Analysis of Factors Influencing Smoking Behavior among Middle-Aged and Older Adults

-- A Study of a Mediation Model based on Risk Attitudes

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Abstract

In this paper, by using face-to-face interview data from the Chinese Household Tracking Survey, we study the important factors influencing smoking behavior of middle-aged and elderly people from the perspective of health behavior, establish a probit model and through regression, conduct empirical analysis, innovatively incorporate risk attitude into the model as a mediating variable, and study the pathway of the independent variable's influence on the dependent variable internally, there is a mediating effect of age and marital status on the model The results show that age has a mediating effect on smoking behavior by influencing risk attitude, and that age is heterogeneous, with different age groups causing changes in risk attitude and having an effect on smoking behavior. The results show that risky attitudes do have some effect on smoking behavior, but the extent of the effect is not very significant compared to gender and education.

Keywords

Health Behavior; Smoking Behavior; Mediating Effect; Heterogeneity Test.

1. Introduction

China is experiencing rapid aging, and relevant data show that the elderly are the most prevalent group in chronic diseases. The health status of middle and old age can have a huge impact on families as well as society, and if health problems occur in the middle and old age group, it can bring a heavy economic burden to families and even to the development of the whole Chinese society. Smoking, as a dangerous health behavior, can have a huge negative impact on the health of people, especially the elderly. The relevant data show that the number of people about smoking in China accounts for about 24.53% of the total population of China, and the data show that the highest smoking rate in the age group of 30 to 50 years old is 78.16%; followed by the older age group of 51 to 75 years old with a smoking rate of 46.25%. It can be seen that the proportion of smoking in the middle-aged and older age groups is quite high, so it is of some significance to focus on the factors influencing the smoking behavior of this group, which will help us to better make appropriate recommendations to further improve the care of the middle-aged and older age groups. Risk attitudes may change at different ages, and gender may also have an effect on risk attitudes, and it has significant research implications to study the extent to which risk attitudes affect smoking behavior from a new perspective.

Most scholars have studied the influences related to smoking behavior from the perspective of physiological aspects, such as gender, age, etc. Wang, Chengzhang, and Gao, Lidong (2019) et al. found that the level of smoking prevalence was significantly higher among male workers than female workers, and the change in age was positively correlated with smoking prevalence. Li Mengyi (2019) explored the psychological mechanisms of smoking behavior from the innovative perspectives of smokers' self-esteem, stress perceptions and coping styles. Using official data from the last five years, Tao Jianqing (2019) Meta-analysis of smoking status of

students in mainland China showed that for this group of students, the inner needs of social following and venting bad emotions were satisfied.

Some other scholars cut from the perspective of education level, income and other external factors, Gao Lidong (2019) and others found that those with less than junior high school education level now have higher smoking rates than the undergraduate group, postgraduate and above group, Jiang Yufeng (2018) found through his study that the lower the level of education degree, the greater the likelihood of smoking instead.

Yuan Linlin (2019) had focused on the middle-aged and elderly groups when conducting a study, using a two-level model to conduct a multifactorial analysis of the relationship between social capital and smoking and drinking, Zhu Cenjing and Jing Shiwen (2017) found through their study that older people showed an overall low level of cognitive development about the hazards of smoking, Wen. Dan Guo; Xiying Wang; Xiaoyun Liang (2019) devoted their attention to middle-aged and older women and conducted a correlation analysis between smoking behavior and depression in this group, while Lei Li and Yujie Lu et al. (2019) focused on the smoking decision-making of middle-aged and older men.

Jakob Everding (2020) had pointed out in the literature of his study that differences in the employment status of couples could also affect their smoking behavior.Thomas Dohmen (2011) in his study on the effect of risk attitudes on smoking behavior had pointed out that different risk preferences may have an effect on smoking behavior under specific conditions, but did not provide further details on the extent to which in risk attitudes on smoking Dohmen (2011), in his study of the effect of risk attitudes on smoking behavior, noted that different risk preferences may have an effect on smoking behavior under specific conditions, but did not further refine the extent to which risk attitudes affect smoking behavior.

