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The impact of Internet medical information on personal medical behavior

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ABSTRACT. *With the rapid development of Internet medical care, related information has been spread and popularized, but the research of Internet medical information has received corresponding attention. Based on the CHNS survey data, this paper uses the propensity score matching method to study the impact of Internet medical information on individual medical behavior choices. The study found that Internet medical information has a significant impact on the choice of individual medical behavior. However, further research shows that Internet medical information has prompted people to actively prevent diseases and tend to rational diagnosis and treatment, but it also has a certain diversion of patients. It can be seen that in the construction of Internet medical care in China, we should continue to intensify efforts to build, break the barriers of knowledge and information on common diseases, promote the people to actively prevent and cure diseases, rationally seek medical treatment, and improve the health of residents from the source.*

KEYWORDS: *Internet, Medical Information, Medical Behaviors, Propensity Score Matching, Treatment Effect*

1. Introduction

Health has always been the need of human beings. As economic development and quality of life improve, people's concern for health is increasing day by day. "Healthy China" has been included in the national development strategy. However, with the improvement of medical and health standards, many medical and health problems such as poor medical knowledge, difficult medical treatment, and expensive medical treatments have been exposed. Limited medical resources cannot meet the people's growing health needs. Due to the professional characteristics of medical and health knowledge, it also involves multiple processes such as prevention, diagnosis, and treatment, which isolates relevant knowledge from ordinary individuals. Although the diagnosis of some common diseases and the use of medicines can be experienced in patients' repeated visits and daily communication. However, in the face of a large number of incurable diseases and some common diseases, the corresponding treatment is also individualized and

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differentiated. Not only is it difficult for patients to frequently treat and guide medical knowledge for self-diagnosis, but because of the lack of judgment standards, it is difficult for patients to produce relatively correct and efficient medical behavior. At the same time, limited medical resources make this imagination appear in the process of diagnosis and treatment. Register for 1 hour, do various tests for 1 hour, and finally communicate with the doctor in the consultation room for less than 3 minutes. This "113 phenomenon" and doctors' overload work coexist in the top three hospitals. In contrast to the large number of people in the outpatient halls of major hospitals, there are very few people at the basic level hospitals. Patients' ambiguous understanding of their own diseases and unreasonable behaviors in diagnosis and treatment not only cause waste of their own medical resources, but also exacerbate the structural imbalance of hospital medical resources, making both waste and shortage of medical resources coexist. How to guide the people to seek medical treatment rationally, standardize the patient's medical behavior, transform the passive treatment of the disease into active prevention and treatment, use limited medical resources to improve the health level of the people, and improve the efficiency of the use of medical resources has become an urgent task at present.

At present, Internet technology is developing rapidly. Through it, people can get medical knowledge timely and comprehensively, and can get medical information anytime and anywhere, thus breaking the barrier between medical knowledge and ordinary people. Internet health care is to organize medical resources in a virtual way by means of Internet technology, to provide equal medical and health information for visitors, so that people can understand the symptoms and pathology of diseases, medical and health institutions and corresponding diagnosis and treatment information. Furthermore, it can make patients make a preliminary judgment of health status, realize the information interaction between doctors and patients, and eliminate the unreasonable and irrational medical behaviors brought by the medical and health knowledge barriers. According to statistics, at present, the number of internet medical users in China has reached 253 million, with a penetration rate of 32.7%. Through the investigation of the utilization rate of some users in the internet medical products, it is found that the highest utilization rate of users is still online appointment registration, accounting for 67.1% of the users interviewed, which can avoid patients queuing in the hospital; Secondly, online communication platform, through the platform consultation and medical information inquiry, users can preliminarily confirm the condition, prevent or reasonably arrange the treatment plan in advance. It can be seen that the Internet is playing a more and more important role in the field of medical treatment, which has affected patients' access to medical information and individual specific medical behaviors. Therefore, through empirical analysis, this paper explores the effect and degree of internet medical information on individual medical behavior, in order to give full play to the social benefits of internet medical treatment, to guide patients to seek medical treatment reasonably, to adjust the imbalance of medical resource allocation, and ultimately to improve the health level of residents.

