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Medical Behavior Choices of Older Adults in the Social Aging Model

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Abstract: *Based on CHARLS survey data, we studied the choice of medical behaviors of the elderly under the social pension model, and analyzed the choice of medical behaviors of the elderly using the propensity matching method, starting from four levels: preventive medical behaviors, timely hospitalization behaviors, treatment selection behaviors, and medical expenditure behaviors. The results showed that the social pension had a significant effect on the behavioral choices of preventive medical treatment and timely hospitalization, while the social pension did not have a significant effect on the other medical behavioral choices of the elderly. It can be seen that the reasons for the choice of medical behavior come from the elderly's own needs and medical support policies and facilities on the one hand, and social pensions in old age on the other. At present, China should make medical insurance and old-age insurance form a synergy to meet the basic living and medical needs of the elderly in their old age and promote the health of the elderly based on ensuring the level of social old-age insurance for the elderly, the balance of the pension fund and the sustainable development of the system.*

Keywords: *Social pension; potential medical needs; medical behavior; propensity score matching; treatment effect*

1. Introduction

Data from the 2020 septuagenary show that China's population aged 60 and above reached 264.01 million, accounting for 18.7% of the total population [1], and the total working population (and its share) is expected to decline further by 2025, while the proportion of people aged 65 and above will rise further to 15.6% [2]. As far as individuals are concerned, their health level in old age will decline year by year compared to their younger years, while the demand for medical services will increase year by year as well as the requirements for the level of medical services, therefore, the issue of old age health is gradually becoming a focus of attention in China as well as in countries around the world. In recent years, China's medical insurance coverage has been expanding and the price of medical services has been decreasing, which has reduced the medical costs of the elderly to a certain extent, while the increasing level of social pension security has not only provided a stable source of income for the elderly but also guaranteed the medical consumption behavior of the elderly. However, most countries and regions still suffer from unmet medical needs, equal medical needs without equal medical services, and other phenomena that are unfair to the health level, and the suppression of medical needs triggered by income is especially prominent.

In addition, medical treatment due to illness will not only consume a lot of their assets or even all of their assets but also make it difficult for them to continue working or even to take care of themselves. As the body grows older, all organs' functions decrease or are lost, resulting in more and higher demand for medical treatment. The elderly are already a vulnerable group in society, and those without pensions are doubly vulnerable in society and the fay, so they may suppress their personal medical needs, which in turn leads to deterioration in health and a vicious cycle of poverty due to illness and illness due to poverty. Furthermore, studies have shown that even if household income increases, health care expenditures of the elderly do not increase compared to those of the young, and although the health care needs of the elderly are not proportional to health care utilization, social pensions cause the elderly to increase their utilization of health care outpatient and inpatient services to some extent. It can be seen that simply increasing household income may not change the medical behavior of the elderly and meet their medical needs. Therefore, after the basic needs of the elderly are met and they have a stable personal income, social pension, which is the main form of sustainable personal income, will directly increase the personal income of the elderly and give them the right and the bottom to directly dispose of their income and the

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time and ability to focus on and achieve other aspects of their needs. In this paper, we select elderly people in their retirement age to assess whether social pensions have an impact on their health care service choices and health care and whether increasing social pension income stimulates the potential to heal healthcare e of elderly people and changes their health care behavior accordingly. This study is conducive to releasing the suppressed medical needs of the elderly, meeting the realistic medical needs of the elderly, indicating the direction of improvement of the medical security system, achieving equity in health levels, and also providing reference suggestions for the development of the old-age security system to ensure the improvement of the living standards and quality of life of the elderly while maximizing the social benefits of old-age security and medical security.

2. Review of the literature

The medical behavior of residents is a complex process influenced by many factors. There is much existing domestic and international literature on the study of old age, medical care, and the integration of old age and medical care, but there are fewer studies on social pensions, the main source of income for the elderly in their old age, and the medical behavior of the elderly, and the interrelationship between the two has not been explored in depth.

