

ORIGINAL RESEARCH ARTICLE

Financial literacy, social security, and healthcare cost anxiety in China

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Abstract

This study examines the impact of financial literacy and social security on healthcare cost anxiety in China using data from the 2021 Global Financial Inclusion database. Employing an ordered logit model and its marginal effects, we analyse how these factors influence varying levels of healthcare cost anxiety (worried, somewhat worried, and not worried at all) across total, female-headed and male-headed households. Financial literacy and social security both demonstrate significant negative effects on healthcare cost anxiety across all household types. It implied that individuals who save for old age and those with social security coverage are less likely to experience high levels of healthcare cost anxiety. The ordered logit results show consistent negative coefficients for financial literacy and social security across all household categories. Marginal effects analysis further illustrates how these factors affect the probability of falling into each category of healthcare cost anxiety. These findings underscore the importance of promoting financial literacy and expanding social security coverage as potential strategies to alleviate healthcare cost anxiety in China. (*Afr J Reprod Health* 2024; 28 [8]: 77-88).

Keywords: Financial literacy; social security; social protection; healthcare cost anxiety; out-of-pocket health expenditure

Résumé

Cette étude examine l'impact de la littératie financière et de la sécurité sociale sur l'anxiété liée aux coûts des soins de santé en Chine à l'aide des données de la base de données mondiale sur l'inclusion financière 2021. En utilisant un modèle logit ordonné et ses effets marginaux, nous analysons comment ces facteurs influencent différents niveaux d'anxiété liée aux coûts de santé (inquiet, quelque peu inquiet et pas du tout inquiet) dans l'ensemble des ménages dirigés par une femme ou un homme. La littératie financière et la sécurité sociale démontrent toutes deux des effets négatifs significatifs sur l'anxiété liée aux coûts des soins de santé dans tous les types de ménages. Cela implique que les personnes qui épargnent pour leur vieillesse et celles qui bénéficient d'une couverture de sécurité sociale sont moins susceptibles de ressentir des niveaux élevés d'anxiété liée aux coûts des soins de santé. Les résultats du logit ordonné montrent des coefficients négatifs cohérents pour la culture financière et la sécurité sociale dans toutes les catégories de ménages. L'analyse des effets marginaux illustre en outre comment ces facteurs affectent la probabilité d'appartenir à chaque catégorie d'anxiété liée aux coûts des soins de santé. Ces résultats soulignent l'importance de promouvoir la culture financière et d'élargir la couverture de sécurité sociale en tant que stratégies potentielles pour atténuer l'anxiété liée aux coûts des soins de santé en Chine. (*Afr J Reprod Health* 2024; 28 [8]: 77-88).

Mots-clés: Littératie financière, sécurité sociale, protection sociale, anxiété liée aux coûts de santé, dépenses de santé directes

Introduction

In recent years, financial literacy has emerged as a critical area of focus, driven by rapid economic growth, demographic shifts and evolving social policies^{1,2}. Financial literacy, defined as the ability to understand and effectively use various financial skills, including personal financial management, budgeting, and investing, is essential for individuals to navigate the complexities of modern economies³. In China, where economic reforms have spurred unprecedented wealth creation

alongside rising income inequality, understanding financial concepts such as savings, investments, and debt management is critical for individual financial security and long-term economic stability⁴.

Moreover, the aging population and shifting family structures in China have placed significant strain on the traditional social security system. Historically, the reliance on familial support for elderly care is being challenged by demographic shifts, urbanization, and changing societal expectations. This transition underscores

the urgent need for robust social security policies that can sustainably support retirees and mitigate intergenerational financial burdens. Furthermore, healthcare cost anxiety has emerged as a pressing concern among Chinese households. Rapid urbanization and industrialization have led to environmental challenges and increased prevalence of chronic diseases, driving up healthcare expenditures. As out-of-pocket expenses remain high and insurance coverage varies, many individuals and families face uncertainty and financial strain in accessing adequate healthcare services.²

This introduction sets the stage for exploring the intertwined challenges of financial literacy, social security, and healthcare cost anxiety in China, highlighting their implications for individual well-being, economic development, and social policy. Recent studies indicate a gap in financial literacy among Chinese citizens, with many lacking the essential knowledge and skills to make sound financial decisions.^{3,5} Addressing this gap is vital for fostering a financially secure population capable of coping with the economic demands of aging and healthcare needs. Government initiatives and educational programs aimed at enhancing financial literacy are crucial steps towards mitigating the financial anxieties related to social security and healthcare costs in China.

