese Medicine Health Services Development Plan (2015–2020) emphasized improving TCM service processes and

Abbreviations: TCM, traditional Chinese medicine; CAM, complementary and alternative medicine

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standards in hospitals, preventive health care institutions, and community health centres [20,21]. In China, 95 % of traditional Chinese medicine hospitals are designated hospitals covered by the national medical insurance system [22]. As reported by the National Basic Medical Insurance, there are 1321 types of Chinese medicines and 1322 kinds of western medicines in the national health insurance drug catalogue. Additionally, 892 pieces of Chinese herbal decoction components are also included [23].

Patients and health care providers play pivotal roles in TCM services for disease prevention and health care in community health centres in China. However, most of previous investigators have focused their concentration on health care providers, such as physicians, nurses, medical technicians, and pharmacy staff, but paid less attention to the opinions of patients in the community [21,24].

The aim of this study was to investigate patients' familiarity with, trust in, and willingness to pay for TCM prevention and health care services in community health centres in Beijing, Tianjin, Shanghai, Hangzhou, and Guangzhou in China. It was hoped to highlight the experience of TCM prevention and health care services in China, and provide guidance for medical professionals, community providers, and government policymakers not only in China but also in other countries who seek to provide and improve CAM health care services.

2. Methods

2.1. Study sites

A cross-sectional study was conducted to investigate the TCM services for disease prevention and health care in community health care centres in Beijing, Tianjin, Shanghai, Hangzhou, and Guangzhou. The five cities were distributed in the northern, central, and southern parts of China, and were pilot cities in the provision progress of TCM prevention and health care services launched by the State Administration of Traditional Chinese Medicine in China on the Opinions on the Implementation of Prevention Health Care Services of Traditional Chinese Medicine in 2009. Additionally, the five cities have had a similar level of development of their TCM services for disease prevention and health care, similar economic development, living standards, policy environments, and levels of primary public health services.

2.2. Sample

A total size of 600 patients was estimated based on 15 times of the number of questions in the questionnaire. Taking into account the qualified rate (95 %) of the questionnaire, the final sample size was 630. Participants could be included in the study if they meet the following requirement: 1) living in the locality of the service for more than 6 months; 2) over 18 years of age; 3) registered with the community health care centre.

Between July and December in 2017, one community health care centre was randomly selected from each city, and a total of 630 patients receiving community-based medical services were surveyed by using hierarchical random cluster proportional sampling method with age stratification conducted (10-year-old as a layered basis).

2.3. Data collection

The investigation was organized by the State Administration of Traditional Chinese Medicine and commissioned by the research group of "Application Demonstration of Traditional Chinese Medicine Prevention and Health Care Service Technology in the Field of Prevention and Control of Chronic Non-Infectious Diseases. The questionnaire was prepared and evaluated for content validity by a group of experts in the field of TCM and community health care. The clarity and readability of the questionnaire was pre-tested in a pilot study. A community in Hangzhou was randomly selected, and 100 patients, who were aged over 18 years and living there for more than 6 months, were selected by a convenience sampling method. The results of the pilot sample were not included in the final analysis. Feedback from the participants was used for modifying and adjusting the questionnaire to reach the final version of the questionnaire. Prior to the questionnaire survey, all the participants signed informed consent forms.

The questionnaire was used to collect information, including demographic characteristics, medical expenditure, health status, degree of valuing health, daily physical exercises and work pressure, number of TCM services provided in the community and patients' perceptions on TCM prevention and health care services. The demographic descriptive characteristics included sex, age, medical insurance types, educational status, monthly income, and monthly expenditure. The medical expenditure includes monthly medical expenditure and monthly expenditure on TCM services for disease prevention and health care. The patients' perceptions on TCM services for disease prevention and health care in communities include familiarity with, trust in, and willingness to pay for them, the patients' most dissatisfied aspects and related TCM service knowledge resources. The patients' unsatisfactory aspects of TCM services for disease prevention and health care in the community include attitudes towards customers, medical safety, equipment for TCM service, service charges, number of TCM providers, diagnosis and treatment quality, number of TCM services, and trustable TCM health products.