This paper incorporates risk attitudes into the analysis of the influencing factors of smoking behavior, and refines the scope of the study to focus on the degree of influence of risk changes on smoking behavior in the elderly group, which organically combines economics and health science, and puts forward targeted recommendations through the study, which will help the government to better guide the elderly group to develop healthy behavior and promote the healthy and stable development of our economy.

2. Analysis of the Influence Mechanism of Smoking Behavior of Middle-aged and Elderly People

2.1. Analysis of the Mechanism based on Cognitive-behavioral Theory

Smoking behavior is a health risk behavior, so when studying the mechanism of smoking behavior, this paper mainly tries to analyze it from the perspective of behavioral economics, using behavioral economics and its related theories to explain the influencing factors of smoking behavior.

Cognitive-behavioral theory is an organic combination of two different economic theories, a criticism and development of the shortcomings of cognitive and behavioral theories, but this theory is not a simple addition of two different theories, or a patchwork. Cognitive-behavioral theory emphasizes the role of cognition as an intermediate bridge. The theory suggests that "automatic thinking" mechanisms may have an impact on cognitive formation. Through the accumulation of time, people develop certain fixed ways of thinking and behaving, which is what we call automatic thinking, where actions can be issued directly without the brain thinking, and in accordance with established patterns. If we want to change the behavior of a certain group of people towards a thing, then we must first change the perception of the thing. Age, gender, education, and even self-rated mental health can all affect an individual's perception of things.

Since the research subjects of this thesis focus on the elderly, most of them have relatively low education level and lack a more accurate perception of the harm level of smoking. Therefore, from the perspective of cognitive-behavioral theory, the exploration in this paper has some significance.

2.2. Mechanistic Analysis based on Expected Utility Theory

This theory mainly analyzes the risky decision-making behavior of individuals. In this theory, scholars follow the principle of economic man, and believe that participants are perfectly rational, pursue profit maximization, can expect the utility they will get according to the existing conditions, and make decisions. Changes in income and the presence or absence of chronic illness can affect an individual's decision making.

Changes in economic conditions can also affect a person's behavior, when individuals are retired or have a relatively low income, people will choose to maximize their utility within the constraints of their existing income budget, and when income levels are low, individuals are less likely to enjoy extravagant consumption, although in China, tobacco prices are not low but not high, so it is possible that differences in individual income levels may also affect Smoking behavior.

2.3. Analysis of the Mechanism based on Prospect Theory

Drawing on the previous theory alone does not explain well the reasons for including risk attitude factors in the model and as mediating factors in this paper. As mentioned in the previous section, prospect theory is an extension of traditional theory that separates the risk decision process into two processes: evaluation and editing. Prospect theory has three important features, one most people prefer to avoid risk; two, most people's risk preferences change if there is a possibility of facing a large loss and may shift to a risk-averse type; and three, people may be more sensitive to loss compared to gain. It can be seen that people's risk preferences are not constant, but may change due to changing conditions, for example, people tend to become risk averse when facing gain and are not willing to take risks; however, they are easy to become risk averse when facing loss and are prone to take risks. Most people are not equally sensitive to loss and gain, and the pain of loss is much greater than the pleasure of gain.

For smokers, the choice of whether to smoke is a risky decision-making behavior. This paper is based on a health behavior perspective. The risk-averse group is likely to believe that the utility of smoking is greater than the loss of health due to smoking, while the risk-averse group is more likely to refuse to smoke.

3. Data Introduction and Model Construction

3.1. Data Introduction

This paper selects data from the 2018 China Family Tracking Survey (CFPS) face-to-face interview questionnaire conducted by the China Social Science Survey Center of Peking University, and combines two databases, household data and adult data, for a total of 2504 valid data.

