The Effect of Medical Insurance on the Mental Health of Middle-aged and Older Non-farm Employed People— Empirical Study Based on CHARLS Data

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Abstract: Nowadays, the social environment is complicated, and the mental health of middle-aged and older non-farm employed people aged 45 and above fluctuates due to various factors. In order to realize the health of all people, we should pay attention to and understand the mental health problems of the middle-aged and elderly non-farm employed people nowadays, so as to improve the medical insurance policy and promote the high-quality development of health care in China. Based on CHARLS data, this article empirically analyzes the effect of medical insurance on the mental health of middle-aged and older non-farm employed people, using mental depression as the explanatory variable. The study found that: i. Medical insurance significantly suppressed the level of mental depression and promoted mental health in middle-aged and elderly non-farm employed population. ii. Medicare had significant population differences in the alleviating effect of mental depression on residents.

1. Introduction

Mental health, as a major part of physical and mental health, is a prerequisite for people to achieve a sense of well-being. Improving early prevention of mental disorders and enhancing mental health services for the elderly is one of the main tasks of "The 14th Five-Year Plan for Healthy Aging". Mental health issues have become one of the major public health problems and social issues due to a variety of factors that can be found in various social media involving working adults due to the impact of heavy life and work pressures. Huang Y et al. (2019) conducted a cross-sectional epidemiological survey of mental disorders from 157 nationally representative population-based disease surveillance sites in 31 provinces in China, and found that the prevalence of depression among adults in China was about 6.9%[1]. Furthermore, according to the data of the 7th National Census, China's population over 60 years old reached 264 million, with an aging level of 18.7%, and is expected to approach 500 million by 2050, accounting for 1/3 of the total population[2]. During the "The 14th Five-Year Plan" period, the aging of China's population will further deepen, and the proportion of people aged 60 and above will exceed 20% of the total population, entering a moderately aging society. As middle-aged

and older adults increase in age, their level of physical versatility and mental and other health problems become increasingly prominent. The combined effect of two major problems, mental illness and aging, has become an upcoming and urgent health conflict for middle-aged and elderly people in China. Therefore, the study of mental health influencing factors and interventions is of great practical significance and reference value for the health of our citizens.

This article examines the impact of medical insurance on mental health. Based on the resident-participating, government-led basic social security system, the impact of medical insurance on the mental health of middle-aged and elderly non-farm employed people was comprehensively assessed based on microdata from the China Health and Retirement Longitudinal Study (CHARLS) national survey of wave four in 2018. The Center for Epidemiological Survey, Depression Scale (CES-D) to measure mental health was invoked to empirically analyze the effect of medical insurance on the mental health of middle-aged and elderly non-farm employed people by Ordinary Least Squares (OLS) and Quantile Regression. It was found that medical insurance significantly suppressed the level of mental depression and promoted mental health among middle-aged and older non-farm employed people, and quantile regression was able to verify the robustness of the findings.

The main contributions of this article are the following three: first, this article uses data from a large national micro-tracking survey to estimate the effect of medical insurance on the mental health of middle-aged and elderly non-farm employed people; second, this article uses the CES-D scale to measure mental health, which more accurately and intuitively reflects the real mental health status of respondents; third, this article uses quantile regression as a basis for testing the robustness regression of medical insurance variables, which makes the research findings more reliable.

2. Review of the literature

In terms of the existing studies within the academic community, two conclusions have been formed with regard to the findings of the relationship between medical insurance and health: some scholars believe that medical insurance promotes health [3-4] and reduces mortality from related diseases [5-8]; another part of scholars believe that medical insurance has no significant improvement on health [9-12].

In early studies of the relationship between medical insurance and health, there were more studies that used physical health as a criterion for assessing health. For example, studies have found that social medical insurance can promote the health of older adults, improve their cognitive function[13], and significantly reduce the incidence of chronic diseases in older adults[14], but has no significant improvement effect on the daily mobility and self-rated health of older adults[15]. Research on medical insurance and mental health has also grown in recent years. For example, studies have found that participation in medical insurance significantly reduces the incidence of chronic diseases, which in turn contributes to the physical functioning and psychological well-being of older adults [14]. After addressing endogeneity through the use of instrumental variables, Zhou Qin et al. (2018) found that pension insurance significantly improved the mental health of rural residents, while medical insurance did not have a significant contribution to the mental health of rural residents[16]. By studying the happiness of urban migrant workers, Yuanta Sun (2015) found that having the Urban Employee Basic Medical Insurance (UEBMI) significantly increased the overall happiness of migrant workers, and the increase in happiness of urban migrant workers was greater compared to urban residents, but the New Rural Cooperative Medical system (NRCMS) had a negative effect on the happiness of urban migrant workers[17].