The investigators (undergraduates and graduate students) were strictly trained to ensure that they were able to provide an accurate interpretation during questionnaire collection, in order to minimize the subjective bias of the participants. Investigators finished the investigation by face to face interviews with the coordination of the general practitioners working in local communities. All the participants were already registered with the community healthcare centre. If some information in the questionnaire was missing, the investigators checked with the participants in order to complete the questionnaires. Trained investigators were also recruited to input the questionnaires, and a random assessment was conducted before the data entry, and if the error rate exceeded 1%, re-entry was required.

2.4. Measures

Familiarity with TCM services for disease prevention and health care was measured by answers to the following questions: "In daily life, have you heard of TCM services for disease prevention and health care ? "(Unfamiliar /Familiar). Trust in TCM services for disease prevention and health care is defined by: "Do you trust TCM services for disease prevention and health care" (Don't trust / Trust). The willingness to pay for TCM services for disease prevention and health care is measured by: "What is your willingness to pay for TCM services for disease prevention and health care, low level or high level? " (Low / High).

Degree of valuing health was analyzed by "Do you care about your health" (Disregarding/Valuing). Chronic disease status was analyzed by "Do you have a chronic disease" (No/Yes). Engaging in daily physical exercise is defined by "Do you exercise regularly" (NO = Never, Seldom, Sometimes/Yes = Often). Work pressure was measured by "Do you have work pressure" (High/Moderate/Low). Number of TCM services was measured by "How many TCM services for disease prevention and health care does your community have?" (<3 items; $\geq$ 3 items = 3,4,5,6,7,8).

- Age: According to the age of the subjects, they were divided into young people (≤ 40), middle-aged (41–60) and elderly (≥ 61) according to their physical health status.
- Medical insurance types included Urban Employee Basic Medical Insurance, Urban Resident Medical Insurance, New Rural Cooperative Medical Care and Commercial Medical Insurance.

- Education status was divided into three subgroups, lower than primary, secondary and higher secondary and bachelor's or higher.
- Participants' economic status *(yuan)* included "monthly income (≤5000; 5000 − 10,000; ≥10,001), monthly expenditures (≤3000; 3001–5000; ≥5001), monthly medicine expenditure (≤2000; 2001–3000; ≥3001), and monthly expenditure TCM services for disease prevention and health care (≤100; 101–200; 201–500; ≥501)".

2.5. Statistical analysis

The database was established using Epidata 3.0, and the statistical analysis was performed using SPSS (SPSS for Windows, version 24.0, SPSS Inc., Chicago, IL, USA). Sample descriptive data were summarized using quantity and percent distribution. The characteristic differences in patients' familiarity with, trust in, and willingness to pay for TCM services for disease prevention and health care in different groups were examined using Chi-square test. Moreover, the Kruskal-Wallis H test was used for the ordinal variables. Binary logistic regression analysis was also performed to investigate influential factors of patients' familiarity with, trust in, and willingness to pay for TCM services for disease prevention and health care. The level of statistical significance was defined as $P < 0.05$, odds ratios (ORs) and 95 % confidence intervals (CIs) were calculated.

3. Results

3.1. Descriptive characteristics of participants

A total of 630 participants receiving community-based medical services were surveyed, and 599 questionnaires (95.1 %) were complete and could be used for analysis.

As shown in Table 1, 56.3 % (n = 337) of the 599 participants were female, 44.9 % were over 60 years old (n = 269), and 96.7 % had health insurance. 21.5 % (n = 337) of the participants had bachelor's degree or higher. Regarding economic status, 81 % (n = 485) of the participants had monthly income less than 10,000 yuan and 86.5 % (n = 518) had monthly expenditure less than 5000 yuan. Regarding monthly expenses, 78.8 % (n = 472) of the participants spent less than 2000 yuan on medical services, and 67.9 % (n = 407) spent less than 200 yuan on TCM services for disease prevention and health care. As for health status, 73.3 % of the participants (n = 439) had chronic diseases, and 76.5 % (n = 458) reported that they valued their health. With regard to lifestyle and work pressure, 43.9 % (n = 263) of the participants exercised regularly, and 33.4 % (n = 200) had high pressure at work. 66.4 % (n = 398) of participants reported that they had used less than three items of TCM services for disease prevention and health care that were provided in their communities.