3.2. Econometric Model and Data Description

3.2.1. Variable Descriptions

Explanatory variables

In the questionnaire, the question "Have you ever smoked cigarettes" was used to construct the explanatory variables, and the value was assigned to 1, not 0.

Explanatory variables

In this paper, age, gender, marital status, education level, retirement status, health insurance, personal income, and chronic disease were selected as the main explanatory variables and assigned values to the variables.

In this paper, individual risk attitudes are used as mediating variables, and the relevant question in the questionnaire is "If your family invests/invest, how much risk are you willing to take?" The four options are: high risk, high return; moderate risk, stable return; low risk, low return; and not willing to take any investment risk. The first one is assigned a value of 2, i.e. risk-averse, the second one is assigned a value of 1, i.e. risk-neutral, and the last two options are assigned a value of 0, i.e. risk-averse.

Table 1. Variable definition and description table

	Variable Name	Symbol	Variable Description
Explained variables	Smoking behavior	Smoke	Assign a value of 1 for smoking and 0 for non-smoking
Intermediate variables	Risk attitude	Risk	2 indicates risk-averse, 1 indicates risk-neutral, and 0 indicates risk-averse
	Health Status	Health	Respondents' autonomous evaluation of physical health
	Age	Age	Age Level of Respondents
Explanatory variables	Gender	Gender	1 for men, 0 for women
	Academic qualifications	Edu	Respondents' hand education level
	Whether to purchase medical insurance	Insurance	Yes to 1, No to 0
	Whether to apply for retirement	Retire	Yes to 1, No to 0
	Total personal income	income	Indicates the economic level of the individual
	Marriage	Marriage	Indicates the marital status of the individual
	History of chronic diseases	Ill	Indicates the physical state of the respondent

3.2.2. Model Construction

According to the relevant reference papers, in order to study the influence of different risk attitudes of the elderly group on smoking behavior and the degree of influence, based on the explanatory variables are qualitative variables, taking the values of 0 and 1, so the probit model is used for empirical testing. Let y=smoke

For natural characteristics, age, gender, education level and marital status were included in the variables for regression, and the model was set as

$$Y1=C1+\beta1*age+\beta2*gender+\beta3*marriage+\beta4*edu+\beta5*retire \qquad (1)$$

On the economic side, income is taken into account and a second model is set up as follows

$$Y2=C2+\beta1*age+\beta2*gender+\beta3*marriage+\beta4*edu+\beta5*retire \qquad (2)$$

For health, respondents' self-rated health and chronic disease prevalence history were included in the regression model set as follows

$$Y3=C3+\beta1*age+\beta2*gender+\beta3*marriage+\beta4*edu+\beta5*retire \qquad (3)$$

The final inclusion of insurance in the model is set to

$$Y4=C4+\beta1*age+\beta2*gender+\beta3*marriage+\beta4*edu+\beta5*retire$$
$$+\beta6*income+\beta7*heaith+\beta8*ill+\beta9*insurance \qquad (4)$$

4. Empirical Analysis of Smoking Behavior Affecting Middle-aged and Elderly People

4.1. Basic Regression

4.1.1. Probit Model Regression

Table 2. Regression results

	(1)	(2)	(3)	(4)
VARIABLES	smoke	smoke	smoke	smoke
age	-0.0096**	-0.0107**	-0.0109**	-0.0109**
	(0.0048)	(0.0048)	(0.0048)	(0.0048)
gender	2.086***	2.101***	2.107***	2.108***
	(0.0800)	(0.0808)	(0.0813)	(0.0813)
edu	-0.0780***	-0.0793***	-0.0731***	-0.0717***
	(0.0259)	(0.0259)	(0.0271)	(0.0271)
retire	0.0093	0.0032	-0.0010	0.0062
	(0.0852)	(0.0854)	(0.0856)	(0.0861)
marriage	-0.333***	-0.325***	-0.326***	-0.323***
	(0.117)	(0.117)	(0.117)	(0.117)
health		0.0228	0.0219	0.0206
		(0.0295)	(0.0295)	(0.0296)
ill		0.112	0.113	0.117
		(0.0803)	(0.0803)	(0.0804)
income			-1.04	-9.99
			(1.3306)	(1.3306)
insurance				-0.0804
				(0.103)
Constant	-0.696**	-0.741**	-0.735**	-0.667*
	(0.344)	(0.352)	(0.352)	(0.363)
R2	0.3199	0.3211	0.3213	0.3215
Observations	2504	2, 504	2, 504	2, 504

