

The importance of patient's experience and its impact on healthcare system for people received Chinese medicine

Shang-Jyh Chiou

National Taipei University of Nursing and Health Sciences

Pei-Chen Lee

National Taipei University of Nursing and Health Sciences

Li-Hui Lee

National Taipei University of Nursing and Health Sciences

Yu-Hsuan Chang

National Health Insurance Administration

Chen-Hui Chen

National Health Insurance Administration

Chen-yin Kuo

National Health Insurance Administration

Kuan-Chia Lin (✉ kuanchia@ym.edu.tw)

National Yang-Ming University

Research article

Keywords: patient experience profiles, patients' expectation, LCA, patient experience, NHI survey, traditional Chinese medicine

Posted Date: November 22nd, 2019

DOI: <https://doi.org/10.21203/rs.2.17662/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background Health system responsiveness is a complicated issue that guides researchers in determining an efficient methodology to enhance understanding of healthcare systems' perspectives. Latent class analysis (LCA) helps healthcare professionals to understand discrepancies in patient experience profiles in traditional Chinese medicine (TCM) and maintain measurability in observational settings. This study examined the relationship between patients' experience profiles and their satisfaction with medical outcomes.

Methods The study focused on an annual National Health Insurance survey examining patients' experiences with medical services in TCM in 2015. We used 11 items from the LCA to develop patients' experience profiles. A logistic regression model was developed to explore differences in patients' satisfaction with their treatment outcome across 4 groups identified via the LCA, with adjustment for demographic factors.

Results Participants (N=2012) were divided into four groups. Regardless of gender and age, Group 2 (null) held the lowest satisfaction with treatment outcome relative to those reported by the other 3 groups (odds ratios with p-value: Group 1 (null): 7.40, Group 3 (nComm): 1.37, Group 4 (Skip): 2.20, $p < 0.001$). Respondents with a more favorable patient experience reported higher satisfaction with treatment outcome.

Conclusions More satisfied patients are more likely to engage in healthy behaviors by complying with treatment recommendations and thus produce better outcomes. The World Health Organization (WHO) emphasizes that traditional medicine integrated with Western medicine (WM) can play an important role in achieving the goal of "Health for All." Health authorities should develop strategies aimed at enhancing patients' experiences in TCM to contribute to a positive care process.

Background

Health care industries are concerned with assessing patients' experiences of receiving services to improve the performance of healthcare systems. Gathering information regarding patients' experiences, such as whether they received easy-to-understand explanations or shared decision-making with their health care professional, provides a useful basis for health care professionals to improve clinical practice [1]. In addition, health authorities are interested in using the information from patients' experience surveys to deliver health services that are better tailored to patients' needs. Numerous studies have assessed patients' satisfaction with the quality of health care they receive and its outcomes [2–4].

Early research in this area focused on developing an appropriate measurement tool for assessing patients' experiences and satisfaction with the health care services they received. In 1985, Press Ganey created a tool for tracking patients' satisfaction with the health care system and the services they receive to explore patients' perceptions. In the meantime, several organizations, such as the National Research Corporation (NRC), Gallup, and HealthStream also developed surveys designed to collect similar

information [5]. Until 2002, the government showed great interest in hearing the consumers' voice. This was particularly apparent in the US Centers for Medicaid and Medicare Services (CMS) cooperating with the Agency for Healthcare Research and Quality (AHRQ) to develop and administer the Hospital Consumer Assessment of Health Providers and Systems (HCAHPS) survey, the first national, standardized survey of patients' hospital experiences in the United States. These surveys were eventually implemented in emergency departments and inpatient and outpatient services to support healthcare choices among consumers. Another example is the intergovernmental Organization for Economic Co-operation and Development (OECD) which is increasingly collecting Patient-Reported Experience Measures (PREMs) from their member health care systems [6] by asking several core questions related to their care journey [7]. PREMs are intended to elicit patients' perspectives regarding the care they receive.

The essential design of PREMs offers insight into patients' health care behavior. PREMs allow for an understanding of patients' views, and this should provide an opportunity to assess differences in patients' health care behavior either in traditional Chinese medicine (TCM) or in the western medical system. Although the majority of patients use health care services within the western medical system, TCM or alternative medicine is still popular in some Asian countries (e.g., Taiwan, China, and Korea [8]) with varied care systems. From the point of view of TCM, practitioners believe if patients can strengthen and rebalance the body-mind connection, TCM will help to resolve medical problems. In Western medicine, the main goal is direct eradication of medical problems using aggressive treatment. TCM therapy focuses on mobilizing and activating the body's natural resources to restore balance, which hopefully will lead to improvements in health [9]. Patient-tailored, individualized treatments have a millennia-old tradition in TCM [10]. It is uncommon in Chinese medicine to examine the efficacy of treatment using pre-clinical research and this leads to reluctance and skepticism of western academia toward TCM.