The five top aspects that caused dissatisfaction with participants regarding TCM services were; inadequate trustable TCM health products (n = 118, 19.7 %), low number of TCM services (n = 110, 18.42 %), low quality of diagnosis and treatment (n = 93, 15.52 %), shortage of TCM service personnel (n = 72, 12 %), and unreasonable charges for TCM services (n = 62, 10.42 %) (Supplementary data, S Figure 1). The sources of knowledge on TCM services for disease prevention and health care included television (n = 375, 62.6 %), community promotion (n = 253, 42.2 %) and newspapers (n = 241, 40.2 %) (Supplementary data, S Table 1).

Regarding the TCM services for disease prevention and health care, 55.1 % of the participants had received health information on acupuncture and cupping, 32.2 % (n = 193) on health record management, 29.0 % (n = 174) on health education, 26.7 % (n = 160) on constitution identification, and 16.4 % (n = 98) on meridian conditioning. (Supplementary data, S Table 2).

Table 1
Descriptive characteristics of survey participants (N = 599).

Variables	N (%)
Gender	
Male	262(43.7)
Female	337(56.3)
Age (years)	
≤ 40	124(20.7)
41–60	206(34.4)
≥ 61	269(44.9)
Medical insurance	
Yes	579(96.7)
No	20(3.3)
Educational status	
Lower than primary	240(40.1)
Secondary and higher secondary	230(38.4)
Bachelor's or higher	129(21.5)
Monthly Income (yuan)	
≤5000	281(46.9)
5001–10,000	204(34.1)
≥ 10,001	114(19.0)
Monthly Expenditure (yuan)	
≤3000	310(51.8)
3001–5000	208(34.7)
≥ 5001	81(13.5)
Monthly Medical expenditure (yuan)	
≤ 2000	472(78.8)
2001–3000	105(17.5)
≥ 3001	22(3.7)
Monthly Expenditure on TCM prevention and health care services (yuan)	
≤ 100	289(48.2)
101–200	118(19.7)
201–500	110(18.4)
≥ 501	82(13.7)
Degree of valuing health	
Disregarding	141(23.5)
Valuing	458(76.5)
Chronic diseases	
Yes	439(73.3)
No	160(26.7)
Engaging in daily exercise	
Yes	263(43.9)
No	336(56.1)
Work pressure	
High	200(33.4)
Moderate	255(42.6)
Low	144(24.0)
Number of TCM prevention and health care services in the community	
< 3 items	398(66.4)
≥ 3 items	201(33.6)

TCM: traditional Chinese medicine.

3.2. Familiarity with TCM services for disease prevention and health care

Familiarity with TCM services for disease prevention and health care was reported by 84.5 % of participants (Table 2). Univariate analysis showed that monthly income, monthly medical expenditure, monthly expenditure on and number of TCM services for disease prevention and health care provided in the community were significantly associated with patients' familiarity ($P < 0.05$).

Binary logistic regression analysis showed that the patients living in communities which provided three or more items of TCM services for disease prevention and health care had higher level of familiarity [OR 7.898(3.358 − 18.577)] than those less than three items (Table 2).

3.3. Trust in TCM services for disease prevention and health care

Of participants, 62.1 % had trust in TCM services for disease prevention and health care, and 37.9 % did not (Table 2). Between both groups there were statistically significant differences in monthly income, monthly expenditure, monthly medical expenditure, monthly expenditure on TCM services, degree of valuing health, engaging in

Table 2
Univariate analysis of patients' descriptive characteristics associated with familiarity, trust and willingness to pay.

