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The Effect of Income on Depression in Old Age-Empirical Analysis Based on CHARLS 2020

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Abstract. The study examines the impact of income on depression levels among individuals aged 60 and older using data from the China Health and Retirement Longitudinal Study (CHARLS) 2020. It found a correlation between income and depression, but the regression analysis did not show statistical significance. Higher levels of depression were associated with marriage and self-rated physical health, while lower levels were associated with gender, education level, and place of living. The research suggests a "four-in-one" synergistic process to improve the mental health and well-being of the elderly.

Keywords: depression in old age, income, CHARLS 2020

1. Introduction

Depression in the elderly population is increasing due to an aging society, and income is a significant factor in mental well-being. However, there is limited research on the impact of money on depression among the aged population. This study investigates the relationship between income and depression in Chinese older adults using the CHARLS2020 data source.

2. Literature Review and Formulation of Questions

The geriatric population is a significant demographic that is susceptible to the onset of depression, and the causes behind this phenomenon are multifaceted. Economic issues have a crucial role in the emergence of negative psychology in the elderly. [1] Income, as a significant socioeconomic determinant, has a substantial influence on the mental well-being of older adults in the field of geriatric depression research. Several studies have demonstrated a noteworthy inverse link between income and elderly depression, [2-3] while there are differing perspectives suggesting that relative income does not have a major impact on senior depression. [4] There is ongoing debate over the influence of income on the mental well-being of older individuals, although there is a consensus regarding the significance of income in relation to their mental health. [5]

Studies have been undertaken to analyze the contributing elements of geriatric depression, including individual characteristics such as gender, as well as aspects like marital status, education level, housing status, and self-rated physical health. [6-7] Furthermore, medical expenses also influence geriatric depression. A multivariate research revealed that medical expenditure significantly influences geriatric depression. Furthermore, older persons with superior medical support are more inclined to maintain a stable and healthy psychological state. [8]

This study uses an ordered logistic regression model to investigate the correlation between income and geriatric depression in older individuals. It uses data from the China Health and Elderly Tracking Survey database to identify potential remedies for geriatric depression.

3. Data Sources and Selection of Variables

3.1. Data Description

This study uses microdata from the China Health and Retirement Longitudinal Study (CHARLS) database, focusing on the senior population aged 60 and above. After excluding missing samples, 6,700 valid samples were collected, excluding missing information.

3.2. Variable Selection

3.2.1. Dependent Variable

This study examines depression among the elderly using the CHARLS questionnaire, which consists of 10 items. Positive questions, such as "I am hopeful about the future" and "I am happy," are considered positive. The survey includes 8 positive and 8 negative questions, assessing the respondent's psychological depression. Each question has four options, with values ranging from 3 to 0 (very little or not at all). The study found that as the score decreases, the respondent's psychological depression also decreases, while as the score increases, the depression level also increases. [9]

3.2.2. Independent Variables

The paper's independent variable is household income, which includes revenue from public transfer expenditures and other sources. The income status of a household is determined by dividing gross yearly household income by the number of permanent residents.

3.2.3. Control Variables

The report included age, gender, greatest level of education, marriage, place of residence, self-assessed physical health, and healthcare expenses as control factors in the model, based on previous academic research results. Specifically, age is calculated based on the respondent's date of birth; gender is assigned the value of "male=1, female=0"; [10]and the highest level of education is assigned the value of "uneducated (illiterate) = 1, did not finish primary school = 2, graduated from private school = 3, graduated from primary school = 4, graduated from junior high school = 5, graduated from senior high school = 6, graduated from junior high school (including secondary teacher training, vocational school, and vocational school) = 6, and graduated from secondary school (including secondary teacher training, vocational school, and vocational school) = 6. 6, secondary school (including secondary teacher training and vocational high school) graduation = 7, college graduation = 8, bachelor's degree graduation = 9, master's degree graduation = 10"; for marriage, the value is "married and living with spouse = 1, married, but temporarily not living with spouse due to work, etc. = 2, separated (no longer living together as spouses) = 3, divorced Marital status: 1 = married and living with spouse; 2 = married but not living with spouse due to work, etc.; 3 = separated; 4 = divorced; 5 = widowed; 6 = never married. Place of residence: 1 = rural, 2 = urban. Self-assessment of physical health: 1 = very good, 2 = good, 3 = average, 4 = bad, 5 = very bad. Medical expenditures include direct or indirect costs.