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2. Literature review

Research on the relationship between medical information and medical needs. Laroche (2003) explained the meaning of medical information knowledge, which refers to the information and experience skills that patients have about their disease or health condition. Prior to this, Kenkel (1990) concluded through the simultaneous equation model that an increase in the patient's medical knowledge will increase the patient's use of medical services and increase their awareness of the value of medical services. Hill (2015) believes that patients can perceive their own health status and the severity of the disease through medical knowledge. And Damali (2016) shows that the more medical information knowledge the patient has, the more he can use this medical information knowledge to manage his own health, and then he can better control his own health status. However, Liu Hong, Wang Jun, and Fang Hai (2010) pointed out that there is no simple linear relationship between the supply of medical information and the evaluation of uncertainty, and the uncertainty evaluation of medical information will affect individual decision-making parameters and make consultations The choice easily deviates from the optimal solution.

Research on the impact of Internet medical information on health. Wang Yong gui and Ma Shuang (2013) pointed out that if the APP platform interacts with patients and continuously enriches its functions, and regularly pushes health care knowledge, patients will more actively browse the content on the APP and search for medical and health-related information, or use various functions to solve your own health problems. Prior to this, some scholars conducted research on different patients. Osman et al. (1994) used random experiments to prove that the use of Internet information-based medical knowledge education can effectively reduce the hospitalization rate of asthma patients. Moreover, Wagner (2001) also used natural experiments to obtain self-diagnosis books, telephones, and Internet health information, which led to a decline in the use of pediatric services. In recent years, Nambisan (2009) pointed out that mobile medical app can promote the communication between patients, doctors and patients, promote the exchange of medical information and the understanding of their own health, and deepen the degree of mutual dependence to a certain extent. Sweeney (2015) believes that patients can transfer results to their own health management through communication and communication on the Internet. For example, patients can learn how to regulate their own emotions, learn healthy and scientific eating habits, and communicate with others about their own Health status, proactive health management, etc. Wang Yonggui, Zhao Hong wen, and Ma Shuang (2018) analyzed 195 data from mobile medical APP users and concluded that mobile medical apps can effectively promote offline health management activities. In a national survey of 17,000 people in the United States, researchers found that 56% of people who have searched for health information on the Internet believe that this information affects how they maintain physical health, and 60% of people think it helps them understand how to prevent disease and how to deal with some health problems. 45% of respondents said that the health information they received from social media prompted them to look for second-party opinions; studies have also shown that 41% of people believe that social media sites influence their choice of doctors, hospitals, and medical

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institutions; more than 40% of people said Medical information on social media influences how they treat their chronic illnesses or improve diet and exercise to stay healthy; 34% of people believe that social media networks may influence their decision whether to take a certain medication. But some studies have found that some ranking sites influence patient choice by allowing patients to evaluate doctors and medical units at will. Although the percentage is small, Although the proportion is relatively small, due to the wide spread of social networks, these misinformation may affect thousands of people.

Research on the relationship between other variables and medical behavior. Ja Koziol (2002) used the inpatient data of California from 1986 to 1995 and found that although medical insurance reduced the inpatient rate during this period, the inpatient cost increased. And D card (2008) points out that medical insurance has an impact on the utilization rate of medical services. It aims at the elderly in the United States, and takes the age of 65 as the breakpoint to prove that medical insurance improves the utilization rate of medical services for the elderly over the age of 65. Gruber (2012) believes that health insurance, expenditure and consumption have a close relationship, and proves that the less developed the health insurance system, the stronger the relationship between health insurance, expenditure and consumption. At the same time, Yao Yao, Liu Bin, Liu Guoen, Zang Wenbin (2014) also found that medical insurance significantly increased the treatment costs of the respondents, but the out-patient out of pocket ratio was significantly reduced, and the possibility of hospitalization of agricultural accounts was lower than that of non-agricultural accounts. C Schoen (2010) pointed out that the medical needs of low-income people are greater, but their affordability is limited and utilization rate is not high. Sun Meng j ie and Han Hua (2013) analyzed the survey data of 18 counties in three provinces and found that rural patients' decision-making at the time of initial consultation was affected by income. Low-income patients will tend to choose informal medical services and low-level medical institutions.

In summary, most of the literature affirmed the impact of education level, income, age, and medical insurance on personal medical behavior, and the impact of the Internet and medical information on patient health and diagnosis and treatment behaviors. Medical information improves patient awareness, which affects the use and demand for medical services. At the same time, Internet medical information urges the public to actively pay attention to health issues, improve the health of residents from the source, and reduce the behavior of residents. Information, behavior, and health have intersected in the above studies and have collectively proved that medical information will affect the patient's diagnosis and treatment behavior, but all ignore the factors of medical information dissemination brought by the development of the Internet. The Internet makes the access to medical information more convenient and time-efficient, and how the influx of a large amount of medical information will affect the specific medical behavior of individuals will be the focus of this article.