First, studies on factors influencing medical treatment behavior. 1968 Andersen proposed the health service behavior model, which has been modified year by year and has become the main internationally accepted template for analyzing factors influencing health service utilization [3]. The model argues that individuals' health care behaviors are influenced by three main factors [4]: first, pre-placement factors, i.e., factors that influence individuals' health care behaviors before the onset of disease. For example, demographic characteristics factors [5] (Ellis &McGuire,2007) such as gender [6] (Zhou Jun 2019) and age [7] (Han-Kyoul Kim,2016) have significant influence, while the degree of influence and significance of social structural characteristics factors such as education [8] (Hu Si-Yang, 2016) and religion [9] (Song Yue-Ping et al.,2021) are inconsistent. Second, the ability factor refers to the ability of individuals to access health care services. For example, health insurance has a significant effect on health care utilization [10] D Card (2008), health care expenditure and consumption [11] Gruber (2002), and the choice of medical treatment varies among people with different income levels (C Schoen [12], 2010, Sun Mengjie et al. [13], 2013). The third is the need factor, which refers to the individual's perceived need for certain health care before seeking medical treatment. For example, disease type [14] (Yu Changyong, 2017) self-rated health status [15] (McCusker J,2003), etc. influence patients' health care choices

Secondly, studies on the ways of aging and other aspects. Social retirement and family retirement have made China's elderly retirement more diversified [16] (Liu Yiwei, 2016), and social retirement now forms an effective alternative to family retirement, especially since the new rural insurance significantly reduces the dependence of rural elderly on children's transfer payments [17] (Zhang Chuanchuan, 2014). Retirement significantly reduces household disposable income and work-related expenditures and some recreation-related and home-food expenditure-related expenditures [18] (Zou Hong, 2015). However, having good social security, higher health, level, and good family interaction will positively influence the consumption of the elderly [19] (Shi Beibei, 2017), and social pension security can, to some extent, reduce the family medical burden of the elderly, make the utilization of medical services of the elderly increase, and significantly increase the formal medical consumption expenditure of individual hospitalization [20] (Jiao Na, 2016). 2016). The consumption levels and structures of different types of retirees differ, with the consumption levels and structures of retirees from corporate units being suppressed by retirement, but retirees from institutions having a positive effect due to retirement, with the latter being less influential and less significant than the former [21] (WangZengwen, 2016).

The above literature, from China's current way of retirement, factors affecting medical treatment behavior, etc., points out some of the current problems faced by China in terms of retirement and medical care, the urgency of solving these problems, and most of this literliteraturermm that pensions will have a certain impact on some consumption expenditures as well as education level, income, age, medical insurance, etc., on individuals' medical behavior, but retirement, memedicalare as two important parts of people's livelihood, there are few studies on the impact of social pensions in medical care and related fields. Moreover, different elderly people have different health and physical conditions, and their medical needs are also different. With the onset of the "silver hair wave" in China, the sustainability of old age and health care in China has been severely tested, and domestic research on the intersection of the two, such as elderly health, is still in its infancy. This paper builds on the previous work by using the propensity matching (PSM) method to further classify medical behaviors, distinguishing the preferences of medical behaviors among older adults with and without social pensions, studying the preferences of specific

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medical behaviors among older adults without social pensions with social pensions, and reducing the bias caused by omitted variables and endogeneity to assess the influence of social pensions on medical behaviors. To assess the extent to which social pensions influence medical behavior, i.e., whether personal sustainable income in old age facilitates the release of potential personal medical needs of older adults and promotes equity in health levels.

3. Data and Empirical Model

3.1. Data sources

This paper uses data from the China Health and Aging Tracking Survey (CHARLS) released by the National Development Institute of Peking University, a national baseline survey conducted in 2011 and tracked every two years, covering 10,000 households in hundreds of county and village units. Based on the research content, this paper selects the national baseline survey data in 2011, 2013, and 2015 as the samples. The purpose of choosing mixed cross-sectional data as the sample in this paper is, first, to increase the sample size and provide more precise estimates; second, to mix cross-sectional data from different years together, so that there are more observations available for the control group when matching, which can better analyze the impact of a decision; third, the social pension policy has not been updated in recent years either, which reduces the interference of the policy on the research results.