Variables	Unfamiliar n (%) 93 (15.5)	Familiar n (%) 506 (84.5)	*P* Value	Do not trust n (%) 227 (37.9)	Trust n (%) 372 (62.1)	*P* Value	Low willingness to pay n (%) 399 (66.6)	High willingness to pay n (%) 200 (33.4)	*P* Value
Gender			0.226			0.369			0.928
Male	46(49.5)	216(42.7)		94(41.4)	168(45.2)		174(43.6)	88(44.0)	
Female	47(50.5)	290(57.3)		133(58.6)	204(54.8)		225(56.4)	112(56.0)	
Age (years)			0.068			0.120			0.168
≤ 40	27(29.0)	97(19.2)		46(20.3)	78(21.0)		87(21.8)	37(18.5)	
41–60	33(35.5)	196(38.7)		76(33.5)	153(41.1)		142(35.6)	87(43.5)	
≥ 61	33(35.5)	213(42.1)		105(46.2)	141(37.9)		170(42.6)	76(38.0)	
Medical insurance			0.947			0.844			0.418
Yes	90(96.8)	489(96.6)		219(96.5)	360(96.8)		384(96.2)	195(97.5)	
No	3(3.2)	17(3.4)		8(3.5)	12(3.2)		15(3.8)	5(2.5)	
Educational status			0.124			0.069			**0.003**
Lower than primary	39(41.9)	201(39.7)		103(45.4)	137(36.8)		172(43.1)	68(34.0)	
Secondary and higher secondary	28(30.1)	202(39.9)		84(37.0)	146(39.2)		156(39.1)	74(37.0)	
Bachelor's or higher	26(28.0)	103(20.4)		40(17.6)	89(23.9)		71(17.8)	58(29.0)	
Monthly Income (yuan)			**0.008**			**p < 0.001**			**p < 0.001**
≤5000	56(60.2)	225(44.5)		130(57.3)	151(40.6)		233(58.4)	48(24.0)	
5001–10,000	24(25.8)	180(35.5)		65(28.6)	139(37.4)		127(31.8)	77(38.5)	
≥ 10,001	13(14.0)	101(20.0)		32(14.1)	82(22.0)		39(9.8)	75(37.5)	
Monthly Expenditure (yuan)			0.221			**p < 0.001**			**p < 0.001**
≤3000	52(55.9)	258(51.0)		138(60.8)	172(46.2)		241(60.4)	69(34.5)	
3001–5000	26(28.0)	182(36.0)		67(29.5)	141(37.9)		120(30.1)	88(44.0)	
≥ 5001	15(16.1)	66(13.0)		22(9.7)	59(15.9)		38(9.5)	43(21.5)	
Monthly Medical expenditure (yuan)			**p < 0.001**			**p < 0.001**			**p < 0.001**
≤ 2000	86(92.5)	386(76.3)		197(86.8)	275(73.9)		342(85.7)	130(65.0)	
2001–3000	6(6.5)	99(19.6)		23(10.1)	82(22.1)		49(12.3)	56(28.0)	
≥ 3001	1(1.0)	21(4.1)		7(3.1)	15(4.0)		8(2.0)	14(7.0)	
Monthly Expenditure on TCM prevention and health care services (yuan)			**p < 0.001**			**p < 0.001**			**p < 0.001**
≤ 100	62(66.7)	227(44.9)		126(55.6)	163(43.8)		216(54.1)	73(36.5)	
101–200	11(11.8)	107(21.1)		43(18.9)	75(20.2)		84(21.1)	34(17.0)	
201–500	13(14.0)	97(19.2)		38(16.7)	72(19.4)		70(17.5)	40(20.0)	
≥ 501	7(7.5)	75(14.8)		20(8.8)	62(16.6)		29(7.3)	53(26.5)	
Degree of valuing health			0.104			**p < 0.001**			0.099
Disregarding	28(30.1)	113(22.3)		71(31.3)	70(18.8)		102(25.6)	39(19.5)	
Valuing	65(69.9)	393(77.7)		156(68.7)	302(81.2)		297(74.4)	161(80.5)	
Chronic diseases			0.068			0.111			0.614
Yes	61(65.6)	378(74.7)		158(69.6)	281(75.5)		295(73.9)	144(72.0)	
No	32(34.4)	128(25.3)		69(30.4)	91(24.5)		104(26.1)	56(28.0)	
Engaging in daily exercise			0.520			**0.048**			0.234
Yes	38(40.9)	225(44.5)		88(38.8)	175(47.0)		182(45.6)	81(40.5)	
No	55(59.1)	281(55.5)		139(61.2)	197(53.0)		217(54.4)	119(59.5)	
Work pressure			0.291			0.434			0.295
High	33(35.5)	167(33.0)		74(32.6)	126(33.9)		125(31.3)	75(37.5)	
Moderate	43(46.2)	212(41.9)		108(47.6)	147(19.5)		183(45.9)	72(36.0)	
Low	17(18.3)	127(25.1)		45(19.8)	99(26.6)		91(22.8)	53(26.5)	
Number of TCM prevention and health care services in the community			**p < 0.001**			**p < 0.001**			**p < 0.001**
< 3 items	87(93.5)	311(61.5)		180(79.3)	218(58.6)		305(76.4)	93(46.5)	
≥ 3 items	6(6.5)	195(38.5)		47(20.7)	154(41.4)		94(23.6)	107(53.5)	