Because of the different perspectives of various studies, this article will be discussed for different studies based on the mental illness perspective and the labor work perspective of Medicare affecting middle-aged and older adults.

2.1 Mental illness perspective

There is an increasing number of domestic and international perspectives on mental health that address mental illness in middle-aged and older adults. Krämer et.al (2014) found that depression was the most predominant type of mental illness affecting migrant workers in China by studying the mental health problems of migrant workers [18]. Li Yazheng et al. (2022), based on CHARLS data, found that participation in Medicare significantly reduced the level of mental depression and significantly improved the cognitive health of rural middle-aged and older adults [19]. However, Chong and Dan Zhang (2016) came to the opposite conclusion and noted that older adults with medical insurance had more pronounced depression and relatively poorer mental health relative to those without medical insurance [20]. A study by Hu, Jing (2015) based on CHARLS data concluded that Medicare did not have an effect on the depression index of older adults [21].

2.2 Labor Work Perspective

There are different conclusions within the academic community based on the perspective of Medicare and the work of the middle-aged and elderly. Qi, Shouwei, and Zhou, Shaofu (2010) used mental health as one of the main indicators to judge the happiness of the elderly and found that increased income could significantly improve the subjective happiness of the urban elderly[22]. Chen, Hua et al. (2016) concluded that medical insurance affects labor supply through both the protection effect and the health effect, and found that the NRCMS significantly increased the off-farm labor supply rate of rural elderly, but reduced the off-farm labor time, and found that the health effect and the protection effect showed opposite effects when they acted on labor supply[23]. Applying social characteristic variables such as pension insurance and medical insurance, Deng Liyuan et al. (2019) found that labor force participation increased among middle-aged and elderly people with pension insurance, while the negative effect of medical insurance on labor force participation among middle-aged and elderly people was not significant[24]. And Liu H. (2017) concluded that participation in medical insurance is significantly positively related to total and agricultural labor time and significantly negatively related to off-farm labor time for rural elderly[25].

In general, although a large number of scholars have studied the mental health of middle-aged and older adults and workplace issues from different perspectives, there is still little research that focuses specifically on the relationship between medical insurance and the mental health of middle-aged and older non-farm employed people. Most current studies use physical health to determine whether medical insurance improves the health of middle-aged and older adults as the main criterion, ignoring the mental health status of middle-aged and older adults. Therefore, this study will further empirical research on whether medical insurance can promote the mental health of middle-aged and elderly non-farm employed people and whether it can produce relative impact effects.

3. Data, Variables & Models

3.1 Data sources

The data used in this paper are from the China Health and Retirement Longitudinal Study (CHARLS) by the National Development Research Institute of Peking University and the China Social Science Research Center. The survey began with the first round of baseline surveys at the national level in 2011, and follow-up interviews have been conducted every two years since. The project uses a stratified, multi-stage, probability sampling method, covering 150 county-level units in 28 provinces in China, and is representative of national micro-survey data.

This paper uses the 2018 CHARLS data to conduct the analysis, excluding samples younger than

45 or older than 70, and those with missing variables included in this study, and retaining only samples from the non-farm employed population, resulting in the inclusion of 3,958 samples for the study.

3.2 Variable descriptions and descriptive statistics

3.2.1 Explained variables

This paper uses the 10 question version of the CES-D test scale from the CHARLS data as a criterion for assessing mental health.

The CES-D test scores developed by Andersen et al. (1994) were used for the mental depression variable to measure the individual's depression and mental and emotional status[26]. The 10-item scale asks about positive and negative emotions in the past week, and each item has four options that respondents judge based on their state and condition, including "rarely or not at all (<1 day)," "not too much (1-2 days)," "sometimes or half the time (3-4 days)," and "most of the time (5-7 days). In this paper, we follow Lei et al. (2014) [27] and assign depressed mood items to integers between "1 to 4" and two positive mood items to the reverse, and the 10 items are scored cumulatively, with scores ranging from 10 to 40. The higher the mental depression score, the worse the mental health status.