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3. Theoretical analysis and empirical methods

3.1 Theoretical analysis

In 1968, Andersen put forward the health service behavior model, which has been revised year by year. The model has become an internationally recognized model to analyze the influencing factors of health service utilization. The latest health service behavior model mainly includes four aspects, as shown in Figure 1. At the same time, changing the corresponding factors can change the individual's medical behavior. It can be seen from the figure that the situation characteristics and population characteristics will directly affect the medical behavior and results, or indirectly affect the medical results through the medical behavior. But at the same time, the medical results will also react on the first three, and the demographic characteristics also include information cognition. At the same time, the general medical behavior is divided into several stages, and the medical prevention behavior is mainly based on the past experience and personal medical knowledge. Most of the behaviors of timely medical treatment are subjective decisions of individuals. The behavior of medical treatment mainly depends on the degree of disease. Many scholars divide disease diagnosis and treatment into ordinary diagnosis and treatment and major disease diagnosis and treatment. Ordinary diagnosis and treatment generally refers to common and chronic diseases, with many patients, and the diagnosis and treatment methods are repetitive. Pharmacies and primary medical institutions can restore patients to health. The diagnosis and treatment of major diseases has the complexity of the disease and the monopoly of professional knowledge. Generally, it depends on advanced diagnosis and treatment institutions to treat. In fact, the uncertainty of information acquisition and cognition can not be completely resolved, and the degree of acquisition and digestion also depends on the personal processing of information. Due to the characteristics of professionalism and complexity of medical information, it is difficult for patients to carry out accurate and complete analysis. Most patients have a wrong understanding of the disease category, severity and potential consequences, so the cognition of information often makes the choice of patients' medical behavior deviate from the best.

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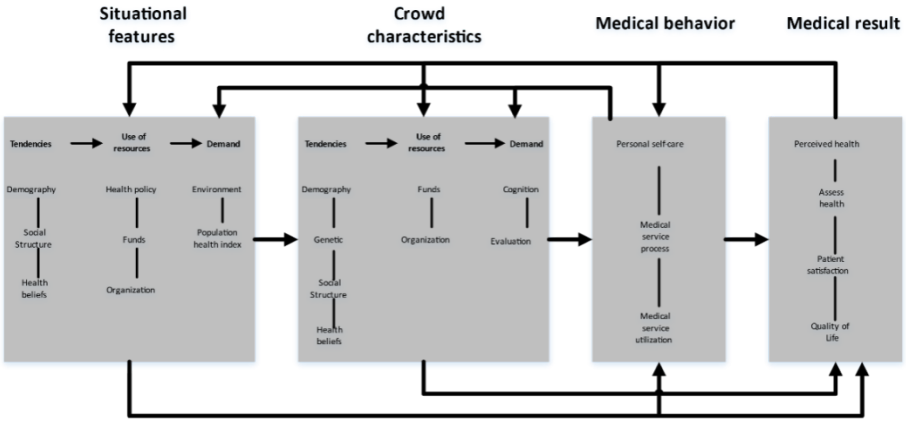

Fig.1 Andersen theory

3.2 Research methods

The acquisition of Internet medical information is based on the use of the Internet, and the use of the Internet and specific medical behavior choices will be affected by factors such as individual income levels and education levels. Variables for medical behavior choice are difficult to control. And, if there are too many variables, it is difficult to perform multi-dimensional accurate matching. At the same time, if ordinary least squares method is used, it is difficult to avoid endogenous problems and sample selection bias caused by missing variables. The propensity score matching method (PSM) has been developed in the social science field in recent years. It can effectively overcome the shortcomings of the least squares method. For the observed and unobserved objects, the multi-dimensional exact matching is simplified to the one-dimensional tendency value. Therefore, the matching process is simplified and similar matching is easier to find. It can adjust the sample relationship in the data in social science experiments to obtain the processing utility close to the laboratory design. The basic idea of the propensity score matching method is to distinguish the individual samples in the experimental group that are affected by certain conditions in the overall sample. The control group is not subject to certain conditions, and the observational characteristics are used as covariates between individuals. The difference in the resulting variables is used to estimate the processing effect.

Firstly, this paper uses the Logit model combined with other covariates to calculate the probability that an individual group not affected by Internet medical information will enter an individual group affected by Internet medical information in the case of other variable characteristics.

$$P(x_i) = Pr[t_i = 1|x_i] = E[t_i|x_i] \quad (1)$$

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In the formula (1): If the individual belongs to a group of individuals not affected by the Internet medical information,t_i=0.If the individual belongs to a group of individuals affected by the medical information of the Internet, t_i=1.