3.2.4. Model Setting

Table 1. Tests for Covariance

Variant	VIF	Tolerance Level
Household Income	1.025	0.976
Medical Expenditure	1.013	0.987
Age	1.127	0.887
Distinguishing Between the Sexes	1.224	0.817
Highest Level of Education	1.282	0.780
Matrimonial	1.128	0.886
Current Address	1.021	0.980
Self-assessed Physical Health	1.025	0.976

The covariance test revealed that the variables influencing the amount of depression in old age had tolerances over 0.5 and VIF values below 2, demonstrating the absence of multicollinearity. The study model had an overall prediction accuracy of 65.01%, indicating a satisfactory model fit. This paper employs ordered logistic regression to examine the variables influencing depression in the elderly. [11] The expression for the ordered logistic regression model is:

$$p = (y = j/X_i) = \frac{1}{1 \pm e^{-\alpha+\beta X_i}} \quad (1)$$

An ordered logistic model was constructed where "i" represents the ith indicator and the amount of depression in the elderly is categorized into three classes from 0 to 30, with higher scores indicating higher levels of depression:

$$Longit(p_j) = I_n[p(y \leq j)/p(Y \geq j+1)] = \alpha_j + \beta X \quad (2)$$

p(y=j) represents the probability of y being equal to 1, 2, or 3. X is an indicator that influences the amount of depression in old age. The set of regression coefficients associated with X and the intercept of the model are denoted by. Once the parameter estimates are acquired, the likelihood of a specific event (e.g., y=j) occurring can be calculated using the following equation:

$$p(y \leq j/X_i) = \frac{e^{-\alpha+\beta X_i}}{1+e^{-\alpha+\beta X_i}} \quad (3)$$

4. Analysis of Empirical Results

The study reveals a significant correlation between family income, medical spending, age, gender, education level, marriage, residence site, and self-assessed physical health and depression levels. Family income, gender, education level, and residence site negatively impact depression, while medical expenses, age, marriage, and self-rated physical health positively correlate with depression levels. Further analysis using regression can further understand these variables.

Table 2. Correlation Analysis

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
1. Depression levels	1								
2. Household Income	-0.049**	1							
3. Medical Expenditure	0.027*	0.029*	1						
4. Age	0.029*	-0.051**	-0.025*	1					
5. Distinguishing Between the Sexes	-0.165**	0.003	0.011	0.008	1				
6. Highest Level of Education	-0.173**	0.096**	0.031*	-0.168**	0.384**	1			
7. Matrimonial	0.104**	-0.024*	-0.075**	0.284**	-0.165**	-0.139**	1		
8. Current Address	-0.135**	0.114**	0.025*	-0.012	-0.018	0.190**	-0.007	1	
9. Self-assessed Physical Health	0.318**	-0.061**	0.072**	0.046**	-0.064**	-0.065**	0.015	-0.071**	1

Based on the findings presented in Table 3, the factors of marriage and self-rated physical health were positively associated with increased levels of depression in old age. On the other hand, gender, greatest level of education, and site of residence were negatively associated with increased levels of depression in old age.

Thorough examinations have revealed that alterations in marital status can heighten the probability of depression in elderly individuals. Experiencing the death of a spouse or being in an unpleasant marriage can cause older persons to feel lonely, have less social support, and struggle with their mental well-being. This, in turn, can worsen their levels of depression. Older individuals' self-rated physical health is positively correlated with higher levels of depression, possibly due to their dissatisfaction or excessive worry about their physical health status, which is strongly linked to depressed mood. Therefore, older adults who perceive their physical health as inferior may face an elevated chance of experiencing higher degrees of depression due to the interplay of several factors.