*** p<0.01, ** p<0.05, * p<0.1

Because the probit model is nonlinear, the coefficients cannot be judged directly and need to be passed through marginal effects, so the table shows the marginal effects of the coefficients.

The above table shows that, analyzing only from the perspective of natural characteristics, excluding retirement status, the rest of the explanatory variables have significant effects on smoking behavior , on the basis of natural characteristics, health factors are added to the model and the regression is re-run, it can be found that self-rated heart health and the presence of

chronic diseases do not have significant effects on smoking behavior, and the significant effects of the constants on the explanatory variables indicate that we still need to further expand the explanatory variables.

The inclusion of economic factors revealed that the level of personal income did not have a significant effect on smoking behavior in this model.

After including all variables except risk attitude in the model it was found that the constants still had a degree of influence on the explanatory variables, but the degree of influence was greatly reduced.

4.1.2. Mediating Effects and Tests

In this paper, in the correlation analysis of variables, it was found that gender, education, and age were correlated with marital status and risk attitude, and also had an effect on the explanatory variables, so this paper used risk attitude as a mediating variable, age, gender, education, and marital status as independent variables, and smoking behavior as dependent variables to investigate whether risk attitude had a mediating effect in the model. The specific transmission paths are as follows

Let smoke=Y and risk=M set the mediating effect model as follows

$$Y = C1 + \beta 1 * age + \beta 2 * gender + \beta 3 * edu + \beta 4 * marriage \tag{5}$$

$$M = C2 + \alpha 1 * age + \alpha 2 * gender + \alpha 3 * edu + \alpha 4 * marriage \tag{6}$$

$$Y = C3 + \gamma M + \gamma 1 * age + \gamma 2 * gender + \gamma 3 * edu + \gamma 4 * marriage \tag{7}$$

Table 3. Regression charts

	Coef	Std Err	Z	P>|Z|
Sobel	.0001	.00006	1.629	.1033
Goodman-1 (Aroian)	.0001	.00007	1.557	.1194
Goodman-2	.0001	.00006	1.711	.0870
	Coef	Std Err	Z	P>|Z|
a coefficient =	-.0032	.0014	-2.2711	.0231
b coefficient =	-.0343	.0146	-2.3374	.0194
Indirect effect =	.0001	.00007	1.6289	.1033
Direct effect =	-.0029	.0010	-2.8104	.0050
Total effect =	-.0028	.0010	-2.7047	.0068
Proportion of total effect that is mediated:			-.0392	
Ratio of indirect to direct effect:			-.0377	
Ratio of total to direct effect:			.9622	

Table 4. Regression charts

C1	β1	β2	β3	β4		R2
.3231***	-.0028***	.5731***	-.0646***	-.0213***		0.3495
(.0803)	(.0010)	(.0158)	(.0273)	(.0064)		
C2	α1	α2	α3	α4		R2
.4162***	-.0032***	.0027	-.0010	.0427***		0.0185
(.1094)	(.0014)	(.0216)	(.0373)	(.1094)		
C3	γM	γ1	γ2	γ3	γ4	R2
.3374	-.0343**	-.0030***	.5732***	-.0650**	-.0198***	0.3509
(.0805)	(.01469)	(.0010)	(.01583)	(.0274)	(.0064)	

*** p<0.01, ** p<0.05, * p<0.1

Using stata software to regress the mediating models, it can be seen that Z is not equal to 0. And after regressing the three models step by step through the software, it can be found that in the second model, the respondents' age and marital status have an effect on smoking behavior through the mediating variable risk attitude.