The contribution of this study to the literature is hinged on the fact that there is limited research on the intersection of financial literacy, social security and healthcare cost anxiety specifically in the context of China. Also, there is a lack of comprehensive studies that focus on how these factors interact and influence each other in the Chinese population. Research in this area could provide valuable insights into the unique challenges and opportunities faced by Chinese individuals in managing healthcare costs in retirement. Also, there is lack of empirical studies on the relationship between financial literacy, social security benefits and healthcare cost anxiety in China. While there is a growing body of literature on each of these factors individually, there is a paucity of research that examines how they are interconnected and impact healthcare cost anxiety among Chinese retirees. More empirical studies are needed to explore these relationships and understand the mechanisms through which

financial literacy and social security benefits can alleviate healthcare cost anxiety in China. Therefore, this study is built around three hypotheses.

Hypothesis 1

Individuals with higher levels of financial literacy are more likely to make informed financial decisions, leading to greater financial security and reduced healthcare cost anxiety

This hypothesis suggests that individuals who possess a greater understanding of financial concepts and principles are more equipped to make well-informed financial decisions. With higher levels of financial literacy, individuals are likely to have the knowledge and skills necessary to effectively manage their finances, budget effectively, save for the future, and invest wisely. By making informed financial decisions, these individuals are better positioned to achieve greater financial security. They may be more adept at planning for their financial future, setting achievable financial goals, and navigating complex financial products and services. This can lead to increased savings, reduced debt, and overall improved financial well-being.

Furthermore, individuals with higher financial literacy may also experience reduced anxiety related to healthcare costs. This is because they are more likely to understand the importance of health insurance, budgeting for medical expenses, and accessing healthcare services efficiently. By making informed decisions about their healthcare coverage and expenses, they can better manage and plan for potential healthcare costs, leading to reduced anxiety about unexpected medical bills.

Hypothesis 2

Improved social security coverage and benefits will positively impact individuals' confidence in their retirement planning, reducing anxiety related to healthcare cost

This hypothesis posits that if there are improvements in social security coverage and benefits, individuals will feel more secure about their retirement planning. This increased sense of financial security can lead to reduced anxiety related to healthcare costs during retirement. When individuals have access to better social security

coverage and benefits, they may have a more reliable and stable source of income in retirement. This can alleviate concerns about running out of money or not being able to afford healthcare expenses as they age. With the assurance of adequate social security support, individuals may feel more confident in their ability to cover healthcare costs during retirement.

Hypothesis 3

Financial literacy and social security interaction will collectively contribute to reducing healthcare cost anxiety

This hypothesis suggests that a combination of financial literacy and social security benefits can work together to reduce anxiety related to healthcare costs in retirement. When individuals have good levels of financial literacy, they are better equipped to make informed decisions about their finances, including planning for healthcare costs in retirement. They may have better understanding of how to budget for medical expenses, navigate health insurance options, and save for future healthcare needs. This financial knowledge can empower individuals to proactively plan for healthcare costs and feel more confident in their ability to manage these expenses during retirement.

In conjunction with financial literacy, social security benefits can play a crucial role in reducing anxiety about healthcare costs. Social security provides a steady income stream for retirees, which can help cover basic living expenses as well as healthcare costs. By receiving social security benefits, individuals may feel more financially secure and less worried about affording healthcare services, medications, or long-term care in retirement. When financial literacy and social security benefits work together, individuals may have a more comprehensive approach to managing their finances and healthcare costs in retirement. By combining financial knowledge with a reliable source of income from social security, individuals can feel more prepared and less anxious about the financial implications of healthcare expenses as they age.

Methods

The study used data from the World Bank⁶ Global Financial Inclusion for the analysis. The ordered

logit model was employed to assess the impact of financial literacy and social security on healthcare cost anxiety, considering the ordinal nature of the variables involved. By calculating the marginal effects after the ordered logit model, the study was able to determine how changes in financial literacy and social security influenced healthcare cost anxiety in China.