Secondly, the different dimensions of the samples of the experimental group and the control group were matched. Different matching methods have different applicability. This paper uses 1:1 matching method, kernel matching method and spline matching method to match. It is hoped that different matching methods can be used to ensure the effectiveness of processing effects.

Again, for the individual i, after using the logit model to calculate the trend score (xi), Equation (2) can determine whether the individual is affected by the Internet medical information and the average treatment effect of the medical treatment behavior selection ATT.

$$\begin{aligned} ATT &= E[y_{1i} - y_{0i}|t_i = 1] = E\{E[y_{1i} - y_{0i}|t_i = 1, P(x_i)]\} \\ &= E\{E[y_{1i}|t_i = 1, P(x_i)] - E[y_{0i}|t_i = 0, P(x_i)]|t_i = 1\} \end{aligned} \quad (2)$$

Among them, y1i represents the choice of individual medical behaviors affected by Internet medical information, and y0i represents individual medical behavior choices that are not affected by Internet medical information.

Finally, a post-match test is performed. It is mainly tested in three aspects: one is the balance test of the distribution of covariates; the other is the coincidence test of the distribution of covariates; the third is the sensitivity analysis. Only through the above three tests can we guarantee the best of the tendency value and matching setting and the credibility of the average processing effect to a certain extent.

4. Data and Research Design

4.1 Sample source

This paper uses the China Health and Nutrition Survey (CHNS) data developed by the National Nutrition and Food Safety Institute of the University of North Carolina at the University of North Carolina and the China Centers for Disease Control and Prevention. The survey was conducted by an international research team using a multi-stage random cluster process for a period of 7 days. A sample survey of about 7,200 households and more than 30,000 people in 15 provinces and municipalities. The survey data began in 1989 and the data was updated to 2015 with a total of 10 surveys. The CHNS survey data added Internet behavior problems in the questionnaires after 2006. Based on the research content of this paper, the CHNS data of 2006, 2009, 2011 and 2015 were selected as samples. After screening and matching, individuals with missing relevant observations and duplicate samples were removed, and the number of samples selected for individual visit behavior was 27,997.. This article selects mixed cross-section data as a sample. The purpose is to increase the sample size and provide more precise estimates. The second is to mix cross-section data from different years to better analyze the impact of a decision.

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4.2 Variable description

First, the use of the Internet as a processing variable is divided into two cases: affected by Internet medical information and not affected by Internet medical information.

$$treat_i = \begin{cases} 0 & \text{Not affected by internet medical information} \\ 1 & \text{Affected by Internet medical information} \end{cases}$$

The experimental group is that $t_i=1$ represents an individual group affected by Internet medical information. The control group is that $t_i=0$, represents an individual group that was not affected by Internet medical information. This article is to study the impact of Internet medical information on personal medical behavior choices, mainly to investigate the specific role of Internet medical information. Because the questionnaire does not directly involve individuals' use of Internet medical information, the definition of the impact of Internet medical information is based on the use of Internet browsing behavior in the Internet as a basis for classification. The reason for choosing Internet browsing as a variable is to exclude the two options of online chat and online games. Online chat and online games are entertainment projects. These two activities have little to do with medical information, and from the perspective of theory and inertia, It has little effect on personal medical behavior choices. Second, access to medical information on the Internet must be achieved through online browsing. Individuals who browse the Internet at the same time are more likely to access Internet medical information. Third, respondents who participate in online browsing activities have a preference for using information and communication technologies. This preference makes it more likely to accept Internet medical information.

Secondly, the outcome variable verified at the end of this article is individual specific medical choice behavior. The analysis of individual medical choices in individual samples is mainly divided into three levels: preventive medical behavior, timely medical treatment behavior, and medical mode behavior. Preventive medical behavior is examined from the perspective of individual health. Prompt medical treatment was investigated from the perspective of timely consultation after illness. medical mode behavior are examined from the diagnosis and treatment methods adopted after illness. The values represented by each specific selection behavior are shown in Table 1 below.

Table 1 Description of result variables

Medical behavior	Variable description
Prevent medical behavior	0 for preventive medical behavior and 1 for preventive medical behavior
Timely medical treatment	0 without timely medical treatment, 1 with timely medical treatment
Medical mode behavior	0 for outpatient clinics and 1 for inpatient clinics

Finally, the choice of covariates must not only ensure that hypotheses conform to

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objective reality, but also the effectiveness of matching. It must consider covariates related to Internet medical information and medical care, and make the variables meet balance and sensitivity tests. It is mainly considered from the following dimensions, namely the population dimension, economic dimension, health dimension, and regional dimension, but the covariates of different medical behaviors are different. The specific names and descriptions are shown in Table 2.