daily exercise and number of TCM services provided in the communities (Table 2). Binary logistic regression analysis noted that patients valuing health more [OR 1.559(1.036 − 2.346)] or living in communities which provided three or more items of TCM services for disease prevention and health care [OR 2.304(1.551 − 3.422)] had higher degree of trust in them (Table 3).

3.4. Willingness to pay for TCM services for disease prevention and health care

33.4 % of the participants had high level of willingness to pay for TCM services for disease prevention and health care (Table 2). The patients' willingness to pay was associated with their educational status, monthly income, monthly expenditure, monthly medical expenditure, monthly expenditure on TCM services for disease prevention and health care, and number of TCM services provided in the community ($P < 0.05$).

Binary logistic regression analysis showed that patients' willingness to pay for TCM services for disease prevention and health care was affected by their monthly income. Patients with monthly income between 5001 − 10,000 yuan [OR 2.612(1.580 − 4.317)] and more than 10,001 yuan [OR 8.460(4.287 − 16.695)] were more willing to pay for the services than those with monthly income less than 5000 yuan. Also, patients who spent higher than 501 yuan monthly [OR 3.187(1.582 − 6.422)] on TCM services for disease prevention and health care were more likely to continue to pay for them than those spent less than 100 yuan. Additionally, three or more items of TCM services for disease prevention and health care provided in the community was a positive factor to promote patients' willingness to pay for such services [OR 3.370(2.232 − 5.089)] (Table 3).

Table 3
Binary logistic regression of patients' familiarity, trust and willingness to pay.

Variables		Odds ratio	95 % CI	*P* Value
Familiarity	*Number of TCM prevention and health care services in the community(reference: < 3)*			
	≥3	7.898	(3.358 − 18.577)	**p < 0.001**
Trust	*Degree of valuing health (reference: Disregarding)*			
	Valuing	1.559	(1.036 − 2.346)	0.033
	Number of TCM prevention and health care services in the community(reference: < 3)			
	≥3	2.304	(1.551 − 3.422)	**p < 0.001**
Willingness to pay	*Monthly Income (yuan) (reference: ≤5000)*			
	5001–10,000	2.612	(1.580 − 4.317)	**p < 0.001**
	≥ 10,001	8.460	(4.287 − 16.695)	**p < 0.001**
	Monthly Expenditure on TCM prevention and health care services (yuan) (reference: ≤ 100)			
	101–200	0.928	(0.535 − 1.610)	0.790
	201–500	1.441	(0.814 − 2.552)	0.210
	≥ 501	3.187	(1.582 − 6.422)	0.001
	Number of TCM prevention and health care services in the community(reference: < 3)			
	≥3	3.370	(2.232 − 5.089)	**p < 0.001**

Table 4
Binary logistic regression analysis of familiarity's effect on trust.

Variables		*β*	Odds ratio	95 % CI	*P* Value
Control variable	*Monthly Income (yuan) (reference: ≤5000)*				
	5001–10,000	0.291	1.338	(0.860 − 2.081)	0.196
	≥ 10,001	0.196	1.217	(0.646 − 2.292)	0.544
	Monthly Expenditure (yuan) (reference: ≤3000)				
	3001–5000	0.185	1.203	(0.755 − 1.918)	0.437
	≥ 5001	0.540	1.717	(0.854 − 3.453)	0.130
	Monthly Medical expenditure (yuan) (reference: ≤2000)				
	2001–3000	0.424	1.528	(0.849 − 2.751)	0.157
	≥ 3001	−0.239	0.787	(0.274 − 2.266)	0.658
	Monthly Expenditure on TCM prevention and health care services (yuan) (reference: ≤100)				
	101–200	−0.055	0.946	(0.586 − 1.527)	0.821
	201–500	0.006	1.006	(0.602 − 1.679)	0.983
	≥ 501	0.298	1.348	(0.676 − 2.689)	0.397
	Engaging in daily exercise (reference: Yes)				
	No	−0.281	0.755	(0.524 − 1.088)	0.131
	Number of TCM prevention and health care services in the community (reference: < 3)				
	≥3	0.643	1.901	(1.265 − 2.858)	0.002
	Degree of valuing health (reference: Disregarding)				
	Valuing	0.432	1.541	(1.015 − 2.338)	0.042
Independent variable	*Familiarity with TCM prevention and health care services (reference: Unfamiliar)*				
	Familiar	1.163	3.200	(1.938 − 5.284)	p < 0.001