Following the study by Osabohien *et al.*², to interpret the coefficients, we explain some notation and revisiting the principles of ordinal logistic regression. For example, consider an ordinal outcome Y (healthcare cost anxiety) with J categories (worried, somewhat worried and not worried at because of medical cost). Let $P(Y \leq j)$ captures the cumulative probability of Y being less than or equal to a specific category $j = 1, \dots, J - 1$. The odds of Y being less than or equal to a particular category can be described posited in equation (1)

$$\frac{P(Y \leq j)}{P(> j)} \quad (1)$$

For $j = 1, \dots, J - 1$ since $P(> j) = 0$ and individually zero is not defined. The log odds are also the logit, such that as shown in equation (2) and the ordinal logistic regression model is parameterized as in equation (3)

$$\log \frac{P(Y \leq j)}{P(> j)} = \text{logit } P(Y \leq j) \quad (2)$$

$$\text{logit } P(Y \leq j) = \beta_0 + \beta_1 \text{FINL}_j + \beta_2 \text{SOS}_j + \beta_3 X'_j + e \quad (3)$$

In this model, the focus is on understanding the factors that contribute to healthcare anxiety among individuals, particularly in relation to concerns about healthcare costs. The dependent variable in this study is healthcare anxiety (Y), which is categorized into three levels: worried, somewhat worried, and not worried. This categorization allows for a nuanced understanding of the varying degrees of anxiety individuals may experience regarding healthcare expenses.

The main independent variables of interest in this model are social security interventions (SOS_j) for household j and financial literacy

Table 1: Variables and measurement

Variable	Code	Measurement
Healthcare cost anxiety	HCA	Financially worried due to medical cost (worried, somewhat worried and not worried at all)
Fin literacy	FINL	Saved for old age (Yes =1, No = 0)
Gender	GD	Female 1, male = 0
Education	Edu	Respondent education level
Age	Age	Age of the respondents in years
Age Squared	Age2	Square of age
Social Security	SOP	Received a government transfer payment
Out-of-pocket expenditure	opx	(Borrowed for medical purposes)
Income level	YL	(Within-economy household income quintile)

Author's compilation

($FINL_j$) for respondent j . The model also includes several control variables to account for potential confounding factors (X'_j), that may influence the relationship between the independent variables and healthcare anxiety. These control variables include age, age squared (to capture potential non-linear relationships with age), education level, gender, income level, and out-of-pocket healthcare expenditures. By including these control variables, the model aims to isolate the effects of social security interventions and financial literacy on healthcare anxiety while controlling for other demographic and economic factors that may also play a role. The variables and measurement are presented in Table 1.

Ethical approval

Not required as the study made use of no human or animal subjects. The data used which is the World Bank⁶ Global Financial Inclusion (Global Findex) Database 2021 for China, can be downloaded from the link. <https://microdata.worldbank.org/index.php/catalog/4627>.

Results

Summary statistics

The summary statistics reveal variations in healthcare anxiety levels within households, particularly when considering gender differences. In the total household population, individuals who are somewhat worried about healthcare costs have a higher mean value compared to those who are not worried. This suggests that a significant portion of

the population experiences moderate levels of healthcare anxiety. When examining gender disparities, females exhibit higher levels of healthcare anxiety than males. Female individuals who are somewhat worried about healthcare costs have a notably higher mean value compared to those who are not worried, indicating a greater concern among females. In contrast, males show minimal differences in mean values between worry categories, suggesting more consistent levels of healthcare anxiety regardless of worry status.

The mean values for financial literacy related to saving for old age indicate differences in attitudes towards saving for retirement within households, particularly when considering gender disparities. In the total household population, the mean value of 0.3642 suggests that, on average, a significant portion (36.42%) of individuals are somewhat likely to save for old age. This indicates a moderate level of financial literacy and preparedness for retirement planning among the population. When examining gender differences, females have a higher mean value of 0.3915 compared to males with a mean value of 0.3401. This suggests that females (39.15%), on average, are more inclined to save for old age compared to males (34.01%) within the household. The higher mean value for females indicates a greater level of financial literacy and awareness of the importance of saving for retirement among female individuals.

For the total household population, the mean age value of 35.4550 indicates that, on average, individuals within households are relatively young. This suggests that a significant portion of the population is in the early to mid-stages of their working lives and may not have reached the typical retirement age yet. The

relatively young age of the population may influence their attitudes towards saving for old age, as younger individuals may not prioritize retirement planning as much as older individuals. When examining gender differences, females have a slightly lower mean age value of 35.05 compared to males with a higher mean age value of 35.8143. This indicates that, on average, males within households are slightly older than females. The differences in mean age values between genders may reflect varying life stages and financial responsibilities, which can influence attitudes towards saving for old age. Older individuals may be more aware of the importance of retirement planning and may be more inclined to save for old age compared to younger individuals.