3.2. Empirical model

Social pension receipt and specific medical behavior choices are affected by individual's income level, education level, and other factors, thus the variables affecting individual pension receipt and specific medical behavior choices are difficult to control, and it is also difficult to conduct multi-dimensional exact matching if there are too many variables, while it is difficult to avoid omitted variables causing endogeneity problems and sample selection if ordinary least squares are used bias. In contrast, propensity score matching (PSM) is a statistical method developed in recent years in the social sciences to observe intervention effects, which can effectively overcome the shortcomings of the least-squares method, reduce endogeneity and bias caused by two-way causality, and simplify multidimensional exact matching into one-dimensional propensity value matching for both observed and unobserved objects, thus simplifying the matching process and making it easier to find similar matching pairs. And it can be used in social science experiments to adjust the sample relationships in the data to obtain a processing utility close to the laboratory design. The basic idea of the propensity score matching method is to distinguish between an experimental group (i.e., a sample of individuals affected by a condition) and a control group (i.e., a sample of individuals not affected by a condition) in the overall sample, with observed characteristics as covariates between individuals, and later estimate treatment effects based on differences in outcome variables.

First, this paper uses a logit model and combines other covariates to calculate the probability that the group of older adults not receiving a social pension will enter the group of older adults receiving a social pension, given the characteristics of the other variables, i.e.:

$$P(x_i) = \Pr[t_i = 1 | x_i] = E[t_i | x_i] \tag{1}$$

(1) Equation: t_i=0 if the older person is in the group of older people who do not receive social pension, and t_i=1 if the older person is in the group of older people who receive the social pension.

Next, the different dimensions of the samples of the experimental group and the control group were matched. Different matching methods have different applicability. In this paper, three methods, the 1:1 matching method, kernel matching method, and sample matching method, are used for matching, hoping to use different matching methods to ensure the effectiveness of the treatment effect.

Again, for the ith elderly person, after calculating the score of propensity (xi) using the logit model, Equation (2) can yield the average treatment effect ATT of whether the elderly person receives social pension on the choice of medical behavior after matching.

$$ATT = E[y_{1i} - y_{0i} | t_i = 1] = E\{E[y_{1i} | t_i = 1, p(x_i)] - E[y_{0i} | t_i = 0], p(x_i) | t_i = 1\} \tag{2}$$

where y_{1i} represents the personal health care behavior choices of the elderly in the case of having received a social pension and y_{0i} represents the personal health care behavior choices of the elderly in the case of not receiving a social pension.

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Finally, post-matching tests are conducted. Three main tests are conducted: first, the balance test of the covariate distribution; second, the overlap test of the covariate distribution; and third, the sensitivity analysis. Only through the above three tests can we ensure to some extent the best propensity value and matching sets as well as the credibility of the average treatment effect.

3.3. Variable description

The situation of social pension is taken as the treatment variable and divided into two situations: received social pension and did not receive social pension

$$treat_i = \begin{cases} 0 & \text{pension=0} \\ 1 & \text{pension>0} \end{cases}$$

The experimental group was t_i=1 representing having received social pension, i.e., having participated in social pension insurance such as urban workers' basic pension insurance, rural residents' pension insurance, urban and rural residents pension insurance, and urban residents' pension insurance. The control group is t_i=0 represents not receiving a social pension, i.e., not having the previous types of insurance, but other commercial insurance is not excluded.

Second, the outcome variable validated in this paper is individual medical choice behavior, which analyzes the specific medical behavior choices of the individual sample at four levels: preventive medical behavior, timely medical treatment behavior, treatment choice behavior, and medical expenditure behavior. The preventive medical behavior was examined from the perspective of the sample's health care; the timely medical treatment behavior was examined from the perspective of whether the sample sought medical treatment promptly; the medical treatment choice behavior was examined from the perspective of the sample's choice of the medical institution after becoming, and the medical expenditure behavior was examined from the perspective of the sample's specific expenditure on medical treatment after becoming ill. The values represented by each specific medical choice behavior are shown in Table 1 below.