In Taiwan, National Health Insurance (NHI) has covered some TCM treatments (such as acupuncture, chiropractic, and Chinese herbal products) as regular reimbursement since 1995 and specialties are currently in three main categories (internal medicine, acupuncture, and traumatology). Most patients perceive Western medicine as having faster effects with a well-founded evidence base (such as in cancer therapy), while TCM involves not only the treatment of disease but also adjusting to the whole-body situation of the patients [11]. In Taiwan, majority of TCM is offered in primary clinics, which provides by 90.3% of TCM physicians [12, 13]. Interestingly, a high proportion of patients simultaneously used both a conventional drug and TCM therapy [14, 15]. Those TCM-seeking behavior may reflect different patient expectation, which is different from western medicine setting.

Owing to increasing interest in collecting information regarding patients' experiences to improve healthcare quality and system performance [6, 16], many countries have created agencies to administer national surveys regularly. In Taiwan, the NHI administration has conducted national surveys annually for a decade. To date, numerous studies have used traditional variable-oriented methodologies and statistical analyses (such as regression) to examine factors associated with patients' satisfaction or patients' experiences; However, few studies have examined patients' experiences and satisfaction with

TCM, especially within a national health care system and only a limited number of studies have used a participant-oriented method (such as LCA) for evaluating patients' satisfaction or experience. Such studies are valuable to support performance improvement and quality development based on the perceptions of patients.

LCA was introduced by Goodman [17], and it has been used in many areas including the medical field for clustering individuals into subgroups to uncover hidden patterns of association, such as different risk groups [18] or different levels of social support [19]. The purpose of this study was to examine the relationship between respondents' patient experience profiles and their satisfaction with their medical outcomes. We hypothesized that different patient experience profiles could influence patients' satisfaction with medical outcomes in TCM. Using a participant-oriented method, LCA, can provide an understanding of the discrepancies in patient experience profiles in TCM care settings and can retain as much measurability as possible in an observational setting.

Methods

Population and setting

This study used the annual NHI survey data to explore patients' experiences with receiving medical care at Chinese medical services in 2015. The survey used the probability-proportional-to-size sampling approach, and random digit dialing was used in computer-assisted telephone interviewing (CATI). The survey was conducted from August 24 to September 6, 2015, and the target population included individuals who had received TCM services during the preceding 3 months. Parent proxy reports were obtained for participants younger than 15 years of age. The final effective sample size was 2,012, and the sampling error was $\pm 2.2\%$. The response rate was around 9.6% in the CATI system.

The annual NHI survey uses a questionnaire consisting of 6 sections: (1) medical care utilization and accessibility; (2) referral and medication compliance; (3) satisfaction and treatment effects evaluation; (4) health behavior; (5) social network; and (6) demographic characteristics. There are over 40 major items in this survey drafted according to Andersen's behavioral model proposed by Ronald Anderson in the 1960s. In 2008, Anderson conducted a review of the model, outlining its five developmental stages. This model explains the use of health services by incorporating three main components: predisposing factors, enabling factors, and need factors. These factors are situated in and intertwined with contextual and individual characteristics [20]. Furthermore, personal characteristics, the characteristics of the health care system, and utilization of services all combine to influence satisfaction.

Measurement instrument and LCA model

We hypothesized that a better patient experience in a TCM setting (e.g., steps taken to ease the geographical and financial barriers and interpersonal communication) leads to increased overall satisfaction with treatment outcome. We constructed 11 items related to patient experience to be used in the LCA model. These items included accessibility to treatment (travel times, waiting times, time spent in

consultation, and ease of making appointments), interpersonal communication (discussions with the provider during treatment, receiving health education, easy-to-understand explanations, and being provided the opportunity to express concerns), and financial barriers (the felling in medical expenditure they spent, skipping doctor's appointment due to long travel time, and skipping doctor's appointment due to cost).

We could only include dichotomous items in the LCA model. Items regarding time included questions as follows: "How much time did you spend in one-way travel, including waiting for vehicles, traffic, and so on?"; "Do you feel that the travel time was too long?"; and "Were you satisfied with your counselling time?" This study dichotomized those answers into Yes/No for travel time, waiting time, and satisfaction with counseling time. The items regarding interpersonal communication such as "Did you discuss with your provider during treatment?" used a 4-point Likert scale (Always-Often-Sometimes-Never). These items were recoded into Yes = always + often; No = sometimes + never. The items such as "discussed with providers in treatment during most appointments," "received health education in most time," "received easy-to-understand explanation most of the time," and "provided the opportunity to express concern most of the time" were scored (Yes/No). The items regarding cost included "How much did you pay for Chinese Medicine services at your last consultation, including out-of-pocket fees?" (not in the model) and "Do you consider this inexpensive or expensive?" Further, we asked participants "Did you skip the doctor's visit due to the long travel time?" and "Did you skip the doctor's visit due to cost?" In the model, we dichotomized those answers into Yes/No. One final item used in the model was related to patient evaluation: "When you need to obtain primary care, is it easy to make an appointment in advance?" This item was scored Yes/No.

Initially, we assessed the model's fit by comparing Akaike information criterion (AIC), Bayesian information criterion (BIC), and entropy in three, four, and five class levels. The AIC and BIC dropped slightly from three class to five class while the entropy values were 0.74, 0.76, and 0.67, respectively. We decided to use the four-class model, and the AIC, BIC, and entropy were 1424.95, 1688.47, and 0.76, respectively, indicating that the LCA model was acceptable for use in further analysis. The details of the LCA model fit are provided in supplemental table S1.