The mean value of age squared for the total household population is 1396.222. Age squared is a mathematical transformation where each individual's age is multiplied by itself. This transformation is often used to account for non-linear relationships between variables. For the total household population, the mean age squared value of 1396.222 indicates that, on average, the age distribution is relatively spread out and not concentrated around a specific age group. The higher mean age squared value suggests that there may be a wider range of ages within the population, with some individuals being older and others being younger. When looking at gender differences, females have a lower mean age squared value of 1344.796 compared to males with a higher mean age squared value of 1441.847. This implies that, on average, males within households have a wider range of ages compared to females. The differences in mean age squared values between genders may reflect varying age distributions and demographic characteristics within households.

Furthermore, the statistics show the proportion of households receiving social security transfers. Overall, 13.31% of households receive these transfers. There's a slight gender difference as 13.93% of male-headed households receive social Security compared to 12.60% of female-headed households. This 1.33%-point difference suggests male-headed households are slightly more likely to receive social Security. Possible explanations include demographic factors, work history differences, or family structure variations. The total household percentage falls between male and female percentages, as expected. These figures

indicate that a relatively small proportion of households receive social security transfers, with a minor gender disparity in receipt rates. From the result, 7.88% of households borrowed for medical purposes. There's a notable gender difference as 5.42% of female-headed households borrowed, compared to 10.06% of male-headed households. This indicates that male-headed households are nearly twice as likely to borrow for medical expenses. Table 2

Logit regression result

The logit regression results reveal a consistent negative relationship between education and healthcare cost anxiety across all groups, with notable gender differences in the magnitude of this effect. For the total household sample, education significantly reduces healthcare cost anxiety (coefficient -0.55952), indicating that higher education levels generally correspond to lower anxiety about healthcare expenses. This trend is observed across all groups but varies in strength. Male-headed households show the strongest negative relationship (coefficient -0.67552), suggesting that education has the most substantial impact on reducing healthcare cost anxiety for this group. Female-headed households, while still showing a negative relationship, have the smallest coefficient (-0.36256), indicating a less pronounced effect of education on reducing anxiety.

For the total population, financial literacy significantly reduces healthcare cost anxiety (coefficient -0.19718), indicating that individuals who save for old age generally experience lower anxiety about healthcare expenses. This trend is observed across all groups but varies in strength. Male-headed households show the strongest negative relationship (coefficient -0.25303), suggesting that financial literacy has the most significant impact on reducing healthcare cost anxiety for this group. Female-headed households, while still showing a negative relationship, have the smallest coefficient (-0.12906), indicating a less pronounced effect of financial literacy on reducing anxiety.

For the total population, age significantly reduces healthcare cost anxiety (coefficient -0.04924), indicating that older individuals generally experience lower anxiety about healthcare expenses. This trend is observed across all groups

Table 2: Summary statistics of variables

Variables	Total Household		Female Household		Male Household	
	Mean (SD) 1	Min [Max] 2	Mean (SD) 3	Min [Max] 4	Mean (SD) 5	Min [Max] 6
Healthcare Anxiety						
Very worry	Ref					
Somewhat worry	0.3891 (0.4876)	0/1	0.4171 (0.4932)	0/1	0.3643 (0.4813)	0/1
Not worry all	0.3528 (0.4779)	0/1	0.3392 (0.4735)	0/1	0.3649 (0.4815)	0/1
Fin literacy	0.3642 (0.4812)	0/1	0.3915 (0.4882)	0/1	0.3401 (0.4738)	0/1
Education	0.1954 (0.3965)	0/1	0.1540 (0.3611)	0/1	0.2319 (0.4222)	0/1
Age	35.4550 (11.7984)	15/87	35.05 (10.7872)	15/78	35.8143 (12.6201)	15/87
Age2	1396.222 (964.0488)	225/ 7569	1344.796 (854.4764)	6084	1441.847 (1049.875)	225/ 7569
Social Security	0.1331 (0.3397)	0/1	0.1260 (0.3320)	0/1	0.1393 (0.3464)	0/1
Out-of-pocket expenditure	0.0788 (0.2695)	0/1	0.0542 (0.2264)	0/1	0.1006 (0.3009)	0/1
Observation	1,350		1,642		1,858	

Source: Authors' computation

Note: SD means standard deviation, Min and Max means minimum and maximum values respectively.

but varies in strength. Male-headed households show the strongest negative relationship (coefficient -0.06247), suggesting that age has the most substantial impact on reducing healthcare cost anxiety for this group. Female-headed households, while still showing a negative relationship, have the smallest coefficient (-0.02384), indicating a less pronounced effect of age on reducing anxiety.