The relationship among patients' familiarity with, trust in and willingness to pay for TCM services for disease prevention and health care was analyzed by controlling confounding factors. We found that patients who were familiar with TCM services for disease prevention and health care had higher trust in them than those who are unfamiliar [OR 3.200(1.938 − 5.284)]. The patients who trusted in TCM services for disease prevention and health care had stronger willingness to pay for them [OR 2.342(1.500 − 3.656)] compared with those who did not trust. Generally, the patients' familiarity with TCM services for disease prevention and health care affected their trust in them ($\beta = 1.163$, $P < 0.05$), and patients' trust in these services affected their willingness to pay for them ($\beta = 0.851$, $P < 0.05$). (Supplementary data, S Figure 2). There was no statistically significant association between patients' familiarity with and willingness to pay for TCM services for disease prevention and health care ($P > 0.05$) (Tables 4 and 5).

4. Discussion

This study offered some insights into the patients' familiarity with, trust in, and willingness to pay for TCM services for disease prevention and health care in community health centres in China.

The participants had high familiarity with TCM services for disease prevention and health care, given the high prevalence of these services in China. The use of TCM has had a long history, and initially played a pivotal role in disease prevention and treatment, and aspects of TCM are increasingly used worldwide.

Types of TCM prevention and health care services provided in a community depend on medical care professionals, facilities and policies. In communities that provided more types of TCM services for disease prevention and health care, higher proportion of patients were familiar with them. We found that these people had higher monthly income, higher monthly medical expenditure, higher monthly expenditure on TCM services for disease prevention and health care, and valued their health more (Supplementary data, S Table 3). These communities probably have better conditions to make local patients exposed to the publicity of TCM and TCM related education, thus promoting their awareness of TCM prevention and health care services. People in these communities are more likely to have frequent access to and a good knowledge on TCM prevention and health care services.

Trust is the basis for continuous usage and willingness to pay for TCM services for disease prevention and health care. In our study, patients who attached more importance to health had higher trust in TCM services for disease prevention and health care, which probably resulted from that TCM services had various advantages [25,26]. In TCM services, the prevalently used acupuncture, moxibustion, massage, and cupping therapy, are advantageous in terms of minimal adverse effects, maintaining good health, and improving quality of life, which have been unanimously recognized and trusted by the general population at

Table 5
Binary logistic regression analysis of the familiarity and trust affecting willingness to pay.