Table 1 displays the four groups derived from the LCA model: individuals who reported all positive experiences in the receipt of healthcare services (Group 1: pall); individuals who reported mostly negative experiences with the receipt of healthcare services (Group 2: nall); individuals who reported all negative experiences with interpersonal communications (Group 3: nComm); and individuals who considered skipping their doctor's visits due to travel time or cost (Group 4: skip). The distribution of response probability among different items showed in Fig. 1 to visualize the four integration types identified from LCA model. Apparently, the four classes were qualitatively different from each other to represent different types of patient experiences.

Table 1
Results from LCA

AIC		1424.95				
BIC		1688.47				
entropy		0.76				
Proportion of population in each group		0.476 (n = 961)	0.088 (n = 162)	0.315 (n = 653)	0.12 (n = 236)	
		total	1	2	3	4
Accessibility	The travel time is not too long	1768	0.9014	0.5383	0.9250	0.9593
	the waiting time is not too long	1469	0.8295	0.0591	0.7998	0.6935
	the counseling time felt more satisfied	1717	0.9221	0.6268	0.8088	0.9461
	easy-to-make appoint	1844	0.9319	0.6210	0.9760	0.9580
Interpersonal communication	Discussed with providers in treatment in most time	1334	0.8513	0.6635	0.3245	0.8162
	received health education in most time	1056	0.8400	0.3237	0.0373	0.7285
	received easy-to-understand explanation in most time	1446	0.9827	0.6260	0.2937	0.8992
	provided opportunity to express concern in most time	1734	0.9728	0.8868	0.6718	0.9716
Financial barriers	The feeling in expenditure is not expensive	1761	0.9633	0.7297	0.9013	0.8133
	not skip doctor visit due to long travel time	1464	0.9238	0.6238	0.7762	0.0129
	not skip doctor visit due to cost	1597	0.9292	0.7202	0.8305	0.4072
Group 1: positive experience in all (pall)						
Group 2: negative experience in all (nall)						
Group 3: negative experience in communication (nComm)						
Group 4: skip experience (Skip)						
AIC, Akaike information criterion; BIC, Bayesian information criterion; LCA, latent class analysis						

Dependent variable

The dependent variable in the study was patients' satisfaction with their treatment outcome. Respondents were asked to indicate the extent to which they were satisfied with the treatment outcome using a Likert scale ranging from 1 (very satisfied) to 5 (very dissatisfied). These responses were recoded into high (very satisfied, somewhat satisfied) or low (neither satisfied nor dissatisfied, somewhat dissatisfied, and very dissatisfied) levels of satisfaction.

Independent variables

To improve understanding of factors associated with participants' satisfaction with treatment outcome, we not only used the latent categorical factor identified in the LCA (i.e., the 4 groups) but also included sex, age, educational level, monthly income, marital status, living conditions, chronic diseases, catastrophic illness, health status as well as smoking and drinking behavior. The NHI in Taiwan issues beneficiaries a catastrophic illness certificate to exempt them from copayments if they qualify. To obtain information regarding health status, we asked the participants to rate their health during the preceding month. In addition, to obtain information regarding chronic diseases, we asked the participants whether they had been diagnosed with hypertension, diabetes, hyperlipidemia, asthma, or heart disease. However, we did not count the numbers of chronic diseases and only used chronic disease (yes/no) and catastrophic illness (yes/no) in the later analysis. Smoking and drinking behavior were also categorized as yes/no.

With regard to missing values, every item was given a "refuse to answer" response in the CATI system when the participant did not answer this question. Regarding monthly income, approximately 34% did not respond. For other items, less than 1% were not answered.

Statistical analysis

We obtained the results of the LCA and deconstructed the 4 groups. We displayed the participants' characteristics (such as demographics, living conditions, chronic diseases, health status, and health behavior) by group to examine the basic features of each group. Thereafter, a logistic regression analysis was performed to model patients' satisfaction with treatment outcome (i.e., high or low) as a function of the 4 groups identified via the LCA and various covariates. We also conducted another logistic regression for the potential misclassification inherent in two-step methods that weighted posterior probabilities of class membership based on LCA as a sensitivity analysis in supplemental file 2. The results showed that the posterior probability of class membership used in the logistic regression produced outcomes that were similar to the original model (see supplemental table S2). SAS 9.3.1 (SAS Institute, Cary, NC) and SPSS 20.0 (SPSS Inc., Chicago, IL) were used to perform all statistical analyses. The significance level was set at .05.

Results

Participants (N = 2012) were divided into four groups: Group 1: positive experience in all (pall); Group 2: negative experience in all (nall); Group 3: negative experience in communication (nComm); Group 4: skip experience (skip) (Table 1). The proportions of participants in Groups 1, 2, 3, and 4 were 48%, 9%, 31%, and 12%, respectively.

For nearly half of the participants in Group 1 (pall), almost all 11 items reflected a positive response in their experience (for example, did not travel too long to their TCM services, were more satisfied with their TCM consulting time, and received adequate patient education in the TCM setting). In addition, they reported that they usually discuss treatment with their provider, receive patient education and easy-to-understand explanations, and had the opportunity to express their concerns when they used their TCM services. However, in Group 2 (nall), participants reported negative experiences when they used the TCM services although they represented a small group. Group 3 (nComm) reported a higher number of negative experiences in interpersonal communication in the TCM setting. Surprisingly, more than 10% (Group 4: skip) reported that they skipped doctor's visits due to longer travel time or cost. One possible reason for this was that patients seeking TCM services were not in acute care or emergency situation and thus skipping was more feasible.