Table 1: Outcome Variable Description

Medical behavior	Variable description
Preventive medical behavior	No preventive medical behavior is 0; with preventive medical behavior is 1
Timely medical treatment behavior	no timely medical treatment behavior is 0; timely medical treatment behavior is 1
Treatment choice behavior	The general hospital is 1; the specialized hospital is 2; the primary medical service institution is 3
Medical expenditure behavior	Expenditure of outpatient and inpatient medical treatment behavior

Finally, for the selection of covariates, it is necessary to ensure both the hypothesis is in line with objective reality and the validity of the matching, both to consider covariates related to social pensions as well as medical aspects and to make the variables satisfy the balance and sensitivity tests. It was considered mainly in the following dimensions, namely, demographic dimension, regional dimension, economic dimension, and health dimension, but the names and descriptions of the different medical behavior-specific covariates are shown in Table 2.

Table 2: Medical behavior variable names and statistical descriptions

Variables	Variable Description	Preventive and timely medical acts		Outpatient behavior and expenditure		Inpatient acts and expenditure	
		AVG	SD	AVG	SD	AVG	SD
Gender	**Dummy variable. 1 for males and 2 for females**	1.502	0.5	1.540	0.498	1.471	0.499
Age	**Age of the sample individuals**	68.420	6.960	68.538	6.886	69.40	7.259
Educational level	**Dummy variable. 1 for illiterate, 2 for not completed elementary school, 3 for private school graduate, 4 for elementary school graduate, and so on**	1.226	0.418	1.213	0.409	1.265	0.4442
Marital status	**Dummy variables. Married is 1, unmarried is 2**	3.070	1.976	2.994	1.969	3.065	1.965
Household registration	**Dummy variable. 1 for agricultural hukou, 2 for non-agricultural hukou**	1.219	0.413	1.234	0.423	1.227	0.419
Total household income	**Ln (total household income in the past year + 1)**	7.704	3.444	7756	3.404	7.809	3.516
Basic medical insurance	**Dummy variable. 1 for having basic medical insurance, 0 otherwise**	0.907	0.2901	0.924	0.265	0.922	0.269
Health self-assessment	**Dummy variable. 1 for very good, 2 for fair, 3 for bad**	2.052	0.693	2.297	0.659	2.289	0.672

To exclude the influence of gender on retirement age, the sample was selected from elderly people

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aged 60 years and above, and considering that the household income (completely dependent on children or others for retirement) may be zero, the natural logarithm of (income + 1) was used to ensure that the sample is not missing.

In the demographic dimension, gender, age, years of education, and marital status were selected, among which gender and age are individual characteristics that physiologically affect the health status of individuals, while years of education to a certain extent affect the working status and pension receipt, and partners to a certain extent have a mutual influence on medical behavior. In terms of the regional dimension, household registration was selected as a variable because it influences the location of medical treatment to some extent, and the residents' mindset varies from one residential environment to another. In terms of economic dimension, two variables, basic medical insurance, and total household income were selected. Basic medical insurance can reduce the number of patients' visits, which reduces the burden of patients to a certain extent and can be said to be a reassurance agent for patients when they visit the clinic, and in China, personal medical resources are often allocated on a household basis, especially for some elderly people who do not have social pensions, most of whom live with their children, and their income and The choice of individual medical behavior is therefore largely influenced by family income. In terms of the f health dimension, the degree of illness is the result of individual self-evaluation, and the self-health feeling influences to a certain extent the degree of concern of the individual sample about thown health and determines the choice of corresponding medical behavior.

4. Analysis of empirical results

4.1. Influence of medical behavior choice under the social retirement model

(1) Propensity score estimation

This paper uses a variety of matching methods, namely the 1:1 matching method, kernel matching method, and sample matching method. The difference between these methods mainly lies in the different weights when matching, from different methods, to make the empirical results more accurate. Among these three methods, this paper is based on the logit model for propensity score estimation, and the results presented by these three methods are roughly the same.

(2) Analysis of matching results

Tables 3 and 4 show the estimation results of the average treatment effect ATT for the propensity score matching method, and the regression results of the other methods are similar, so only the results of 1:1 matching are reported.

