

# Research on the Willingness of Guangzhou Residents to Sign Up for Family Doctors and Its Influencing Factors Based on TAM

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## ABSTRACT

The implementation of the "Healthy China" strategy calls for strengthening the community-level medical and health service system and building the ranks of general practitioners. After provincial (municipal and district) governments actively responded to the national call to establish relevant pilot programs, the signing rate of family doctors has been rapidly increased, but residents' understanding and utilization rates for family doctors are still relatively low. Therefore, based on the theory of Rational Behavior (TRA) and Technology Acceptance Model (TAM), this paper establishes a structural equation model (SEM) based on residents' signing behavior and carries out empirical tests on the hypothesis model, exploring the status quo of residents' signing and services and the factors affecting residents' signing.

**Keywords:** Family doctor; Rational behavior theory; Technology acceptance model; Structural equation model

## 1. INTRODUCTION

Compared with foreign countries, the policy system of family doctors in China is not perfect and mature in disease prevention and control, resident health management and integration of medical resources. In addition, although the provincial (city, district) governments have actively responded to the national call to establish a family doctor pilot, and the signing rate has increased rapidly, the residents' understanding and utilization rate of family doctors are still low, which is seriously inconsistent with the rapidly growing signing rate. Therefore, taking Guangzhou as an example, this paper explores the current situation of residents' signing and service and the factors affecting residents' signing.

This paper uses a questionnaire survey and literature survey to obtain relevant empirical data to study the development status, influencing factors and residents' views and expectations of the "family doctor system" in Guangzhou, and uses the improved model based on TAM and TRA to verify the research results, so as to deeply understand the current situation and dilemma of the "family doctor system". To provide a reference for promoting the institutionalization and legalization of general practitioners and graded diagnosis and treatment in China.

## 2. LITERATURE REVIEW

At present, the contract service of family doctors in China is divided into five typical modes: the "1 + 1 + 1" contract service mode in Shanghai, the "basic package + personalized package" contract service mode in Yancheng City, Jiangsu Province, the "medical maintenance integration" contract service mode in Hangzhou City, Zhejiang Province, the "three division co management" contract service mode in Xiamen City, Fujian Province, and the "prepayment according to the total amount of head" in Dingyuan County, Anhui Province Contract service mode.

The study found that families with catastrophic health expenditures or family members with a graduate degree or above were less willing to continue signing family doctor contracts. Families with labor force accounting for more than half of the total number of families or high economic conditions are also reluctant to continue to sign family doctor contracts [1]. Many residents still have the concept of "emphasizing treatment over prevention", have not fully accepted the idea of health management, do not understand its importance [2], and deeply lack the understanding of community health service centers and family doctors [3]. In addition, residents also have

misreading of the first diagnosis in the community, such as "signing the contract is fixed", and worry that their free right to see a doctor is limited [4].

The study found that the problem of "difficult and expensive medical treatment" exists in the United States as in China. Residents need to spend a long queue time if they want free examination and treatment [5]. However, due to the existence of family doctors, there is no "crowded" phenomenon in the United States [6]. In the UK, 90% of patients are cured by family doctors [7].

### 3. MODEL CONSTRUCTION AND ESTIMATION

#### 3.1. Structural equation model

Structural equation model (SEM) is a comprehensive method to analyze the relationship between variables based on the covariance matrix of variables. It can be generally divided into two categories: measurement model and structural model.

The measurement model is usually expressed as:

$$\begin{cases} x = \Lambda_x \xi + \delta \\ y = \Lambda_y \eta + \epsilon \end{cases} \quad (1)$$

Where,  $x$  and  $y$  represent specific measurable exogenous indicators and endogenous measurable variables respectively;  $\xi$  and  $\eta$  represent exogenous latent variable and endogenous latent variable, respectively;  $\Lambda_x$   $\Lambda_y$  is the relationship between exogenous measurable index and exogenous latent variable, and  $\Lambda_y$  is the relationship between the endogenous index and endogenous latent variable;  $\delta$ ,  $\epsilon$  is the error of exogenous measurement model and endogenous measurement model, respectively.

Secondly, the structural model is usually expressed as:

$$\eta = B\eta + \Gamma \xi + \zeta \quad (2)$$

Where,  $B$  is the structure coefficient matrix of endogenous latent variable;  $\Gamma$  is the structure coefficient matrix of exogenous latent variable and endogenous latent variable;  $\zeta$  is the equation error in the structural equation model, indicating the part that the exogenous latent variable cannot explain the endogenous latent variable.