The participants' characteristics in the different groups are provided in Table 2. Unsurprisingly, sex, age, educational level, monthly family income, marital status, living conditions, health status, and health behavior (smoking and drinking) differed significantly among the 4 groups, with chronic diseases and catastrophic disease being nonsignificant factors. Group 4 (skip) had a higher proportion of females, higher education levels (over college), a greater probability of being single, better health status, and a greater proportion who engaged in drinking behavior. In age, the youngest was Group 2 (nall); in education level, the lowest proportion of higher education levels was Group 1 (pall); and in monthly family income, the lowest was Group 3 (nComm).

Table 2
participants' characteristics in different groups from LCA

variables		Group 1	Group 2	Group 3	Group 4	p
		961 (48%)	162 (8%)	653 (32%)	235 (12%)	
Gender	Male	424(44.1)	56(34.6)	261(40.0)	66(27.8)	< 0.001
	Female	537(55.9)	106(65.4)	391(60.0)	171(72.2)	
Age	0–19	178(21.8)	21(14.9)	58(11.3)	28(13.0)	< 0.001
	20 ~ 29	129(15.8)	22(15.6)	113(22.0)	45(20.9)	
	30 ~ 39	194(23.8)	45(31.9)	103(20.0)	58(27.0)	
	40 ~ 49	156(19.1)	33(23.4)	104(20.2)	44(20.5)	
	50 ~ 59	138(16.9)	18(12.8)	118(23.0)	37(17.2)	
	> 60	20(2.5)	2(1.4)	18(3.5)	3(1.4)	
Education	Illiterate	98(10.3)	10(6.2)	34(5.3)	13(5.5)	< 0.001
	Primary school	94(9.9)	15(9.3)	84(13.0)	21(8.9)	
	Junior high	115(12.1)	16(9.9)	79(12.2)	7(3.0)	
	Senior high	273(28.6)	34(21.1)	164(25.4)	51(21.6)	
	College	317(33.2)	79(49.1)	238(36.8)	112(47.5)	
	Graduate school	57(6.0)	7(4.3)	47(7.3)	32(13.6)	
Monthly income	< 45000	170(27.7)	36(30.8)	154(36.0)	35(22.3)	0.007
	45000–59999	123(20.0)	19(16.2)	71(16.6)	21(13.4)	
	60000–89999	136(22.1)	27(23.1)	99(23.1)	40(25.5)	
	>= 90000	185(30.1)	35(29.9)	104(24.3)	61(38.9)	
Marriage	Single	382(40.2)	64(39.8)	230(35.6)	107(45.5)	0.012
	Married	535(56.3)	88(54.7)	379(58.7)	121(51.5)	
	Others ^a	34(3.5)	9(5.6)	37(5.7)	7(3.0)	

a: divorced and widowed

variables		Group 1	Group 2	Group 3	Group 4	p
		961 (48%)	162 (8%)	653 (32%)	235 (12%)	
Living conditions	One	19(2.0)	3(1.9)	39(6.0)	11(4.7)	< 0.001
	With others	934(98.0)	158(98.1)	608(94.0)	224(95.3)	
Chronical disease	No	764(80.3)	126(77.8)	505(77.9)	190(82.6)	0.385
	Yes	187(19.7)	36(22.2)	143(22.1)	40(17.4)	
Catastrophic illness	No	917(96.2)	154(95.1)	613(94.6)	231(97.9)	0.138
	Yes	36(3.8)	8(4.9)	35(5.4)	5(2.1)	
Health status	Very well	32(3.3)	0(0.0)	19(2.9)	3(1.3)	< 0.001
	Well	211(22.0)	33(20.4)	92(14.1)	32(13.5)	
	Good	400(41.6)	52(32.1)	295(45.2)	131(55.3)	
	Natural	188(19.6)	46(28.4)	128(19.6)	33(13.9)	
	Low	116(12.1)	25(15.4)	105(16.1)	33(13.9)	
	Very low	14(1.5)	6(3.7)	14(2.1)	5(2.1)	
Drinking behavior	No	479(49.8)	71(44.1)	302(46.2)	91(38.4)	0.013
	yes	482(50.2)	90(55.9)	351(53.8)	146(61.6)	
Smoking behavior	No	784(81.7)	138(85.7)	532(81.6)	215(90.7)	0.005
	yes	176(18.3)	23(14.3)	120(18.4)	22(9.3)	
a: divorced and widowed						