Variables		M1		M2		M3	
		β	Odds ratio (95 %CI)	*β*	Odds ratio (95 %CI)	*β*	Odds ratio (95 %CI)
Control variable	*Educational status (reference: Lower than primary)*						
	Secondary and higher secondary	−0.149	0.862(0.541−1.372)	−0.165	0.848(0.529−1.358)	−0.166	0.847(0.529−1.357)
	Bachelor's or higher	0.043	1.044(0.591−1.844)	−0.003	0.997(0.563−1.767)	0.000	1.000(0.564−1.776)
	Monthly Income (yuan) (reference: ≤5000)						
	5001–10,000	0.918**	2.504(1.535−4.084)	0.878**	2.405(1.471−3.933)	0.875*	2.399(1.465−1.625)
	≥ 10,001	2.042**	7.707(3.953−15.027)	2.041**	7.696(3.931−15.067)	2.036**	7.660(3.902−15.040)
	Monthly Expenditure (yuan) (reference: ≤3000)						
	3001–5000	−0.054	0.947(0.563−1.596)	−0.038	0.962(0.571−1.621)	−0.037	0.964(0.572−1.625)
	≥ 5001	0.052	1.053(0.517−2.147)	0.009	1.009(0.494−2.059)	0.014	1.015(0.495−2.080)
	Monthly Medical expenditure (yuan) (reference: ≤2000)						
	2001–3000	0.175	1.192(0.675−2.102)	0.123	1.131(0.638−2.004)	0.120	1.128(0.636−2.001)
	≥ 3001	0.276	1.318(0.441−3.942)	0.308	1.360(0.436−4.242)	0.304	1.355(0.434−2.080)
	Monthly Expenditure on TCM prevention and health care services (yuan) (reference: ≤100)						
	101–200	−0.133	0.876(0.505−1.517)	−0.155	0.883(0.505−1.544)	−0.159	0.853(0.490−1.487)
	201–500	0.373	1.451(0.832−2.532)	0.343	1.392(0.779−2.492)	0.341	1.406(0.798−2.478)
	≥ 501	1.153*	3.168(1.599−6.275)	1.097*	2.917(1.935−4.396)	1.096*	2.992(1.503−5.955)
	Number of TCM prevention and health care services in the community (reference: < 3)						
	≥3	1.146**	3.144(2.080−4.753)	1.070**	2.917(1.935−4.396)	1.064**	2.898(1.905−4.409)
Independent variable	*Familiarity with TCM prevention and health care services (reference: Unfamiliar)*						
	Familiar	0.264	1.302(0.691−2.454)			0.047	1.048(0.546−2.010)
	Trust in TCM prevention and health care services (reference: Don't trust)						
	Trust			0.851**	2.342(1.500−3.656)	0.845**	2.328(1.481−3.661)

* *P* Value < 0.05; ** *P* Value < 0.001.

home and abroad [15,27]. Therefore, those people valued more on their health probably were inclined to trust TCM services. In communities where more types of TCM services provided, the patients show statistically higher satisfaction with TCM service quality which makes the patients more likely to build their trust in them.

Patients' higher monthly income and expenditure on TCM services were positively associated with their willingness to pay for TCM services for disease prevention and health care. High monthly income means financial authority and greater disposable income to spend on health care [28]. Research has demonstrated that participants who have higher monthly income were more likely to use CAM services [27]. In the US, patients are increasingly paying out-of-pocket for acupuncture services, and residents with higher income have higher acceptance level of acupuncture [29]. In our research, the patients with higher income also had a higher expenditure on TCM services for disease prevention and health care. These participants with higher monthly income also had higher levels of education, and valued their health more (data not shown). High level of education proved to be associated with more frequent use of CAM than those with lower levels of education [27]. Moreover, people with higher educational levels have higher levels of health literacy, more frequent access to health care resources, higher potential for self-determination, and a higher emphasis on health [30], making them more willing to use and pay for TCM services for disease prevention and health care in health maintenance and improvement of quality of life. Higher expenditure on TCM services probably indicated patients' previous better experiences in TCM services for disease prevention and health care, which make them more willing to pay for them.

Interestingly, in the communities where more types of TCM services for disease prevention and health care provided, patients had stronger willingness to pay for them. This may indicate that the patients living there had higher trust in TCM services for disease prevention and health care mentioned above, which make these patients more willing to pay for them.

The patients' familiarity with TCM services for disease prevention and health care affected their trust in them, and then the patients' trust in TCM services subsequently affected their willingness to pay for them. The relationship between the patients' familiarity with, trust in and willingness to pay for TCM services for disease prevention and health care was the basis for carrying out measures to increase the patients' trust and consumption of services and willingness to engage with them in future.

In this study, the patients' monthly expenditures on the TCM services for disease prevention and health care were not high. We found that 96.7 % of the patients surveyed had medical insurance, and 84 % of the patients supported the inclusion of TCM services for disease prevention and health care into the medical insurance. This is potentially reflected by the community patients' most dissatisfied aspects including having to pay for charges for TCM services. The reimbursement system of medical treatment may be a major factor affecting the choice of people to seek for TCM services for disease prevention and health care. In the US, actual insurance reimbursement for acupuncture services was only around 25 %, and some commercial medical insurance companies set up many barriers to receiving acupuncture coverage [29,31]. At present, the reimbursement of the medical treatment is also restricted in China, especially on the types of reimbursable TCM services and health products, and total reimbursement amount. In China, the National Healthcare Security Administration has worked out a list of basic medical diagnosis and treatment items. In addition to non-disease treatment and auxiliary treatment, other eligible therapeutic TCM diagnosis and treatment items can be paid by the medical insurance fund [22]. In addition, TCM services such as therapeutic massage, acupuncture and bone setting manipulation have been included in the coverage of basic medical insurance in most many regions of China [22].