#### 3.2. Model construction and coefficient estimation

##### 3.2.1. Multicollinearity diagnosis

Firstly, this paper makes a multicollinearity diagnosis on the observation indexes to test whether it is suitable for structural equation modeling. The results show that

the range of  $Vif$  is 1.687 ~ 3.064, less than the threshold 5, and the tolerance values are greater than 0.2, indicating that there is no collinearity problem of variables, which is suitable for structural equation analysis.

##### 3.2.2. Model modification

After preliminary fitting according to the theoretical hypothesis model, it is found that the direct impact of perceived ease of use on behavior attitude is not significant. According to the TAM theoretical model, it is considered that among the potential factors, perceived ease of use has an indirect impact on behavior attitude and behavior intention mainly through perceived usefulness. At the same time, it is found that perceived risk has an indirect effect on perceived ease of use, and subjective norms have a direct impact on perceived usefulness. The path after modifying the model is shown in Figure 1.

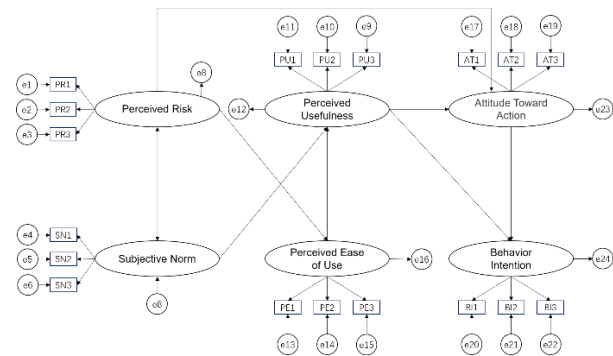


Fig1 Revised model path map

##### 3.2.3. Coefficient estimation and test

In this paper, the maximum likelihood estimation method is used to estimate the parameters of the model. The regression coefficients estimated by the maximum likelihood method and the results of the coefficient significance test of the parameters are used. The original assumption is that the regression coefficient is equal to 0. The results show that all paths have reached the significance level of 1%. In addition, there are no items exceeding or very close to 1 in the standardized regression coefficient in the table, there is no too large standard error, and there is no negative error variance.

#### 3.3. Model evaluation

##### 3.3.1. Combination reliability and mean-variance extraction

According to the estimated value of standardized regression coefficient, the combined reliability and mean-variance extraction of 6 potential variables can be calculated. The combination reliability is the reliability index to test the latent variables, and the mean-variance extraction is the validity index to test the internal

consistency of structural variables. The calculation formula is as follows:

$$CR = \frac{\sum_{i=1}^k \lambda_i^2}{\sum_{i=1}^k \lambda_i^2 + \sum_{i=1}^k e_i} \quad (3)$$

$$AVE = \frac{\sum_{i=1}^k (\lambda_i^2)}{\sum_{i=1}^k (\lambda_i^2) + \sum_{i=1}^k e_i} \quad (4)$$

The final calculation results of each dimension are shown in Table 1:

**Tab1** Combination reliability and mean extraction variance

Potential variable	Observation variable	Standardized factor load	Composite reliability	Mean variance extraction
Perceived usefulness	PU1	0.833	0.833	0.625
	PU2	0.807		
	PU3	0.727		
Perceived ease of use	PE1	0.729	0.747	0.500
	PE2	0.784		
	PE3	0.594		
Subjective norm	SN1	0.821	0.809	0.586
	SN2	0.771		
	SN3	0.7		
Perceived risk	PR1	0.399	0.735	0.502
	PR2	0.765		
	PR3	0.872		
Behavior attitude	AT1	0.804	0.862	0.675
	AT2	0.835		
	AT3	0.826		
Behavioral intention	BI1	0.83	0.869	0.689
	BI2	0.824		
	BI3	0.836		

Generally, the combination reliability is better than 0.7, and the average variance extraction is better than 0.5. It can be seen that except that the average variance extraction amount of perceived ease of use is just 0.5, the other dimensions meet the requirements of the model, and the results are good.

### 3.3.2. Combination reliability and mean-variance extraction

The 8 model fitting indexes selected in this paper are shown in Table 2. Among the three value-added fitness indexes, IFI, TLI and CFI are 0.952, 0.941 and 0.952, respectively, which are greater than 0.9, indicating that the fitting effect of the model in this paper is good, and the modified model in this paper fits with the observation data, which meets the empirical requirements.