Table 3
the logistics model of expectations regarding in different groups from LCA with participant characteristics

variables		OR	95 CI		p
			Low level	Up level	
Gender	Female	2.375	1.402	4.023	0.001
Age	0 ~ 19				0.023
	20 ~ 29	1.061	0.228	4.931	
	30 ~ 39	0.236	0.062	0.905	
	40 ~ 49	0.168	0.042	0.671	
	50 ~ 59	0.215	0.055	0.846	
	> 60	0.323	0.038	2.772	
Education	Illiterate				0.027
	Primary school	0.141	0.007	2.973	
	Junior high	0.081	0.004	1.684	
	Senior high	0.169	0.008	3.628	
	College	0.301	0.014	6.622	
	Graduate school	0.463	0.019	11.549	
Monthly income	< 45000				0.099
	45000-59999	1.730	0.745	4.018	
	60000-89999	0.670	0.350	1.284	
	>= 90000	0.711	0.356	1.421	
Marriage	Single				0.143

OR: odds ratio, CI: confidence interval,
Group 1: positive experience in all (pall)
Group 2: negative experience in all (nall)
Group 3: negative experience in communication (nComm)
Group 4: skip experience (Skip)

variables		OR	95 CI		p
			Low level	Up level	
	Married	1.658	0.852	3.227	
	others	5.588	0.709	44.017	
Living conditions	Living with others	1.590	0.528	4.784	0.410
Chronical disease	Having Chronical diseases	0.629	0.340	1.163	0.139
Catastrophic illness	Having Catastrophic illness	1.348	0.377	4.817	0.646
Health status	Health status better	1.472	0.896	2.419	0.127
Drinking behavior	Yes	0.708	0.416	1.204	0.202
Smoking behavior	Yes	1.287	0.652	2.540	0.467
Group	Group 2				< 0.001
	Group 1	7.369	3.346	16.228	
	Group 3	1.366	0.701	2.662	
	Group 4	2.204	0.948	5.127	
OR: odds ratio, CI: confidence interval,					
Group 1: positive experience in all (pall)					
Group 2: negative experience in all (nall)					
Group 3: negative experience in communication (nComm)					
Group 4: skip experience (Skip)					

We used logistic regression to examine the effect of the different patient experience groups with other control variables on the likelihood of satisfaction with treatment outcome. Regardless of gender and age, Group 2 (nall) held the lowest satisfaction treatment outcome relative to those reported by the other 3 groups (odds ratios with p-value: Group 1 (pall): 7.40, Group 3 (nComm): 1.37, Group 4 (Skip): 2.20, $p < 0.001$). Respondents with a more favorable patient experience reported higher satisfaction with treatment outcome.

Discussion

In this study, we found that, regardless of gender and age, individuals who have positive experiences in TCM settings report greater satisfaction with their medical outcome. Although some patients using TCM may have negative experiences in communication with their provider or consider that barriers in finance

or accessibility may affect the likelihood of satisfaction with medical outcomes. In addition, older respondents were less likely to be satisfied and females were more likely to be satisfied; however, issues of accessibility and the physician-patient relationship were still the most important dimensions related to the patients' perceptions of medical outcomes.

In the LCA model, the items used examined the patient experience from the point of view of accessibility, the doctor-patient relationship (including interpersonal communication), and barriers. Patients seeking TCM who report all positive experiences display higher levels of satisfaction with their medical outcomes than those who have mostly unfavorable experiences. This finding is consistent with other studies in other medical settings [2, 21, 22]. In addition, when patients reported a partially unsatisfactory experience in their doctor-patient relationship or experienced some barriers concerns, this led to some degree of lower levels of satisfaction with medical outcomes compared with all positive patient experience, even though the results were not statistically significant. However, these patients have the most time to discuss with their providers during treatment, receive health education or easy-to-understand explanations, or have the opportunity to express their concerns, and these are still important factors in measuring the doctor-patient relationship [23, 24].

TCM has been the most common alternative medicine in Taiwan for over one hundred years. The reasons for using complementary/alternative medicine (CAM) including TCM are complex [25]. People may use TCM to tone up their constitution or use Chinese herbs for treatment on their own or combined with western medicine regimens. We expected that patients seeking TCM may reflect different health behaviors or philosophies [26] as well as the heterogeneity of individual background [27]. For example, TCM patients may tolerate a longer traveling time for consultations or be less concerned with cost due to not being in an acute care situation or being obsessed with seeing a famous physician in some specific field. A study in Taiwan revealed the alternative health seeking behavior occurred in TCM when patients have past experience lower than expected with western medicine [28]. Further, different disease processes in TCM may result in different patient expectations compared to western medicine settings. In this study, some of them expressed skipping their doctor visits due to financial consideration; however, they have reported higher satisfaction in medical outcomes compared with those who have most unfavorable patients experience. Surprisingly, patients under NHI in Taiwan have experienced great improvements in reducing the barriers to accessibility and financial burdens [29], and patients under NHI express concerns about skipping their doctor's appointments in TCM due to long travel time or costs. Unlike some patients seeking WM treatment, the possible reason is that patients seeking TCM usually do so for nursing care and recuperation or considers as an "alternative".

In early work in this area, health authorities were dedicated to the improvement of accessibility and measuring patients' satisfaction as a means of improving the performance and quality of healthcare services [30, 31]. In the patient-centered era, not only improving patients' experience with accessibility but also examining interpersonal relationships with providers, especially with regard to communication, are important factors in medical services [32]. A Swiss study in TCM provided empirical evidence that better patient-physician communication is associated with better patient experiences, and that more positive

patient-physician interactions are associated with longer durations of consultation [21]. Patients' expectations with TCM did not appear to be so different from western medicine (all focus on accessibilities, interpersonal communication, and reduced barriers), which is in line with the findings of previous studies [33, 34]. However, we can not ignore the predominant factor (such as age, and sex) and patients seeking TCM as a form of complementary and alternative medicine in this study. Therefore, the assessment of patient experiences with TCM by examining positive accessibility and interpersonal relationships is necessary to enhance health care services quality.