The negative coefficient for age suggests that as individuals get older, their healthcare cost anxiety tends to decrease initially. This could be due to factors like increased financial stability, better healthcare coverage, or more experience with healthcare systems as people age. On the other hand, the positive coefficient for age squared indicates that the relationship between age and healthcare cost anxiety is not linear. Instead, it suggests that at some point, the effect of age on healthcare cost anxiety begins to reverse.

Furthermore, the negative relationship between social security and healthcare cost coefficients indicates that there is an inverse association between the two variables. In other words, as social security benefits increase, healthcare costs tend to decrease. This relationship can have important

implications for individuals and households in terms of financial planning and retirement preparedness. For the total household population, the coefficient of -0.03693 suggests that for every unit increase in Social Security benefits, healthcare costs are expected to decrease by 0.03693 units. This negative relationship implies that social security benefits may help offset some healthcare expenses for households, potentially reducing the financial burden associated with medical care.

When looking at gender differences, females have a lower coefficient of -0.0032 compared to males with a higher coefficient of -0.07527. This indicates that the negative relationship between social security benefits and healthcare costs is stronger for males than for females. In other words, an increase in Social Security benefits has a greater impact on reducing healthcare costs for males compared to females. The differences in coefficients between genders suggest that social security benefits may play a more significant role in mitigating healthcare costs for males within households. This information can be valuable for policymakers, financial planners, and individuals in understanding the potential

Table 3: Ordered logit regression

	1 Total Household	2 Female Household	3 Male Household
Financial literacy	-0.19718*** (0.0693) [0.004]	-0.12906** (0.0999) [0.019]	-0.25303*** (0.0968) [0.009]
education	-0.55952*** (0.0905) [0.000]	-0.36256 (0.1435) [0.012]	-0.67552*** (0.1156) [0.000]
Age	-0.04924*** (0.0145) [0.001]	-0.02384*** (0.0227) [0.0025]	-0.06247*** (0.0189) [0.001]
Age2	0.00074*** (0.0001) [0.000]	0.00035*** (0.0002) [0.001]	0.00094*** (0.0002) [0.000]
Social protection	-0.03693** (0.0930) [0.0069]	-0.0032** (0.1035) [0.0198]	-0.07527* (0.1128) [0.055]
Out of pocket expenditure	0.07917*** (0.1337) [0.000]	0.85858*** (0.2285) [0.000]	0.15238 *** (0.1638) [0.000]
Income level	-0.66247 *** (0.0667) [0.000]	-0.71149 *** (0.0978) [0.000]	-0.62414*** (0.0922) [0.000]
/cut1	-1.654 (0.2803)	-1.2410 (0.4264)	-1.8096 (0.3714)
/cut2	0.1245 (0.2785)	0.6548 (0.4270)	-0.1313 (0.3678)
Log pseudolikelihood	-3582.5328	-1691.3775	-1882.5819
Number of obs	3,446	1,620	1,826
Wald chi2(8)	288.16	97.14	192.59
Prob > chi2	0.0000	0.0000	0.0000
Pseudo R2	0.0416	0.0288	0.0543

Note: The brackets () contain the standard errors, while the square brackets contain the p-values

impact of social security benefits on healthcare expenses and overall financial well-being.

The positive relationship between out-of-pocket expenditure and total, female, and male populations suggests that as these populations increase, out-of-pocket healthcare expenses also tend to increase. This indicates that individuals are likely to spend more of their own money on healthcare as the overall population, particularly the female population, grows. The higher positive relationship between out-of-pocket expenditure and the female population compared to the male population (0.85858 for females and 0.15238 for males) suggests that women may bear a larger burden of out-of-pocket healthcare costs compared to men. This could be due to a variety of factors,

including women's higher healthcare utilization rates, longer life expectancy, and specific healthcare needs related to reproductive health and maternity care.