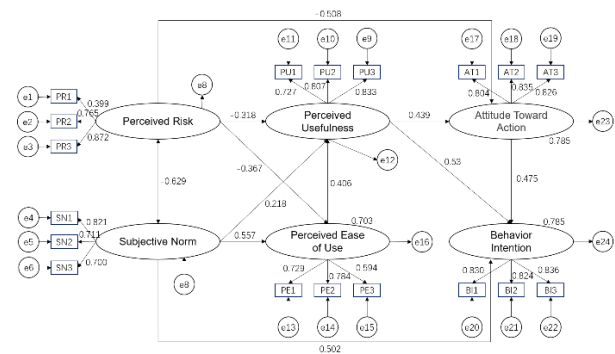
**Tab2** Model fitting index.

Index	CMIN/DF	RMSEA	RMR	PNFI
Index value	2.779	0.076	0.030	0.757
Recommended value	1~3	<0.08	<0.05	>0.5
Index	PGFI	IFI	TLI	CFI
Index value	0.672	0.952	0.941	0.952
Recommended value	>0.5	>0.9	>0.9	>0.9

### 3.4. Research hypothesis verification and conduction effect analysis

#### 3.4.1. Research hypothesis verification

The final model fitting results are shown in Figure 2:



**Fig2** Standardized path analysis diagram.

Combined with Figure 2, it can be verified that the seven hypotheses proposed in this paper are tenable, and there is a significant correlation between perceived risk and subjective norms in potential factors. The explanatory abilities of the overall model to endogenous variables are perceived ease of use ( $R^2=0.703$ ), perceived usefulness ( $R^2=0.726$ ), behavior attitude ( $R^2=0.785$ ) and behavior intention ( $R^2=0.785$ ).

#### 3.4.2. Analysis of conduction effect between factors

The paths between factors reached the significance

level of 1%. Further, this paper sorts out three standardization effects of the model, as shown in Table 3:

**Tab3** Model fitting index.

Total effect of standardization					
	SN	PR	PE	PU	At
PR	-.629	.000	.000	.000	.000
PE	.788	-.367	.000	.000	.000
PE	.738	-.467	.406	.000	.000
AT	.644	-.714	.178	.439	.000
BI	.808	-.339	.085	.209	.475
Direct effect of standardization					
	SN	PR	PE	PU	At
PR	-.629	.000	.000	.000	.000
PE	.557	-.367	.000	.000	.000
PE	.218	-.318	.406	.000	.000
AT	.000	-.508	.000	.439	.000
BI	.502	.000	.000	.000	.475
Indirect effect of standardization					
	SN	PR	PE	PU	At
PR	.000	.000	.000	.000	.000
PE	.231	.000	.000	.000	.000
PE	.520	-.149	.000	.000	.000
AT	.644	-.205	.178	.000	.000
BI	.306	-.339	.085	.209	.000

Note: row variables in the table are influencing factors and column variables are affected factors.

According to Table 3, it can be found that the behavior intention is most affected by subjective norms, indicating that residents are vulnerable to the influence of external society when signing family doctors. When signing family doctors becomes mainstream, residents will feel the usefulness and simplicity of signing family doctors and will prefer signing family doctors more. In the total effect of standardization, the factors affecting behavior intention are ranked in descending order as subjective norm, behavioral attitude, perceived risk, perceived usefulness, and perceived ease of use, which means that residents' perception of the usefulness of family doctor service will promote residents' behavior intention of family doctor service more than other factors.

Among the direct effects of factors, subjective norms have the highest coefficient of perceived ease of use, which is 0.557; the second is the direct influence coefficient of behavior attitude on behavior intention, which is -0.508. Among the indirect effects of factors, the coefficient of subjective norms for behavior attitude is the highest, reaching 0.644, which means that among the potential indirect influencing factors of behavior intention, subjective norms are easier to promote residents' willingness to sign contracts than other factors.

### 3.5. Chapter summary

To sum up, when promoting family doctor services, the first thing is to publicize the convenience and effectiveness of signing contracts and using services so that residents can truly feel the benefits of family doctors. In addition, we need to realize that perceived risk, subjective norms, perceived ease of use and perceived usefulness are potential variables of behavior attitude and intention. Among them, perceived risk will directly affect perceived ease of use and usefulness and affect behavior intention through behavior attitude. In addition, perceived risk also directly affects behavior attitude and behavior intention, indicating that residents' risk perception of family doctor services will more directly affect their signing attitude and signing intention, reflecting residents' psychology of fear of loss. The impact of perceived usefulness on behavior and attitude is higher than perceived ease of use. This result reflects that the signing family doctor process is simpler for the public and will not affect residents' intention to sign family doctors. Therefore, residents should feel the benefits brought by signing family doctors.