To examine if the outcomes from LCA are acceptable in fitting the model, we displayed the probability of class membership from LCA as a sensitivity analysis to examine whether a significant difference could convert to a dichotomy distribution in a logistic regression (shown on the right in the supplement file table S2). The results indicate that the posterior probability of class membership as a weight using logistic regression produced outcomes similar to those of the original model. Providing these results can help enhance readers' understanding of the relationship between patient experience and expected treatment outcomes after adjustment using the LCA model.

Limitation and strength

This is the first study to use a novel approach to explore satisfaction with medical outcomes in TCM. LCA not only provides a concise group classification in the model and maximizes the variables' explanatory power, but also affords an easy to understand outcome from a subject-oriented study on patient experience. Another strength of this study is that we have adopted the NHI national patient experience data, although representativeness is still a concern. We have applied the appropriate weighting methods referring to the distribution of outpatient services in TCM in the NHI claim system to the entire annual survey database. However, some limitations need to be addressed. First, LCA is a novel approach for the development of patient experience profiles, and some items may not be readily distinguishable among different subgroups. For example, with regard to the opinion that expenditures are not very high, in this study, the item responses in different subgroups were slightly disparate. Second, patients' experience constitutes many concepts; however, in this study, we examined accessibility, interpersonal communication, and barriers, and we need to acknowledge that it is difficult to capture more details in the NHI annual survey because of the time limitations of the survey. Third, in some cases, participants' health status was in a period of transition, such as waiting for cancer therapy during the study period, which may have affected their responses. This situation could affect the causal pathway between exposure and outcome. However, the health care system does not have a gatekeeper design and patients using TCM usually are not in an acute care situation. When a patient's health status undergoes a great change, that patient usually visits the WM hospital for treatment. Finally, patients with worse treatment outcomes tend to report negative healthcare experiences [35]. In this study using cross-sectional data, it is difficult to assess this kind of relationship. We have examined the reasons for lower levels of satisfaction, and these were related to negative treatment effects in only a very small proportion of individuals.

Conclusions

In this study, the assessment of patients' experiences with TCM by examining positive accessibility and interpersonal relationships together led to higher satisfaction with treatment outcome. More satisfied patients are more likely to engage in healthy behaviors by complying with treatment recommendations and thus produce better outcomes. The World Health Organization (WHO) emphasizes that traditional medicine integrated with Western medicine can play an important role in achieving the goal of "Health for All." Health authorities should develop strategies aimed at enhancing patients' experiences in TCM to contribute to a positive care process.

List Of Abbreviations

Latent class analysis (LCA)

traditional Chinese medicine (TCM)

The World Health Organization (WHO)

Western medicine (WM)

National Research Corporation (NRC)

Medicaid and Medicare Services (CMS)

Agency for Healthcare Research and Quality (AHRQ)

Hospital Consumer Assessment of Health Providers and Systems (HCAHPS)

Organization for Economic Co-operation and Development (OECD)

Patient-Reported Experience Measures (PREMs)

National Health Insurance (NHI)

computer-assisted telephone interviewing (CATI)

Akaike information criterion (AIC)

Bayesian information criterion (BIC)

Declarations

Ethics approval and consent to participate

The Institutional Review Board (IRB) of the National Taiwan University has approved this study (201505ES011).

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors have no conflicts of interest to declare.

Funding

National Health Insurance Administration

Authors' contributions

SJC and KCL jointly drafted the every version of the manuscript. PCL, LHL and SJC participated in the design and analysis of the study. YHC and KCL surprised in acquisition of data. PCL provided the statistical consultation. All authors contributed to the discussion and to reviewing of the manuscript. All authors read and approved the final manuscript.

Acknowledgements

This study was supported by NHI grant (2015): "The study on longitudinal monitoring system of the right to seek medical care under the National Health Insurance" awarded by the National Health Insurance Administration. The funder had no role in study design, and analysis, or decision to publish.

References

1. Schlesinger M, Grob R, Shaller D: **Using Patient-Reported Information to Improve Clinical Practice.** *Health Serv Res* 2015, **50 Suppl 2**:2116-2154.
2. Tsai TC, Orav EJ, Jha AK: **Patient satisfaction and quality of surgical care in US hospitals.** *Ann Surg* 2015, **261**(1):2-8.
3. Mohammed K, Nolan MB, Rajjo T, Shah ND, Prokop LJ, Varkey P, Murad MH: **Creating a Patient-Centered Health Care Delivery System:A Systematic Review of Health Care Quality From the Patient Perspective.** *American Journal of Medical Quality* 2016, **31**(1):12-21.
4. Nelson EC, Eftimovska E, Lind C, Hager A, Wasson JH, Lindblad S: **Patient reported outcome measures in practice.** *BMJ : British Medical Journal* 2015, **350**:g7818.
5. Siegrist RB, Jr.: **Patient satisfaction: history, myths, and misperceptions.** *Virtual Mentor* 2013, **15**(11):982-987.
6. Coulter A: **Measuring what matters to patients.** *BMJ* 2017, **356**:j816.
7. Fujisawa R, Klazinga NS: **Measuring patient experiences (PREMS).** 2017.