Among them, in order to exclude the influence of behavioral ability on age, the sample selects adults aged 16 and above to ensure that the sample has certain behavioral ability and judgment ability. At the same time, considering that family income (totally dependent on children or other people's pension) may be 0, the method of taking natural logarithm (income + 1) is used to ensure that the sample is not missing.

In terms of population dimension, the variables of gender, age and years of education are mainly selected, which belong to individual characteristics. They affect the health status of individuals physiologically, and the years of education drive the use and popularization of the Internet to a certain extent. In terms of economic dimension, two variables, basic medical insurance and total family income, are selected. Basic medical insurance can reduce the amount of patients' medical treatment and reduce the burden of patients to a certain extent. It can be said that it is a tranquilizer for patients when they seek medical treatment. In China, the individual medical resources are often allocated by family as a unit, especially in rural areas, the elderly have no fixed support Laojin, most of them live with their children and share the burden of income and expenditure. Therefore, the choice of personal diagnosis and treatment institutions is largely affected by family income. Transportation, on the one hand, is the performance of family financial resources, and on the other hand, when patients are ill, it increases the convenience of medical service to a certain extent. In the aspect of health dimension, the degree of disease is the result of personal self-evaluation, and self-health feeling to a certain extent affects the attention of individual samples to their own health, and determines the choice of corresponding medical behaviors. In the regional dimension, the choice of household registration as a variable, is to a certain extent, it affects the location of treatment, and different living environment, residents will have different ideas.

5. Analysis of empirical results

5.1 Impact of Internet Medical Information on Medical Behavior Choice

5.1.1 Propensity score estimation

In this paper, a variety of matching methods are used, which are 1:1 matching method, kernel matching method and spline matching method. The difference between these methods is mainly that the weights are different when matching, starting from different methods, so that the empirical results are more accurate. Among the three methods, the paper uses the logit model to estimate the propensity

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scores. The results of the three methods are roughly the same, but the significance of each covariate is different in the specific treatment choice.

5.1.2 Analysis of matching results

Table 3 The Influence of Internet Medical Information on Individual Medical Treatment Behavior Choice

	Prevent medical behavior	**Timely medical treatment**	**Medical mode behavior**
ATT	0.019 (0.003***)	-0.038 (0.070*)	-0.059 (0.018**)
sample number	29572	5809	3943
The number of samples that do not satisfy the hypothesis	Experimental group 5 Control group 3127	Experimental group 3 Control group 1451	Experimental group 3 Control group 1071

Note: The number of samples that do not satisfy the hypothesis sample representation that are not in the common value range. The number in parentheses is the standard error of the average processing effect ATT. "*" indicates significant at the 10% level, "**" indicates significant at the 5% level, and "***" indicates significant at the 1% level. The same table below

Table3 shows the estimation results of the average processing effect ATT of the tendency score matching method. The regression results of other methods are similar, so only the results of 1: 1 matching are reported.

Prevent medical behavior. Individuals affected by Internet medical information were 1.9% more likely to choose preventive medical behavior than individuals not affected by Internet medical information, and were significant at the 1%. Individuals pay more and more attention to preventive medical treatment, and carry out health care and disease prevention, and analyze the reasons. First, as their living standards improve, on the basis of meeting the basic needs of life, the people pay more attention to the improvement of the quality of life such as the health level; secondly, the spread of medical information makes the people understand how to care for health, the hazards of disease and the corresponding costs, and the people are more willing to change from passive treatment to active treatment.

Timely medical treatment. The tendency of the individuals affected by internet medical information to choose timely medical treatment is 3.8% lower than that of the individuals not affected by internet medical information, and it is significant at the level of 10%.When patients feel uncomfortable, they don't go to the hospital in time. It may be that the internet medical knowledge breaks the barriers of medical knowledge, enables individuals to have a simple understanding of their own conditions, improves the convenience and healing rate of self diagnosis and treatment, and has a certain alternative effect on basic diagnosis and treatment. Patients usually make self diagnosis and treatment and observe the treatment effect And then decide on further diagnosis and treatment.