3.2.2 Explanatory variables

The explanatory variable in this paper is medical insurance. Based on the question "Are you the policy holder/primary beneficiary of any of the types of medical insurance listed below? (circle all that apply)" This question was used to determine whether or not the respondent had medical insurance, with the exception of option 12, "No insurance". This article identifies participation in any one type of medical insurance as 1, otherwise 0.

3.2.3 Control variables

In this paper, the control variables are divided into four categories: demographic characteristics variables, socioeconomic characteristics variables, health characteristics variables, and household characteristics variables.

In the first category, demographic characteristics variables include gender, age, type of residence, marriage, etc. For the marriage variable, "married with a spouse present" and "have a mate and living together as a couple" are considered as married and set to 1 according to the CHARLS questionnaire, otherwise they are set to 0.

In the second category, socioeconomic characteristics variables include education level, annual household income, and pension insurance. For the education level variable, this paper classifies the education level into "elementary school and below", "middle school", "high school and vocational school", and "bachelor's degree and above" according to "the highest level of education you have now", and assigns values to them in order, with the variables taking values between 0 to 3. In addition, the paper is logarithmic for annual household income.

In the third category, health characteristic variables included variables such as the presence of chronic diseases, the presence of disabilities, and daily sleep duration. In particular, the paper is based on the question "During the past month, how many hours of actual sleep did you get at night (average hours for one night)?" This question generates the corresponding daily sleep duration variable by selecting the corresponding sleep duration.

In the fourth category, family characteristics variables include number of children, intergenerational parenting, and social interactions. In this paper, we refer to Li Yaqing et al. (2022) [19]and include these two variables in the model, considering that the number of children and intergenerational parenting are among the main factors affecting the mental health of middle-aged
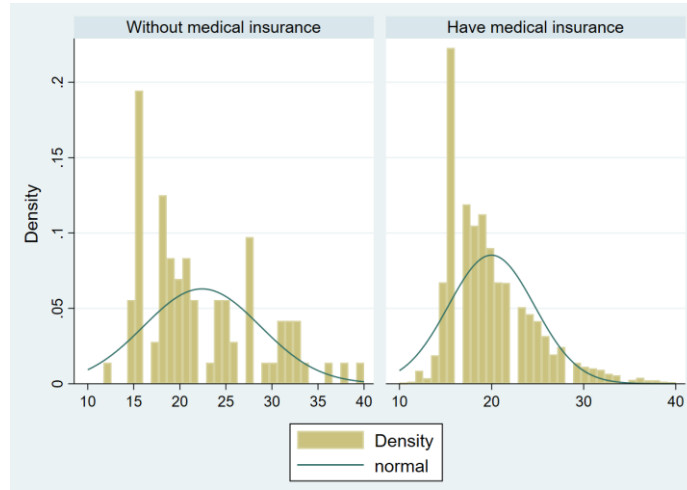
and older adults.

3.2.4 Descriptive Statistics

Figure 1 The distribution of CES-D scores

Table 1: Descriptive statistics

Variable Names	Variable Descriptions	N	Mean	SD	Min	Max
Mental depression	Continuous Variable	3625	20.048	4.735	10	40
Medical Insurance	Have medical insurance = 1	3958	0.977	0.154	0	1
Gender	Male = 1	3958	0.673	0.469	0	1
Age	Continuous variable (years)	3958	54.813	6.057	45	70
Type of residence	Living in the countryside = 1	3958	0.630	0.483	0	1
Marriage	Married = 1	3958	0.802	0.399	0	1
Education level	Elementary school and below = 0 Middle high school = 1 high school and vocational school = 2 bachelor's degree and above=3	3958	0.791	0.839	0	3
Annual household income	Continuous variable (¥)	3880	10.322	1.104	2.996	15.607
Pension insurance	Have pension insurance = 1	3956	0.275	0.446	0	1
Have a chronic disease	Having a chronic disease = 1	3958	0.357	0.479	0	1
Have a disability	Having a disability = 1	3958	0.078	0.268	0	1
Daily sleep time	Continuous variable (hours)	3957	6.436	1.596	0	15
Health Trends	Better = 1 Almost = 2 Worse = 3	3830	2.328	0.591	1	3
Number of children	Continuous variables	3958	0.048	0.275	0	4
Intergenerational parenting	With intergenerational parenting = 1	3945	0.371	0.483	0	1
Social interactions	Having social interactions = 1	3957	0.606	0.489	0	1