8. Huang CW, Hwang IH, Lee YS, Hwang SJ, Ko SG, Chen FP, Jang BH: **Utilization patterns of traditional medicine in Taiwan and South Korea by using national health insurance data in 2011.** *PLoS One* 2018, **13**(12):e0208569.
9. Xu W, Towers AD, Li P, Collet JP: **Traditional Chinese medicine in cancer care: perspectives and experiences of patients and professionals in China.** *Eur J Cancer Care (Engl)* 2006, **15**(4):397-403.
10. Konkimalla VB, Efferth T: **Evidence-based Chinese medicine for cancer therapy.** *J Ethnopharmacol* 2008, **116**(2):207-210.
11. Leung S-w, Hu H: **Evidence-based Research Methods for Chinese Medicine:** Springer, Singapore; 2016.
12. Chen FP, Chen TJ, Kung YY, Chen YC, Chou LF, Chen FJ, Hwang SJ: **Use frequency of traditional Chinese medicine in Taiwan.** *BMC Health Serv Res* 2007, **7**:26.
13. Wu TP, Tsai CH, Su YT, Wang CC, Chen TJ, Chang CM, Chen FP: **The Evaluation of Professional Divisions of Traditional Chinese Medicine in Taiwan through Patient Visit Records of 2012.** *Int J Environ Res Public Health* 2018, **15**(9).
14. Chen MC, Lai JN, Chen PC, Wang JD: **Concurrent Use of Conventional Drugs with Chinese Herbal Products in Taiwan: A Population-based Study.** *J Tradit Complement Med* 2013, **3**(4):256-262.
15. Lin MH, Chang HT, Tu CY, Chen TJ, Hwang SJ: **Doctor-Shopping Behaviors among Traditional Chinese Medicine Users in Taiwan.** *Int J Environ Res Public Health* 2015, **12**(8):9237-9247.
16. OECD: **Recommendations to OECD ministers of health from the high level reflection group on the future of health statistics: Strengthening the international comparison of health system performance through patient-reported indicators.** In.: Organisation for Economic Co-operation and Development; 2017.
17. Goodman LA: **The Analysis of Systems of Qualitative Variables When Some of the Variables Are Unobservable. Part I-A Modified Latent Structure Approach.** *American Journal of Sociology* 1974, **79**(5):1179-1259.
18. Lanza ST, Rhoades BL: **Latent class analysis: an alternative perspective on subgroup analysis in prevention and treatment.** *Prev Sci* 2013, **14**(2):157-168.
19. Santos LM, Amorim LD, Santos DN, Barreto ML: **Measuring the level of social support using latent class analysis.** *Soc Sci Res* 2015, **50**:139-146.
20. Andersen RM: **National health surveys and the behavioral model of health services use.** *Med Care* 2008, **46**(7):647-653.
21. Jones CH, O'Neill S, McLean KA, Wigmore SJ, Harrison EM: **Patient experience and overall satisfaction after emergency abdominal surgery.** *BMC Surg* 2017, **17**(1):76.
22. Lake ET, Germack HD, Viscardi MK: **Missed nursing care is linked to patient satisfaction: a cross-sectional study of US hospitals.** *BMJ Qual Saf* 2016, **25**(7):535-543.
23. Hirsh AT, Atchison JW, Berger JJ, Waxenberg LB, Lafayette-Lucey A, Bulcourf BB, Robinson ME: **Patient satisfaction with treatment for chronic pain: predictors and relationship to compliance.** *Clin J*

Pain 2005, **21**(4):302-310.