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Medical mode behavior. Individuals affected by internet medical information have a 5.9% higher tendency to choose out-patient diagnosis and treatment than those not affected by internet medical information, which is significant at the level of 5%. That is to say, patients are more willing to carry out outpatient treatment first due to the influence of internet medical information after they get sick. It may be that the reimbursement proportion of inpatient treatment is higher than that of outpatient treatment. In the past, many patients chose not to treat after the occurrence of common diseases, repressed their own medical needs, and easily turned minor diseases into major diseases. With the popularization of internet medical information, patients can understand the basic diagnosis and treatment situation and expenses, and understand that with the accumulation of diseases, it may cause more medical expenses. Therefore, the patients tend to be more rational and tend to self-treatment or outpatient treatment.

The above results show that, on the whole, internet medical information has a significant impact on individual medical behavior choice, but further analysis of specific diagnosis and treatment behavior shows that the effect is different. This paper speculates that the above results may be caused by the following three reasons.

On the one hand is the acceptance level. First, individuals are affected by the medical information on the Internet and deeply realize that proactive disease prevention can reduce medical expenses from the source and improve their health. The second is affected by the Internet medical information, so that individuals have an understanding of their own health status and diagnosis and treatment methods, making self-diagnosis and treatment institutions have a certain substitution effect. Third, affected by Internet medical information, individual medical behaviors tend to be rational, and they have a certain degree of understanding of their own physical conditions, reducing more medical expenditures and waste of medical resources.

The other aspect is psychological. The first is that individuals who may pay more attention to their own health ,when they use the Internet usually pay more attention to health information. The second is that some individuals may pay too much attention to their health status and believe that their knowledge is limited and cannot be accurate Judging one's own health status, and expecting to go to a hospital for treatment, or individuals with a higher education level, use the Internet for medical treatment more, resulting in the overflow of Internet medical information and an excessive medical effect.

In addition, it is also possible that factors such as income, out-of-pocket medical expenses, and reimbursement rates have a much greater impact on personal diagnosis and treatment than the Internet, thus diluting the role of Internet medical information.

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5.2 Balance test of covariate distribution

Table 4 Balance test of covariate distribution

Variable	Matching	Prevent medical behavior	Timely medical treatment	Medical mode behavior
Age	before	-110.7 %***	-127.0%***	-106.5%***
Gender	after	-1.0%	1.5%	8.0%
education level	before	-19.5 %***	-23.4 %***	-13.9 %***
Total household income	after	3.1%	11.5%*	2.2%
Medical insurance	before	140.8 %***	161.9 %***	156.2%***
Transportation	after	-1.1%***	2.3%	5.9%
Degree of disease	before	19.6 %***	26.3%***	26.4%***
	after	6.9%	-0.3%	3.1%
Age	before	11.7 %***	15.5%***	10.8 %**
Gender	after	-0.6%	0.4%	0.0%
education level	before		26.0%***	
Total household income	after		-5.4%	
Medical insurance	before		-34.9%***	-29.4%***
Transportation	after		0.8%	6.4%
Degree of disease	before	-31.1 %***	-12.2%***	-11.7%**
	after	-2.2%	2.1%	6.5%

Note: The values in the table are deviation values.

This article mainly discusses the impact of Internet medical information on personal medical treatment behavior, and is limited by the length limit, so only this part of the test is presented, other tests are not listed. It can be seen in the table that the deviation values are all less than 10%, and some variables have significant differences before matching, but there is no significant difference after the match, and significant decrease in the significant, or only one of the matching methods exist significantly, it can be proved that the matching quality is higher, matching balance is better.

5.3 Coincidence Test of Covariant Distribution

In the process of propensity matching, there are some samples that are not in the common value range. The specific values are listed in the previous table, and the values are small relative to the sample, so it has not yet had a big impact. Since the number of matched culling data is the same and the matching quality is almost the same, only the coincidence test of the covariate distribution of one of the methods is presented, and other coincidence tests are not listed one by one. Figure2 . Comparison of the matching coincidence of each matching value of the diagnosis and treatment behavior, and the proportion of the samples not in the common value range and the number of samples in the common value range. Fig. 3 and Fig. 4 are comparisons before and after the matching of the diagnosis and treatment behaviors. Before the matching, the matching degree of the experimental group and the control

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group was poor, and the coincidence of the two groups after the matching was greatly improved, and the fluctuation was consistent.