## 4. PROPOSAL

It is necessary to strengthen publicity and create a good social environment for the implementation of the system. The government should expand policy publicity channels and adopt efficient publicity means. Through both online and offline channels, effectively expand the publicity coverage, improve awareness, and make full use of the areas under the jurisdiction of the neighborhood (Village) committee to form a long-term publicity mechanism. In addition, the family doctor service team implementing the contracted service should strengthen household publicity, carefully interpret the contracted terms for residents, so that policy implementers and citizens can have a deeper understanding of the necessity and importance of the policy, which will help to resolve the dilemma of family doctor policy implementation.

Improve the diagnosis and treatment level of family doctors and improve the design of medical insurance management system. The improvement of family doctors' medical level is inseparable from the positive actions of the government. On the one hand, we should increase financial policy support and focus on training family doctors. We should not only establish a training system for long-term input of family doctors, but also provide communication and learning opportunities for existing doctors and introduce talents through multiple channels, such as bringing specialists from secondary and tertiary hospitals into the family doctor team and establishing a high-level general practitioner service team. On the other hand, we should appropriately improve the level of hardware and facilities of grass-roots medical services,

break the barriers to information system sharing, promote the construction of medical communities at all levels, and promote the sinking of high-quality medical resources.

Strengthen the construction of family doctors to improve their service awareness. If family doctors want to provide people-centered health care to family members, they need to communicate directly with community residents. Enhancing family doctors' service awareness and serviceability will help to reduce medical friction and establish a good grass-roots doctor-patient relationship. Improve the service awareness of family doctors and increase the study of the basic theory of interpersonal relationships and doctor-patient relationships in the training of general practitioners. At the same time, the service satisfaction of family doctors can be included in the performance appraisal of family doctors so that the income of family doctors can be directly linked to their service satisfaction. In addition, local governments can urge relevant institutions, especially relevant non-profit organizations, to carry out service skills training for family doctors.

Change the medical compensation mechanism to solve the problem of difficult and expensive medical treatment. Fundamentally changing the medical compensation mechanism can convert the compensation channels of the medical institution from the service price, financial subsidies, and drug compensation for two channels of financial subsidies and service compensation. At the same time, it can fully develop community medical services and establish the medical treatment mode of "minor diseases in the community and serious diseases in the hospital", so as to resolve the dilemma of "difficult to see a doctor" in the registration queue in large hospitals.

Define the evaluation and Assessment Department of family doctor services: In order to improve the situation of "signing without an appointment", a performance evaluation system for family doctors should be established and supervised by the evaluation and Evaluation Department of family doctors' services. Performance evaluation should take the service quality, service efficiency, service content, cost control and performance of family doctors as indicators, scientifically and reasonably verify the labor value of family doctors, so as to implement the evaluation and evaluation of family doctors and get specific feedback on the implementation of policies. At the same time, the implementation of the family doctor performance evaluation system should be supervised and evaluated by special personnel. Family doctors can not determine that they have provided family doctor services only by filling in the form.

## 5. CONCLUSION

The residents' awareness rate of family doctor service is not high, but the signing rate of family doctor service

is falsely high. There is a phenomenon of "signing but not making an appointment": through field investigation, we find that the vast majority of the interviewed residents in the pilot area of family doctor service do not understand the service, and only a few residents express a clear understanding of the family doctor system and its services. According to the sampling results, only a few residents actively signed up for family doctors. More than half of the residents signed the contract passively through the publicity of the community or unit, did not understand the specific services of the family doctor, and lacked the awareness of actively using the family doctor's services. As a result, only a few people often used the services such as daily examination and health assessment of blood glucose and blood pressure provided by the family doctor, resulting in the phenomenon of "signing but not making an appointment". In addition, according to the research results, there is a great difference between the officially announced signing rate and the signing rate of the sample survey, which shows that the false high signing rate of family doctor services is serious.

The factors and needs affecting residents' signing family doctors have an obvious bias: the survey shows that the treatment level, charge level and service attitude of family doctors are the three main factors affecting residents' signing. Therefore, paying attention to the training and introduction of grass-roots medical personnel and improving the signing service standards and systems are the key to improving the signing and use intention. In addition, daily health security, systematic health care and health consultation for special groups (such as pregnant women, infants, patients with chronic diseases and the elderly over 60 years old) are the main needs of residents of all ages for family doctors. Family doctor services urgently need to be "tailored" for different groups.

The signing behavior of residents is vulnerable to external factors: the results show that residents are vulnerable to the influence of external society when signing family doctors. When signing family doctors becomes mainstream, residents will feel the usefulness and simplicity of signing family doctors, and will be more inclined to sign family doctors. At the same time, residents' risk perception of family doctor service will more directly affect their signing attitude and signing intention, reflecting residents' fear of loss.

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