The negative correlation coefficients between income level and healthcare costs show that as income increases, out-of-pocket healthcare expenses tend to decrease. This suggests that higher-income individuals can more easily afford healthcare services and expenses compared to lower-income individuals. The stronger negative correlation for females indicates that women, especially those with lower incomes, may face greater financial barriers to accessing healthcare. Addressing income disparities in healthcare access is crucial to ensure all individuals can afford

quality care, and targeted interventions may be needed to support lower-income individuals. Table 3

Marginal effect ordered logit regression

The marginal effects from the ordered logit regression results indicate how changes in financial literacy impact healthcare cost anxiety for female and male households at different levels of worry (very worried, somewhat worried, not worried at all). Financial literacy has a negative effect on healthcare cost anxiety across all levels of worry. Specifically, for females who are very worried about healthcare costs, an increase in financial literacy is associated with a decrease in healthcare cost anxiety by 0.03614 units. Similarly, for females who are somewhat worried, an increase in financial literacy leads to a decrease in anxiety by 0.0084 units. Interestingly, for females who are not worried at all about healthcare costs, an increase in financial literacy actually results in a slight increase in anxiety by 0.04460 units.

Similarly, financial literacy has a negative impact on healthcare cost anxiety for males at all levels of worry. For males who are very worried about healthcare costs, an increase in financial literacy is associated with a decrease in anxiety by 0.04738 units. For those who are somewhat worried, an increase in financial literacy leads to a decrease in anxiety by 0.01080 units. Notably, for males who are not worried at all about healthcare costs, an increase in financial literacy results in the largest decrease in anxiety by 0.05819 units.

The negative coefficients for Social Security in the ordered logit regression results indicate that Social Security has a dampening effect on healthcare cost anxiety for both female and male households. Specifically, for female households, the impact of Social Security on healthcare cost anxiety varies depending on the level of worry. For female households who are very worried about healthcare costs, the coefficient of -0.00681 suggests that an increase in Social Security benefits is associated with a decrease in anxiety about healthcare expenses. Similarly, for female households who are somewhat worried, the coefficient of -0.0015 indicates a smaller but still negative effect of Social Security on healthcare cost anxiety.

Interestingly, for female households who are not worried at all about healthcare costs, the

coefficient of -0.0083 suggests that social security also has a negative impact on anxiety levels, indicating that even those who are less concerned about healthcare expenses may still benefit from Social Security benefits in terms of reducing anxiety. Similarly, for male households, the coefficients show a similar pattern. For those who are very worried about healthcare costs, the coefficient of -0.0141 indicates a stronger negative impact of Social Security on anxiety levels. For those who are somewhat worried, the coefficient of -0.0030 suggests a smaller but still negative effect. And for male households who are not worried at all about healthcare costs, the coefficient of -0.0172 indicates that Social Security also has a negative impact on anxiety levels.

Age and age squared have negative coefficients in relation to healthcare cost anxiety for both female and male households. This indicates a non-linear relationship, where as individuals get older, their healthcare cost anxiety tends to decrease. The negative coefficient for age suggests that anxiety decreases with age, while the negative coefficient for age squared indicates a slowing rate of decrease as individuals age further. Overall, older individuals tend to have lower levels of healthcare cost anxiety compared to younger individuals, with the rate of decrease in anxiety slowing down as individuals grow older.

The negative coefficient for income in the ordered logit regression analysis indicates that as household income increases, healthcare cost anxiety tends to decrease. This suggests that households with higher incomes are less likely to experience anxiety related to healthcare costs, as they have greater financial resources to cover expenses. Higher income levels may provide a sense of financial security and stability, reducing concerns about the affordability of healthcare. On the other hand, the positive coefficient for out-of-pocket expenditure implies that as households spend more out-of-pocket on healthcare, their level of healthcare cost anxiety tends to increase. This may seem counterintuitive at first, but it could be due to the fact that higher out-of-pocket expenditures can strain household budgets and lead to concerns about the affordability of healthcare services. While spending more on healthcare may indicate better access to care or willingness to invest in health, it can also create financial stress and anxiety if the expenses become burdensome.