Table 3: Effect of social pension on the choice of preventive medical care as well as timely medical care behavior among the elderly

	Preventive medical behavior	**Timely outpatient behavior**	**Just-in-time inpatient behavior**
ATT	0.031 (0.068*)	0.006 (0.632)	0.027 (0.015**)
Number of samples	11610	11610	11610
Number of samples that do not satisfy the hypothesis	test group 1 control group 1	test group 1 control group 1	test group 1 control group 1

Note: The number of samples that do not satisfy the hypothesis indicates the number of samples that are not in the common range of values. The numbers in parentheses are standard errors of the mean treatment effect ATT. "*" indicasignificancecant at the 10% level, "**" indicsignificanceicant at the 5% level, and "***" indicates significance at the 1% level. The same table below

Table 4: The effect of social pension on the choice of medical treatment and the choice of the medical spending behavior of the elderly

	Outpatient treatment degree behavior	**Inpatient treatment level behavior**	**Outpatient medical expenditure behavior**	**Inpatient medical expenditure behavior**
ATT	-0.055 (0.408)	-0.076 (0.303)	0.159 (0.351)	0.043 (0.866)
Number of samples	2520	1289	2520	1289
Number of samples that do not satisfy the hypothesis	test group 2 control group 1	test group 1 control group 18	test group 2 control group 1	test group 1 control group 18

Preventive medical behavior: the propensity to choose preventive medical behavior is 3.1% higher among older people with social pensions than those without social pensions, and it is significant at the 10% level. The reasons for the increasing concern of individuals for preventive medical care and active

ISSN 2616-7433 Vol. 4, Issue 8: 11-20, DOI: 10.25236/FSST.2022.040803

health care and disease prevention are, first, that as people's living standards improve, the existence of social pensions makes older people pay more attention to the improvement of their quality of life such as health level based on meeting basic living needs; second, the sustainable income of social pensions gives older people extra energy to pay attention to health care and more willing to shift from passive treatment to active treatment.

In terms of timely outpatient care, older adults with social pensions have a 0.6% higher propensity to make timely outpatient visits than those without social pensions, but no significant effect is observed. In terms of timely hospitalization, the propensity to make timely hospital visits was 2.7% higher for those with social pension recipients than for those without social pension recipients and was significant at the 5% level. This result may be because the cost of outpatient care is generally lower than the cost of inpatient care, and older adults can generally afford less costly care, so social pensions have less impact on timely outpatient care, and thus only have a significant impact on timely inpatient care.

In the case of outpatient care, the tendency to choose higher-level medical institutions was 5.5% higher for those with social pensions than for those without social pensions; in the case of hospitalization, the tendency to choose higher-level medical institutions was 7.6% higher for those with social pensions than for those without social pensions, but neither had a significant effect. One of the reasons for this is that most elderly people think that the severity of diseases that require hospitalization is generally higher than that of outpatient treatment, and such diseases are more likely to attract the attention of elderly people, and the higher the severity of diseases, the more patients tend to choose more comprehensive, large-scale and high-level treatment institutions. Secondly, other factors are still the main factors influencing the choice of medical treatment for the elderly at this stage, which will weaken the influence of social pension; thirdly, the choice of medical treatment institutions by the elderly may not show overall consistency, which makes its significance weaken.

Medical expenditure behavior: social pension did not have a significant effect on medical expenditure, but both showed a tendency to spend more, with a 15.9% tendency to increase medical expenditure for outpatient medical behavior and a 4.3% tendency to increase medical expenditure for inpatient medical behavior. The reasons for this are, first, that many patients choose not to treat common illnesses or suppress their medical needs after they occur, and social pensions enable patients to release their suppressed medical needs; second, the severity of illnesses that require hospitalization is generally higher than that of outpatient treatment, and the illnesses are generally unbearable for patients, who may need treatment with or without social pensions, and the reimbursement rate for hospitalization is higher than that of outpatient treatment. The reimbursement rate of inpatient treatment is higher than that of outpatient treatment, which makes the elderly consider inpatient treatment more "cost-effective" when faced with the choice.

These results suggest that, in general, social pensions have a significant effect on preventive medical behavior and timely medical treatment, but not on treatment choice and medical expenditure. This paper speculates that the above results may be due to the following three reasons.