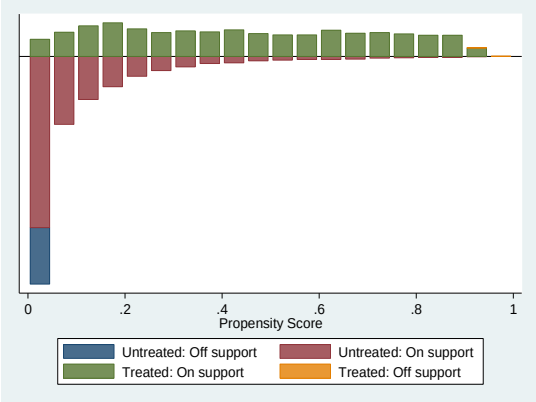

Fig.2 Match coincidence

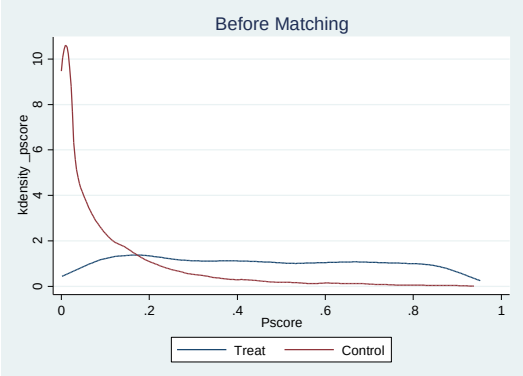

Fig.3 before

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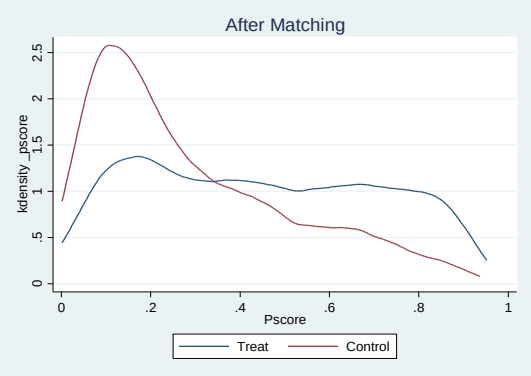

Fig.4 after

5.4 Sensitivity analysis

In this paper, we study the choice of internet medical information to individual medical behavior. Although eight covariates are controlled, there may still be hidden bias. Therefore, we use the methods of Hodges-Lehmann point estimates and confidence intervals to test sensitivity. If the gamma value is larger, the sensitivity of this study will be lower. Generally speaking, as long as gamma >2, we can think that this study has eliminated the sensitivity bias and the estimated processing utility is effective.

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Table 5 Sensitivity analysis

Gamma	t-hat+	t-hat-	CI+	CI-
	Prevent medical behavior			
1	-2.9e-07	-2.9e-07	-2.9e-07	-2.9e-07
1.2	-2.9e-07	-2.9e-07	-2.9e-07	-2.9e-07
1.4	-2.9e-07	-2.9e-07	-2.9e-07	-2.9e-07
1.6	-2.9e-07	-2.9e-07	-2.9e-07	-2.9e-07
1.8	-2.9e-07	-2.9e-07	-2.9e-07	-2.9e-07
2	-2.9e-07	-2.9e-07	-2.9e-07	-2.9e-07
Gamma	**Timely medical treatment**			
1	-2.9e-07	-2.9e-07	-2.9e-07	-2.9e-07
1.2	-2.9e-07	-2.9e-07	-2.9e-07	-2.9e-07
1.4	-2.9e-07	-2.9e-07	-2.9e-07	-2.9e-07
1.6	-2.9e-07	-2.9e-07	-2.9e-07	-2.9e-07
1.8	-2.9e-07	-2.9e-07	-2.9e-07	-2.9e-07
2	-2.9e-07	-2.9e-07	-2.9e-07	-2.9e-07
Gamma	**Medical mode behavior**			
1	-4.5e-07	-4.5e-07	-4.5e-07	-4.5e-07
1.2	-4.5e-07	-4.5e-07	-4.5e-07	-4.5e-07
1.4	-4.5e-07	-4.5e-07	-4.5e-07	-4.5e-07
1.6	-4.5e-07	-4.5e-07	-4.5e-07	-4.5e-07
1.8	-4.5e-07	-4.5e-07	-4.5e-07	-4.5e-07
2	-4.5e-07	-4.5e-07	-4.5e-07	-4.5e-07

Note: gamma is the unobservable factor for the logarithm of the occurrence of different contact processing; t-hat+, t-hat- represents the Hodges-Lehmann test point estimate; CI+, CI- represents the 95% credit interval Upper and lower bounds.

According to the test results, it can be concluded that the sensitivity of the 1:1 matching method, the nuclear matching method and the spline matching method is low in the outpatient diagnosis and treatment behavior. When gamma ≤ 2, the 95% credit interval of the point estimation does not include 0. That is, this point estimate is significant, so the processing utility is effective.