It can be seen that 97.7% of the non-farm employed people are covered by medical insurance and 2.3% of the non-farm employed people are not covered by medical insurance, and those who are covered by medical insurance are obviously more than those who are not covered by medical insurance. The mean value of mental depression was 20.048, with a slightly skewed distribution, and it can be judged that the mental depression (CES-D) scores of the sample population were higher than

the division line proposed by Andreasen et al. (1994) for determining the presence or absence of depressive symptoms, and it can also be observed by the comparison in Figure 1 that the distribution of CES-D scores of the population with medical insurance was better than that of the population without medical insurance. In addition, the average age of the sample was 54.8 years old, 67.3% were male, the non-farm employed population was predominantly male, 63.0% lived in rural areas, 80.2% of the respondents were married, and most of the respondents had an education level of junior high school or above. In terms of health status, 35.7% of respondents had chronic diseases, 7.8% had disabilities, the average daily sleep time was 6.4 hours, the vast majority of respondents had no children, 37.1% had intergenerational parenting of grandchildren or grandchildren, and 60.6% had social interactions. Table 1 describes the basic information of the variables.

4. Econometric models

This paper uses the 2018 CHARLS data to estimate the impact of medical insurance on the mental health of the middle-aged and older non-farm employed population. Multiple linear regression models with OLS regression parameters are used in this paper, and the basic econometric model is set as follows.

$$Y_i = \beta_0 + \beta_1 * Ins_i + \beta_2 * X_i + \mu \tag{1}$$

Here, Y_i denotes the mental depression status of respondent i.

ins_i represents the medical insurance variable, where the coefficient β_1 is the focus of this paper, reflecting the effect of medical insurance on the mental health of middle-aged and older non-farm employed people, and if the coefficient β_1 is significant, it indicates that medical insurance has a significant effect on mental health. X_i represents the vector set of control variables, including the four categories of demographic characteristics, socioeconomic characteristics, health characteristics, and household characteristics. μ is a random disturbance term.

5. Empirical Results and Discussion

5.1 Basic regression

Table 2 The basic regression results.

Variables	Mental depression		
	(1)	(2)	(3)
Medical Insurance	-1.811***	-1.416***	-1.421***
	(-3.46)	(-2.72)	(-2.73)
Gender	-1.338***	-1.318***	-1.339***
	(-7.89)	(-7.87)	(-7.93)
Age	-0.029**	-0.033**	-0.038***
	(-2.18)	(-2.57)	(-2.83)
Type of residence	-0.205	-0.161	-0.164
	(-1.12)	(-0.89)	(-0.91)
Marriage	-0.759***	-0.564***	-0.567***
	(-3.77)	(-2.84)	(-2.84)
Education level	-0.301***	-0.328***	-0.309***
	(-2.76)	(-3.05)	(-2.84)
Annual household income	-0.434***	-0.374***	-0.373***
	(-5.74)	(-5.01)	(-4.99)
Pension insurance	-0.524**	-0.531**	-0.494**
	(-2.45)	(-2.52)	(-2.33)
_cons	29.881***	29.063***	29.336***
	(24.73)	(22.46)	(22.42)
Variables	Mental depression		
	(1)	(2)	(3)
N	3564	3479	3478

Note: robust standard errors in parentheses. *p < 0.1, **p < 0.05, ***p < 0.01

Table 2 shows the basic regression results. In Table 2, column 1 shows the regression results after controlling for demographic and socioeconomic characteristics, column 2 shows the regression results with the addition of health characteristic variables, and column 3 shows the regression results with the addition of household characteristic variables on top of the above.

The regression results in columns 2-4 of the above table show that having medical insurance is always negatively and highly statistically significant related to the level of mental depression in the middle-aged and elderly non-farm employed population as control variables are continuously added.

5.2 Sub-sample regression

This sample was subjected to sub-sample regression to test population heterogeneity for samples by gender, different economic levels, and different education levels.

Table 3 Sub-sample regression results

Variables	Sample by gender		Sample by different economic levels		Sample by education level	
	Female	Male	low income	Middle and high income	Junior high school and below	high school , vocational school and above
Medical Insurance	1.276	-2.795***	0.156	-2.834***	-1.483***	-0.588
	(1.285)	(-4.625)	(0.177)	(-4.356)	(-2.661)	(-0.310)
Control variables	Control	Control	Control	Control	Control	Control
N	1130	2348	1182	2296	2703	775

Note: robust standard errors in parentheses. *p < 0.1, **p < 0.05, ***p < 0.01. Control variables are the same as Table 2.