One is the demand level. First, with the improvement of living standards, the demand of the elderly for health is increasing day by day, and they are not only concerned about how to cure diseases, but also more concerned about how to prevent diseases, hoping to prevent the occurrence of diseases at the source; second, the social pension model gives a limited amount of pensions, and the CHARLS data used in this paper shows that the per capita monthly income of the sampled elderly is less than 500 yuan, which shows that a considerable part of the current elderly in China Although they can rely on pensions to a certain extent, they still have to rely on their savings in their younger years and their children's support, which makes the elderly uphold the principle of "saving as much as possible" and tend to seek medical treatment at low-level outpatient institutions, self-treat or no treatment, and the elderly are much less concerned about "minor illnesses" than "minor diseases". The degree of concern for "minor illnesses" is much less than that for "major illnesses", and they tend to delay "minor illnesses" that only require outpatient treatment to become "major illnesses", thus leading to a tendency to suffer from "major illnesses". The tendency is to delay "major illnesses" to "major illnesses" and thus tend to hospitalize them promptly.

On the other hand, there is the income level. First, the social pension model has a certain degree of independent selection, especially for the elderly who participate in the new rural insurance, urban and rural residents pension insurance, and are themselves unemployed or have insufficient financial resources, and these two types of insurance protection capacity are also limited, these people are also still vulnerable in terms of medical security; second, the social pension model has an indirect effect on medical security, the current elderly in the choice of medical care. Third, medical expenses are unpredictable expenses for

ISSN 2616-7433 Vol. 4, Issue 8: 11-20, DOI: 10.25236/FSST.2022.040803

the elderly before they go to the doctor, and even if they have a social pension, it is difficult to control medical expenses, so there is no significant impact.

Finally, there is the psychological aspect. Health self-evaluation affects the choice of specific medical institutions in terms of mentality, and the degree of self-evaluation varies with the choice of the elderly, and the location of the medical institution is also taken into consideration when the elderly visit the medical institution, and sometimes they need to be accompanied by family members, all these aspects affect the medical choice of the elderly, thus weakening the role of the social pension.

4.2. Equilibrium test of covariate distribution

This paper mainly discusses the medical behavior choices of the elderly under the social pension model, and due to the limitation of space, only one of the tests is presented, and the other methods are not listed. From the data in Table 5, it can be seen that most of the deviation values after matching are less than 10%, and most of the variables have significant differences before matching, while no significant differences are shown after matching, as well as the significance is significantly reduced, so it can be proved that the matching quality is high and the matching balance is good.

Table 5: Balanced test of covariate distribution

Variables	Matching	Preventive medical behavior%	Timely medical behavior%	Outpatient treatment degree behavior%	Inpatient treatment level behavior%	Outpatient medical expenditure behavior%	Inpatient medical expenditure behavior%
Gender	Before	-8.3***	-8.3***	-4.8	-15.5**	-4.8	-15.5**
Age	after	-0.4	-0.4	-1.6	1.5	-1.6	1.5
Educational level	Before	2.5	2.5	2.9	3.7	2.9	3.7
Marital status	after	0.1**	0.1**	4.1	-1.8	4.1	-1.8
Household registration	Before	15.2***	15.2***	18.6***	13.2**	18.6***	13.2**
Total household income	after	-2.6	-2.6	1.5	5.0	1.5	5.0
Basic medical insurance	Before	-5.7***	-5.7***	-7.2	-7.9	-7.2	-7.9
	after	2.3	2.3	0.8	-4.2	0.8	-4.2
Gender	Before	33.5***	33.5***	48.5***	33.2***	48.5***	33.2***
Age	after	-5.3	-5.3	-0.7	-1.1	-0.7	-1.1
Educational level	Before	58.6***	58.6***	59.4***	63.1***	59.4***	63.1***
Marital status	after	2.5	2.5	-0.4	-1.0	-0.4	-1.0
Household registration	Before	-10.3***	-10.3***	-11.3**	-3.3	-11.3**	-3.3
Total household income	after	-0.4**	-0.4**	-4.1	-10.1	-4.1	-10.1
Basic medical insurance	Before	-12.8***	-12.8***	-11.5**	-4.4	-11.5**	-4.4
	after	1.2	1.2	-0.2	3	-0.2	3

Note: The values in the table are deviation values.