Table 4: Ordered logit regression

	1	2	3	4	5	6
	Female Household			Male Household		
	Very worried	Somewhat worried	Not worried at all	Very worried	Somewhat worried	Not worried at all.
Financial literacy	-0.03614*** (0.0125) [0.004]	-0.0084 (0.0034) [0.014]	0.04460 (0.0157) [0.005]	-0.04738 (0.0177) [0.008]	-0.01080 (0.0050) [0.034]	0.05819 (0.0224) [0.010]
Education	-0.11246*** (0.0194) [0.000]	-0.0052*** (0.0035) [0.141]]	-0.11771*** (0.0176) [0.000]	-0.139*** (0.0255) [0.000]	-0.0042** (0.0056) [0.045]	-0.14371 *** (0.0226) [0.000]
Age	-0.00915*** (0.0027) [0.001]	-0.0018*** (0.0006) [0.002]	-0.0110*** (0.0032) [0.001]	-0.019*** (0.0036) [0.001]	0.00227*** (0.0008) [0.008]	-0.0142*** (0.0043) [0.001]
Age Squared	-0.00013*** (0.0000) [0.000]	-0.0002*** (0.0000) [0.000]	0.00016*** (0.0000) [0.000]	-0.018*** (0.000) [0.000]	-0.00003*** (0.0000) [0.002]	0.00021*** (0.0000) [0.000]
SoS	-0.00681* (0.0170) [0.0689]	-0.0015 (0.004) [0.007]	-0.0083** (0.0210) [0.0693]	-0.0141* (0.0239) [0.0553]	-0.0030* (0.0058) [0.0598]	-0.0172** (0.0297) [0.561]
opx	0.2381*** (0.0325) [0.000]	0.03880 *** (0.0148) [0.009]	0.19938*** (0.0189) [0.000]	0.258*** (0.0398) [0.000]	0.0415*** (0.0181) [0.022]	-0.21666*** (0.0236) [0.000]
Interaction	-0.1401*** [0.000]	-0.2410*** [0.000]	-0.4101*** [0.000]	-0.411*** [0.000]	-0.401*** [0.000]	-0.4201*** [0.000]
Income	-0.12213*** (0.0122) [0.000]	-0.02615*** (0.0044) [0.000]	0.14828*** (0.0148) [0.000]	-0.118*** (0.0172) [0.00]	- 0.0235*** (0.0058) [0.000]	0.1417*** (0.0208) [0.000]

Note: The brackets () contain the standard errors, while the square brackets contain the p-values

The study reveals a negative interaction effect between social security and financial literacy on healthcare cost anxiety in China. This finding suggests that these factors work synergistically to reduce financial stress related to healthcare costs. Individuals with both social security coverage and higher financial literacy (indicated by saving for old age) experience a more significant reduction in anxiety than the sum of these factors' individual effects. This complementary relationship likely stems from enhanced financial preparedness, better understanding and utilization of benefits, improved risk mitigation, and a stronger sense of financial security. The results highlight the importance of policies that simultaneously expand social security coverage and promote financial education to effectively address healthcare-related financial concerns. Table 4.

Discussion

Hypothesis 1

Individuals with higher levels of financial literacy are more likely to make informed financial decisions, leading to greater financial security and reduced healthcare cost anxiety. The negative relationship between financial literacy and healthcare cost anxiety aligns with the hypothesis that individuals with higher levels of financial literacy are more likely to make informed financial decisions, leading to greater financial security and reduced healthcare cost anxiety. Research has shown that individuals with higher levels of financial literacy are better equipped to understand and manage their finances, including healthcare expenses. A study by Kim and Garman⁷

found that individuals with higher levels of financial literacy were more likely to engage in positive financial behaviours, such as saving for emergencies and retirement, compared to those with lower levels of financial literacy. This suggests that individuals who are financially literate are more likely to plan for future expenses, including healthcare costs, and have a greater sense of financial security.

In the context of healthcare cost anxiety, individuals with higher levels of financial literacy may be more adept at budgeting for healthcare expenses, understanding insurance coverage, and navigating healthcare billing processes. This can help them make informed decisions about their healthcare spending and feel more confident in their ability to manage healthcare costs. As a result, they may experience lower levels of anxiety related to healthcare expenses. Furthermore, a study by Osabohien *et al.*² found that financial literacy was positively associated with retirement planning and wealth accumulation.³ Individuals who are financially literate are more likely to have savings and assets that can be used to cover unexpected healthcare expenses, reducing the financial strain and anxiety associated with healthcare costs.

Hypothesis 2

Improved social security coverage and benefits will positively impact individuals' confidence in their retirement planning, reducing anxiety related to healthcare cost

The findings of this study, showing that social security has a negative impact on healthcare cost anxiety across total, male, and female populations, strongly support the hypothesis: This supports the foundational role of social security as a financial safety net. This aligns with research by Poterba *et al.*, who found that social security benefits significantly reduce the risk of financial hardship among retirees.⁸ The current study extends this by showing that the protective effect of social security also reduces anxiety about future healthcare costs.