24. Michlig M, Ausfeld-Hafter B, Busato A: **Patient satisfaction with primary care: a comparison between conventional care and traditional Chinese medicine.** *Complement Ther Med* 2008, **16**(6):350-358.
25. Astin JA: **Why patients use alternative medicine: results of a national study.** *JAMA* 1998, **279**(19):1548-1553.
26. Yang LH, Corsini-Munt S, Link BG, Phelan JC: **Beliefs in traditional Chinese medicine efficacy among Chinese Americans: implications for mental health service utilization.** *J Nerv Ment Dis* 2009, **197**(3):207-210.
27. Yeh ML, Lin KC, Chen HH, Wang YJ, Huang YC: **Use of traditional medicine and complementary and alternative medicine in Taiwan: a multilevel analysis.** *Holist Nurs Pract* 2015, **29**(2):87-95.
28. Wu SI, Chou P, Chen ML, Chen JH, Yeh ML, Lin KC: **Multiple interacting factors corresponding to repetitive use of complementary and alternative medicine.** *Complement Ther Med* 2012, **20**(4):190-198.
29. Cheng TM: **Reflections on the 20th anniversary of Taiwan's single-payer National Health Insurance System.** *Health Aff (Millwood)* 2015, **34**(3):502-510.
30. Powell L: **PATIENT SATISFACTION SURVEYS FOR CRITICAL ACCESS HOSPITALS:** Mountain States Group, Inc.; 2001.
31. Cabrera-Barona P, Blaschke T, Kienberger S: **Explaining Accessibility and Satisfaction Related to Healthcare: A Mixed-Methods Approach.** *Social Indicators Research* 2017, **133**(2):719-739.
32. Biglu MH, Nateq F, Ghojazadeh M, Asgharzadeh A: **Communication Skills of Physicians and Patients' Satisfaction.** *Mater Sociomed* 2017, **29**(3):192-195.
33. Chung VC, Yip BH, Yu EL, Liu S, Ho RS, Sit RW, Leung AW, Wu JC, Wong SY: **Patient Perceptions of Expression of Empathy From Chinese Medicine Clinicians in a Chinese Population: A Cross-Sectional Study.** *Medicine (Baltimore)* 2016, **95**(17):e3316.
34. Chiou S-J, Lee P-C, Chang Y-H, Huang P-S, Lee L-H, Lin K-C: **Assessment of patient experience profiles and satisfaction with expectations of treatment effects by using latent class analysis based on a national patient experience survey in Taiwan.** *BMJ Open* 2019, **9**(3):e023045.
35. Lehto U-S, Tenhola H, Taari K, Aromaa A: **Patients' perceptions of the negative effects following different prostate cancer treatments and the impact on psychological well-being: a nationwide survey.** *British Journal Of Cancer* 2017, **116**:864.

Figures

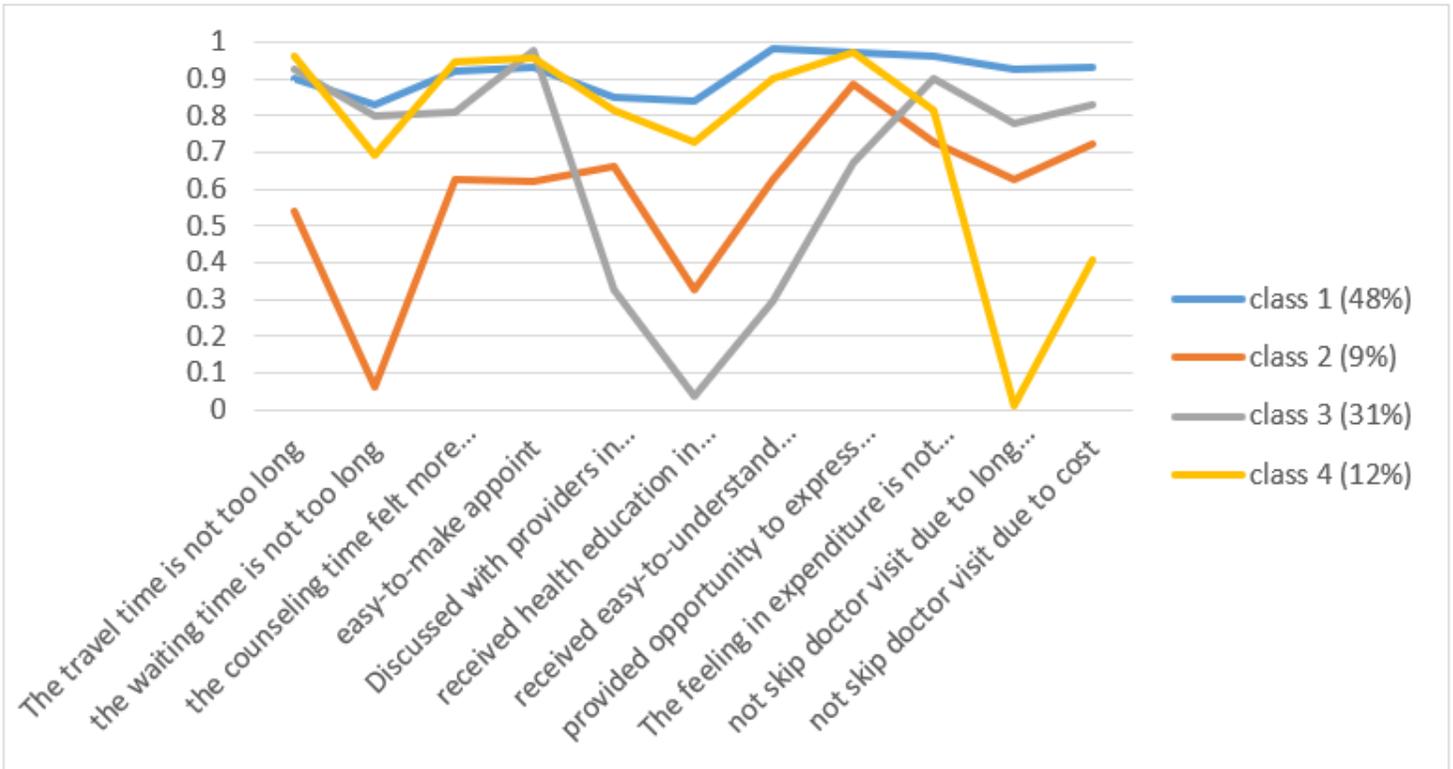


Figure 1

The distribution of response probability among different items in four classes