4.2. Mediating Effect Test

The test with bootstrap shows that there is indeed a certain mediating effect of risk attitude.

4.2.1. Heterogeneity Analysis

Table 5. Regression results by age group

		40-60	60-80	80-100
modle(1)	$C1$	-.1767 (.2003)	4844 (.1995)	-1.3349* (.8737)
	$\beta1$	.0062 (.00351)	-.0050 (.0026)	.01628* (.0100)
	$\beta2$	.5890*** (.0196)	.5571*** (.0279)	.2438 (.0957)
	$\beta3$	-.0808 (.0392)	-.0457 (.0419)	.0705 (.0909)
	$\beta4$	-.0175 (.0077)	-.0296** (.0111)	.0032 (.0418)
	R2	0.3851	0.3079	0.1511
modle(2)	$C2$	0.738 (0.785)	-0.138 (0.765)	-5.262 (3.813)
	$\alpha1$	-0.0326** (0.0139)	-0.00953 (0.0104)	0.0574 (0.0432)
	$\alpha2$	0.0298 (0.0709)	-0.0268 (0.0974)	0.257 (0.450)
	$\alpha3$	0.149*** (0.0280)	0.0921** (0.0388)	-0.301 (0.278)
	$\alpha4$	0.130 (0.148)	0.0165 (0.150)	-0.766* (0.421)
	R2	0.0211	0.0085	0.1353
modle(3)	$C3$	-.1552 (.2011)	.5137 (.1998)	-1.4590 (.8812)
	γM	-.0223 (.0181)	-.0482 (.0249)	-.0870 (.0832)
	$\gamma1$	.0059 (.0035)	-.0053 (.0027)	.0181* (.0102)
	$\gamma2$	.5894*** (.0196)	.5565 (.0279)	.2417* (.0957)
	$\gamma3$	-.0802 (.0392)	-.0466 (.0418)	.0605 (.0913)
	$\gamma4$	-.0163 (.0078)	-.0282* (.0112)	-.0007 (.042)
	R2	0.3858	0.3104	0.1107

*** p<0.01, ** p<0.05, * p<0.1

Through the above analysis, we can find that age has some significance in the mediation model. Considering that risk attitudes may change with age, we divide age into three partitions of 40-60, 60-80, and 80-100, and test the heterogeneity of age.

Through the above table, it can be found that different age stages have different degrees of influence on the model, 40-60 as well as 60-80 are more significant, indicating that the mediating effect of risk attitude is more obvious in these two age groups, risk preference will change with age, the older the person is, the more obvious the aversion to risk is shown, and the more obvious the aversion to smoking behavior is.

5. Robustness Test

In order to ensure the robustness of the model, this paper classifies the data according to gender, recombines them, and then performs probit regression on the model separately, and the results are obtained to be robust.

6. Conclusion

In this paper, we used micro survey data from the China Household Financial Survey to systematically analyze the influencing factors of smoking behavior among middle-aged and elderly people from the perspective of health behavior, and the empirical results show that age, gender, marital status, and education level have significant effects on smoking behavior of middle-aged and elderly people.

Risk attitude has an effect on smoking behavior, risk-averse group is more likely to smoke and risk-averse group is less likely to smoke.

However, there are still shortcomings in this paper. First, the main research object of this paper is the elderly group, and the sample aged below 44 years old was excluded, while the data from the household paper and the adult self-response paper were matched and integrated, and the sample size was relatively small, and the results may have some errors.

Second, the ratio of males to females in this data is not the standard 1:1, which leads to a possible error in the results of the effect of gender on smoking behavior and reduces the accuracy and persuasiveness of the data.

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