The regression results in columns 2 and 3 of Table 3 show that the suppressive effect of participation in medical insurance on the level of mental depression in men is significantly present, while the effect of participation in medical insurance on the mental health of women in the middle-aged and older non-farm employed population is not significant at the 10% level.

In addition, this paper divides the total sample into three groups of low, middle and high income samples according to the annual household income level from low to high, where the low income samples are classified as one group and the middle and high income samples are classified as another group. Columns 4 and 5 are the corresponding regression results. It can be seen that the suppressive effect of participation in medical insurance on the level of mental depression is significantly present for middle and high income groups, but not for low income participants. Possible reasons for this are that middle- and high-income people have access to a more resourceful medical structure, as well as access to more authoritative and high-quality medical specialists [28].

Columns 6 and 7 report the impact of medical insurance participation on the mental health of middle-aged and older non-farm employed people with different levels of education. Among them, participation in medical insurance had a significant inhibitory effect on the level of mental depression for those with middle school and lower education, while the effect was not significant for those with high school or vocational school and higher education.

5.3 Robustness analysis

In order to explain more intuitively and specifically the impact of medical insurance on the mental health of middle-aged and older non-farm employed people, this paper supplemented the analysis of the overall population mental health with the use of quantile regression for people with different mental health status, and the regression results are shown in Table 4. In this paper, 5 quartiles of 0.10,

0.25, 0.50, 0.75 and 0.90 were selected.

According to the regression results in Table 4, it is clear that the effect of medical insurance on mental health occurred mainly in the middle and high quartiles, which were significant at the 10%, 5%, and 1% levels, respectively. For those with poor mental health status (90th quartile of the CES-D score index), the facilitative effect of medical insurance was most prominent, reducing the CES-D score index by 4.553 units at the 1% significance level, while not significant for the lower quartile, with the progressive effect of medical insurance on mental health improvement increasing as mental depression status became worse. The regression results in this paper are also moderately robust.

Table 4 Quantile regression

Variables	(1) 0.10 fractile	(2) 0.25 fractile	(3) 0.50 fractile	(4) 0.75 fractile	(5) 0.90 fractile
Medical Insurance	-0.340	-0.065	-1.046*	-2.243**	-4.553***
	(-0.956)	(-0.167)	(-1.711)	(-2.408)	(-3.318)
Control variables	Control	Control	Control	Control	Control
N	3478	3478	3478	3478	3478

Note: robust standard errors in parentheses. *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$. Control variables are the same as Table 2.

6. Conclusions

This paper analyzes the impact of medical insurance on the mental health of the middle-aged and older non-farm employed population using 2018 CHARLS data, and synthesizing the results of these empirical analyses, the main findings of this study are as follows.

First, medical insurance significantly reduces the level of mental depression among middle-aged and older non-farm employed people and promotes their mental health.

Second, according to the subsample regression results, the population differences in the effect of medical insurance on residents' mental depression relief were significant, mainly in men, middle and high income groups, and people with middle school and lower education, while the effect on women, low income groups, and people with high school or vocational school and higher education was not significant.

Besides, there are some shortcomings in this paper, mainly because we use cross-sectional data for 2018 and do not use dynamic panel data, so we cannot observe the persistent effect or lagged effect of medical insurance. Second, there are endogeneity issues related to the explanatory variable of "whether or not to participate in medical insurance" that have not been solved, and there is also a certain chance of adverse selection due to the different health conditions of the middle-aged and elderly.

In response to the study results, this paper gives the following recommendations: First, the role of medical insurance for mental health should be emphasized and the medical insurance system should be improved. It is important to focus on the participation of the population in medical insurance, and to improve the system for different groups of people and the policy system for the disadvantaged groups, in order to reduce the differences in gender, income and education level. Second, increase the coverage of medical insurance and coverage. There are still some people who are not covered by our basic medical insurance, especially the mobile and freelance population, and many medical insurance must be registered and issued at the community, which is disadvantageous for the non-permanent residents. Therefore, the coverage of medical insurance needs to be further expanded to ensure the health of our people and their long-term peace of mind.

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