6. Conclusions and policy recommendations

Based on the data of China Health and Nutrition Survey (CHNS), this paper uses the propensity score matching method to match the population dimension, economic dimension, health dimension and regional dimension to group the individuals affected by internet medical information and strive to get the "clean" result of internet medical information for individual medical behavior selection. The results show that first, internet medical information makes people pay more attention to medical prevention and take practical actions. Second, internet medical information makes patients more inclined to self diagnosis and treatment when they are sick. Third, internet medical information makes patients more inclined to outpatient treatment in the choice of medical methods. Thus, on the one hand, internet medical information has the characteristics of diversity, involving price information,

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diagnosis and treatment information, health information and disease threat information. It not only provides reference for people's health care, diagnosis and treatment, but also has a certain degree of fear effect, making people more active in disease prevention and treatment. On the other hand, the popularization of medical information enables patients to obtain the corresponding diagnosis and treatment information and treatment plan according to their own conditions, realize the interaction between doctors and patients on the Internet, and carry out self-treatment accordingly, which has a certain substitution effect on medical behavior. On the other hand, the disease itself has a certain degree of complexity and difference. Doctors still have a certain degree of professional monopoly on medical knowledge, which also makes the Internet have a weak impact on the corresponding medical behaviors of some diseases.

Therefore, under the current Internet medical background, China should focus on the following aspects: First, strengthen the guidance of residents' medical behavior choices. Promote the concept of "Healthy China" from both the policy and ideological perspectives, transform the passive treatment of diseases into active prevention, and reduce the waste and unreasonable use of medical resources. The second is to use the Internet's rich form of medical and health services to achieve online and offline cooperation, that is, to ensure the medical effect of Internet medical information, and to enrich and activate the functions of primary medical and health institutions, enabling them to achieve basic diagnosis and upward referral Function to provide guidance for graded diagnosis and treatment. The third is to strengthen the construction of Internet medical services. First, continue to develop online medical online business. Ensure the quality of services such as registration and consultation on the Internet medical platform, expand the number of users of the platform, and allow more people to enjoy better Internet medical services. Second, standardize the management of Internet medical information. It is necessary to strictly review the qualifications of Internet practitioners, ensure the reliability of online medical information, and prevent the recurrence of similar incidents in Putian Hospital, and also pay attention to the rational use of Internet medical information to prevent excessive overflow. Finally, promote the combination of online and offline medical care on the Internet. Promote multi-point practice of doctors, and the construction of electronic prescriptions and electronic health records, so that medical insurance and medical e-commerce can really land. Upgrade offline medical treatment and medical collaboration, conduct comprehensive medical quality management, integrate Internet medical services and traditional primary medical services, and jointly promote the construction of a hierarchical diagnosis and treatment system in China.

It should be noted that the CHNS data selected in this article belongs to the sample survey data. The survey population has limitations. At the same time, individuals aged 16 and over are selected. Whether the sample is scientific needs further consideration, and the survey data does not include Internet medical treatment directly. As the variable, the online browsing variable was selected as a substitute, and whether covariates were omitted or not may cause some errors in the results, which need to be further expanded and studied.

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Table 2 covariates and statistical descriptions

Variable	Variable description	Prevent medical behavior		Timely medical treatment		Medical mode behavior	
		Mean value	Std	Mean value	S Std	Mean value	Std
Age	Age of sample individuals	49.991	15.831	56.022	15.683	57.010	15.248
Gender	Virtual variable. 1 for men ,2 for women	1.527	0.499	1.571	0.495	1.580	0.494
education level	Virtual variable. The above school years are divided, for example, the number of individuals who have not attended school is 0, the number of individuals who have attended primary school for one year is 1, and so on.	8.096	4.348	7.142	4.682	6.886	4.620
Total household income	ln(Total household income in the past year +1)	8.200	3.378	8.233	3.162	8.256	3.132
Medical insurance	Virtual variable. Medical insurance is 1, no medical insurance is 0	0.829	0.377	0.839	0.367	0.859	0.348
Transportation	Virtual variable. 1 for motorcycles or cars at home, otherwise 0 for other situations			0.339	0.473		
Degree of disease	Virtual variable. Disease free is 0, not serious is 1, generally 2, quite serious is 3			1.703	0.644	1.628	0.805
Household registration	Virtual variable. Urban accounts are 1 , rural accounts are 2.	0.829	0.377	0.805	0.396	0.815	0.388