4.3. Overlap test of covariate distribution

In this paper, in the tendency matching process, some samples are not in the common range of values, the specific values are listed in Table 3 and Table 4, and their values are small compared to the sample, so they have not yet had a large impact. Since the number of data rejected by different matching methods 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 the other coincidence tests are not listed. Also, due to space limitation, only the matching overlap of each matching value of preventive medical behavior and the comparison of the number of samples not in the common range of values and the percentage of samples in the common range of values are presented, as shown in Figure 1. Figure 2 and Figure 3 show the comparison of preventive medical behavior data before and after matching, the matching overlap between the experimental group and the control group before matching is poor, while the overlap between the two groups after matching has much improved and the fluctuations are consistent.

ISSN 2616-7433 Vol. 4, Issue 8: 11-20, DOI: 10.25236/FSST.2022.040803

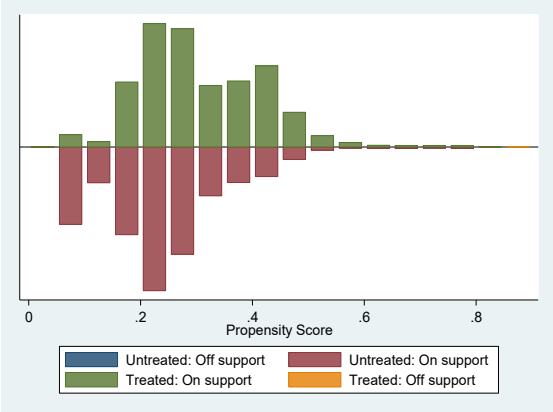

Figure 1: Propensity Score

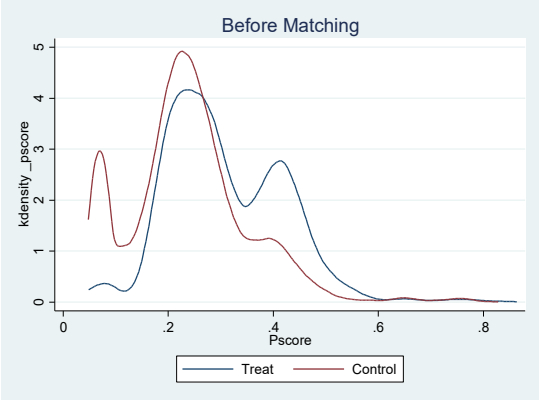

Figure 2: Before matching

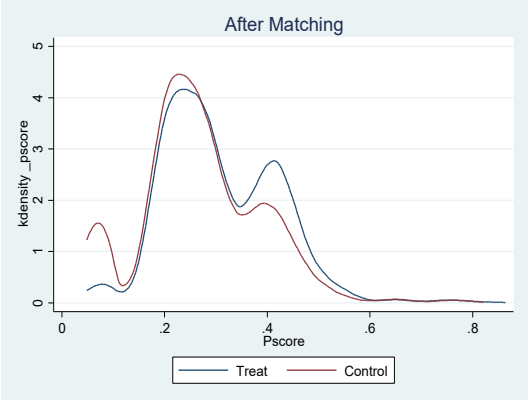

Figure 3: After matching

4.4. Sensitivity analysis

This paper studies the choice of medical behavior of the elderly under the social care model, although the 8 covariates are controlled, there may still be hidden bias, so this paper uses the credit interval estimation (Hodges-Lehmann point estimates and confidence intervals) method for sensitivity testing, if the value of Gamma the larger the value of Gamma, then the lower the sensitivity of the study, and in general, as long as Gamma > 2, the study can be considered to have eliminated sensitivity bias and the estimated obtained treatment utility is valid. Due to space limitations, only the results of sensitivity analysis of one matching method for preventive medical behaviors are shown, and the sensitivity analysis of all other medical behaviors also passed the test.