As for the TCM services for disease prevention and health care, besides the charges for TCM services, patients' most dissatisfied aspects also include the inadequate trustable TCM health products, number of TCM services, diagnosis and treatment level, and number of TCM providers. Shortage of TCM services providers in community health centres

is widespread in China, which severely restricted the types of services provided and affected the medical quality of TCM services. For example, some general practitioners rarely use TCM services during patient consultations because of their lack of knowledge on TCM indications, side effects and TCM-WM (western medicine) interactions [32].

A longitudinal data set analysis on Chinese Health and Nutrition Survey from 1991 to 2004 suggested that in the formal medical sector, the use of Chinese medicine has decreased, particularly in cities, which probably resulted from the changing demographic and socioeconomic characteristics of the population, shifts in cultural values and structural changes in the healthcare system [33]. In addition, compared with western medicine, the development of TCM services is probably restricted by its lower number of medical services, lower medical service fees and incomplete medical insurance reimbursement system [34]. To deal with this situation, the Chinese government has actively promoted the development of TCM services. By the end of 2018, various provinces had set up between 100 and 300 TCM medical services, and more than 80 percent of the total TCM medical services in 14 provinces had raised their prices, with the average price adjustment in most provinces ranging from 30 percent to 50 percent [22]. Different cities and counties across the country should give full consideration to the characteristics and actual services of TCM and TCM hospitals, and actively coordinate the medical insurance departments to reasonably determine the total amount of medical insurance payment control indicators and the payment standards for medical services of TCM hospitals, including the scale of charges line and the reimbursement limits line [34].

In summary, in order to improve the TCM services for disease prevention and health care in Chinese communities, and enhance the medical quality and availability, several measures can be taken by the policymakers or the community leaders. First of all, it is urgent to strengthen the publicity of TCM services and health education, increasing the residents' knowledge and health belief. Secondly, it is important to strengthen training of personnel of traditional Chinese medicine, standardize the price of traditional Chinese medicine, and increase the level of diagnosis and treatment, increasing the residents' trusts in TCM prevention and health care services. Finally, it is essential to speed up improving the reimbursement policy of local medical insurance, and increasing the reimbursement of TCM healthcare and diseases prevention usage, stimulating the patients' willingness to use this approach.

5. Limitations

The main limitation of this study was that the data were obtained from patients' self-report of familiarity with, trust in, and willingness to pay for TCM services for disease prevention and health care. It relied on patients' recall ability may have led to some degree of either under or over-reporting of certain variables. Secondly, the five surveyed cities were representative of pilots providing TCM services for disease prevention and health care but the results may not accurately represent the situations in middle-sized and small-sized cities. Future studies will need to cover more diverse geographical areas. Thirdly, this research reported information from the viewpoint of patients, lacking the perception of providers which should be studied in future research.

6. Conclusions

Patients have high familiarity with and trust in TCM prevention and health care services, but their willingness to pay for them was not strong. The health policymakers and the community health centres should explore effective measures to improve the uptake of TCM services for disease prevention and health care in China.

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Ethics approval and consent to participate

The research was reviewed and approved by the Ethics Committee of Hangzhou Normal University (No.2015LL203). We obtained written informed consent from all participants after clear introduction of the survey. Confidentiality was assured codes of their information, and secured storage was prepared for paper questionnaires.

CRediT authorship contribution statement

Fanli Meng: Conceptualization, Methodology, Supervision. **Zhuoyu Ji:** Investigation, Software, Data curation, Writing - original draft. **Fengbin Song:** Investigation, Software, Data curation, Writing - original draft. **Tiantian Bai:** Data curation. **Xiaoqing Fan:** Data curation. **Dahui Wang:** Writing - review & editing.

Declaration of Competing Interest

The authors declare that they have no competing interests.

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Appendix A. Supplementary data

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