The consistent negative impact across total, male, and female populations suggests that social security provides a broadly equitable reduction in healthcare cost anxiety. This finding relates to work by Jefferson⁹, who emphasized the importance of gender considerations in pension policy design. The current study indicates that social security in China may be effective in

addressing healthcare cost concerns for both genders. The current study suggests that this planning extends to healthcare cost considerations, reducing anxiety about these potential expenses.

The findings align with research by De Nardi *et al.*¹⁰ who highlighted the significant role of health expenses in retirement planning. The negative impact of social security on healthcare cost anxiety in the current study suggests that social security systems can effectively address this key concern in retirement planning. The results support arguments made by Osabohien *et al.*² about the importance of well-designed social security systems in providing economic security. The findings are consistent with the life-cycle hypothesis of saving behaviour, as discussed by Modigliani.¹¹ The reduction in healthcare cost anxiety across all groups suggests that social security allows individuals to better plan for their entire life cycle, including potential healthcare needs in later life.

Hypothesis 3

Financial literacy and social security interaction will collectively contribute to reducing healthcare cost anxiety

The study's findings support the hypothesis that the interaction between financial literacy and social security contributes to reducing healthcare cost anxiety in China. This result aligns with and extends previous research in several key areas. The negative interaction effect suggests a synergistic relationship between financial literacy and social security, consistent with Lusardi and Mitchell's work on financial literacy's role in retirement planning and health expense management.³ It also supports van Rooij *et al.*¹² findings on the association between financial literacy and better retirement planning.

The results reinforce Selim and Aydemir's¹³ concept of financial literacy influencing risk perception and management, while also supporting Fornero and Monticone's¹⁴ arguments about the importance of financial education in complementing social security reforms.^{13,14} The study extends Topa *et al.*¹⁵⁻²⁰ research on financial literacy and reduced financial stress, showing how social security interacts with financial literacy to further alleviate anxiety. It also indirectly supports Berkman *et al.*²¹⁻²⁷ findings on the relationship between health literacy and healthcare utilization.

Strengths and weakness

One of the sailing strengths of the study is that it is among the very first to consider the interaction impact of social security and financial literacy on healthcare cost anxiety, focusing in China. The findings have practical implications for policymakers and healthcare providers, offering insights into potential interventions to reduce healthcare cost anxiety and enhance financial security for individuals. The study also employed robust research methods to collect and analyze data, enhancing the reliability and validity of the findings. However, limitations include the specificity of the findings to the Chinese population, challenges in establishing causality between series under consideration and a potentially limited scope of factors considered. Despite these limitations, the study contributes valuable insights into healthcare cost anxiety in China, highlighting the importance of addressing financial literacy and social security provisions to alleviate individuals' concerns about healthcare expenses

Conclusion

The research focused on the roles of financial literacy, social security, education level, income level, and out-of-pocket expenditure in determining individuals' levels of anxiety related to healthcare costs. One of the key findings of the study was that financial literacy and social security have a significant impact on healthcare cost anxiety. Individuals with higher levels of financial literacy were found to have lower levels of anxiety about healthcare costs, indicating that understanding financial concepts and being able to manage finances effectively can help alleviate concerns about healthcare expenses. Similarly, access to social security benefits was associated with lower levels of healthcare cost anxiety, suggesting that having a safety net in place can provide individuals with a sense of security regarding their healthcare expenses. Furthermore, the interaction between financial literacy and social security was found to have a negative impact on healthcare cost anxiety. This highlights the importance of considering both individual financial knowledge and the availability of social security benefits when assessing anxiety related to healthcare costs. On the other hand, out-of-pocket expenditure was identified as a factor

contributing to healthcare cost anxiety. Individuals who bear a larger share of healthcare costs out-of-pocket were more likely to experience anxiety about their healthcare expenses. The study categorized healthcare cost anxiety into three levels: worried, somewhat worried, and not worried. By understanding the factors influencing these different levels of anxiety, policymakers and healthcare providers can tailor interventions and support services to address the specific needs of individuals experiencing varying degrees of anxiety about their healthcare costs. In conclusion, the study highlights the importance of financial literacy, social security, education level, income level, and out-of-pocket expenditure in determining healthcare cost anxiety in China. By enhancing financial literacy programs, strengthening social security systems, reducing out-of-pocket expenditure, and promoting higher education and income opportunities, policymakers can work towards alleviating anxiety about healthcare costs and improving overall financial well-being in the population.

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