Table 6: Sensitivity analysis results

Gamma	t-hat+	t-hat-	CI+	CI-
	Preventive medical behavior			
1	-4.1e-07	-4.1e-07	-4.1e-07	-4.1e-07
1.2	-4.1e-07	-4.1e-07	-4.1e-07	-4.1e-07
1.4	-4.1e-07	-4.1e-07	-4.1e-07	-4.1e-07
1.6	-4.1e-07	-4.1e-07	-4.1e-07	-4.1e-07
1.8	-4.1e-07	-4.1e-07	-4.1e-07	-4.1e-07
2	-4.1e-07	-4.1e-07	-4.1e-07	-4.1e-07

Note: gamma is the logarithm of the occurrence ratio of unobservable factors for the occurrence of different exposure treatments; t-hat+, t-hat- represent the Hodges-Lehmann test point estimates; CI+, CI- represent the upper and lower bounds of the 95% credit interval.

Based on the test results, it can be concluded that the matching results of various specific behaviors in preventive medical behavior are less sensitive, and the 95% credit interval of the point estimate does not include 0 at gamma ≤ 2, i.e., this point estimate is significant and therefore the treatment utility is valid.

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5. Conclusions and policy recommendations

Based on the data from the China Health and Retirement Tracking Survey (CHARLS) released by the National Development Institute of Peking University, this paper uses the propensity score matching method to match the four characteristic variables of demographic dimension, regional dimension, economic dimension, and health dimension as covariates in groups according to whether the elderly have a social pension or not, and seeks to obtain the social pension's effect on the elderly's choice of medical behavior "The results show that, first, having a social pension is the most important factor in the choice of health care behavior. The results show that, first, having a social pension makes older adults more concerned about medical prevention and take practical actions; second, having a social pension makes older adults more inclined to undergo timely hospitalization when they are sick; third, having a social pension does not have a significant effect on the choice of medical treatment and medical spending behavior. It can be seen that, on the one hand, with sustainable self-discretionary income, the elderly can release some of their suppressed medical needs and take the initiative to pay attention to health care, while being more willing to actively and proactively prevent and treat illnesses promptly, thus improving their health; on the other hand, there are still some low-level medical needs of the elderly that have not been met in China, especially the rural elderly, who are still the family income, On the other hand, there are still some low-level medical needs of the elderly that have not been met, especially the rural elderly, who are still the important pillar of family income. If the level of social security for the elderly in China is further improved, it may have a significant impact on the choice of medical treatment and medical spending behavior of the elderly, enhance their awareness of active prevention and timely treatment of diseases, and a certain extent prevents "minor diseases" from becoming "major diseases". "On the other hand, there are various factors affecting the medical behavior of the elderly, and the disease itself has a certain complexity and difference, so the choice of the elderly may also vary according to their own and external factors.

Therefore, with the onset of the silver hair wave in China, China should focus on the following areas: First, the field of health care. The elderly's concern for medical preventive health care shows a growing trend, providing basic free medical checkups for the elderly can meet the basic preventive medical needs of the elderly and prevent the occurrence of diseases in advance, thus reducing the subsequent greater medical expenses; second is the field of medical services. Strengthen the ability of family doctors to contract service, so that the elderly can solve health problems without leaving home, and create convenient conditions for the sick elderly to seek medical treatment in time; third is the field of medical policy. There is still an imbalance between the medical needs of the elderly and the current medical resources, there is still room for improvement in the medical insurance system, and the medical assistance system is still the focus of China's precise poverty alleviation work, and the reimbursement system of medical insurance needs to be further improved from the perspective of the suppressed demand of the elderly for hospitalization, especially for the poor elderly and some other special cases of the elderly, the design of additional reimbursement subsidies, so that the elderly Fourth, the field of pension policy. To ensure a steady increase in the level of old-age security, so that old-age security and medical security can form a synergy to jointly ensure the quality of life of the elderly in their old age, but the increase should not be too large, to prevent the phenomenon of social security pan-welfare from arising, and to consider the ratio of the three pillars of China's old-age security system from multiple perspectives, so that China's old-age security system can play a great role.

It should be noted that the CHARLS data selected in this paper is a sample survey data, there are limitations in the way of surveying the population, and the retirement age in China is somewhat complex, to ensure that the boundary between the experimental group and the control group is clear and rigorous, only the elderly above 60 years old are selected in this paper, there is a lack of consideration for the retired population below 60 years old, and the selection and expenditure of specific medical institutions are not analyzed one by one. These aspects need to be further expanded and studied.

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