Table 3. Ordered Logistic Regression Results

Variant	β value	standard error	Vardø (city in Finnmark, Norway)	95 per cent Confidence Interval lower limit	limit
Household Income	-0.000	0.000	0.882	1.000	1.000
Medical Expenditure	0.000	0.000	1.130	1.000	1.000
Age	-0.008	0.005	3.119	0.983	1.001
Distinguishing Between the Sexes	-0.470**	0.058	64.565	0.557	0.701
Highest Level of Education	-0.115**	0.017	47.950	0.863	0.921
Matrimonial	0.104**	0.018	35.208	1.072	1.148
Current Address	-0.504**	0.060	70.012	0.527	0.680
Self-assessed Physical Health	0.712**	0.029	585.069	1.924	2.159
Cox and Snell	0.150				
Goodness-of-fit Chi-square Value	1086.266				
Chi-square Test Probability Group	0.000				
-2log Likelihood Estimate	10123.627				

Note: $p<0.05$ is *, $p<0.01$ is **.

The inverse correlation between gender and depression in later life is due to various factors. Women are more vulnerable to stress and mood fluctuations, while women face more external pressures due to socio-cultural influences. Older individuals with higher education have a lower likelihood of experiencing depression due to stronger coping mechanisms, financial and health awareness, and a better living environment. However, older individuals living in certain locations have higher levels of depression. The provision of secure, comfortable, and easily accessible community facilities and a favorable living environment can significantly improve the overall well-being and contentment of the senior population, reducing feelings of isolation and minimizing depression.

5. Conclusions and Recommendations

5.1. Conclusion

Collectively, the aforementioned studies demonstrate a robust association between family income and the extent of depression in later life. However, the regression model does not reveal a substantial impact of family income on the level of depression in old age. The variables of gender, educational attainment, and place of residence had a negative correlation with the level of depression in older individuals. There was a strong positive correlation between marriage and self-rated physical health and geriatric depression.

5.2. Recommendations

Elderly depression is a significant social issue that impacts the general well-being of society and requires immediate attention. To address this issue, it is crucial for various stakeholders to collaborate and implement a "four-in-one" collaborative system that considers the viewpoints of the individual, family, community, and government.

From a subjective perspective, older individuals should use digital devices to enhance their self-directed learning capacity, such as watching educational videos and enrolling in online courses. Engaging in moderate physical activities can boost physical fitness and psychological resilience against stress. From a familial standpoint, it is essential for young people to exhibit compassion, respect, and patience while helping the elderly alleviate daily life burdens and offer medical and psychological assistance.

From a sociocultural standpoint, it is essential to foster reciprocal aid within society and establish an all-encompassing social ambiance. Communities should arrange voluntary services for older individuals, offering tangible assistance like grocery shopping, carrying items, and providing medical treatment. Society should embrace a comprehensive and welcoming mindset, offering emotional and social support networks to address the psychological challenges faced by the elderly.

From a governmental standpoint, there is a need to enhance policies aimed at providing assistance to the elderly and encourage the transformation of society to be more accommodating and supportive of the aging population. The government can facilitate the expansion of mental health services for older individuals by enacting legislation and providing policy guidance to community organizations, non-profit institutions, and volunteer groups. Additionally, the government can allocate more funds towards the establishment of mental health service centers and the training of personnel in this field.

In conclusion, fostering an inclusive social environment that values and supports the elderly is crucial for the gradual recovery of elderly depression.

Both of the two authors have made equally significant contributions to the work and share equal responsibility and accountability for it.

References

[1] Ai, X., Xu, A., Qiao, X., & Song, Y. (2021). Study on health shock and influencing factors of low-income population. Journal of Nanjing Medical University (Social Science Edition), 21(6), 572-578.

[2] Jiang, M., Tan, L., Fan, Y., & Zhan, R. (2021). Correlation between sleep quality, self-perceived health level and depression among community-dwelling older adults in Guangzhou. Chinese Journal of Gerontology, 41(18), 4095-4098.

[3] Li, J., Wang, L., Li, S., Zhou, B., & Yang, L. (2021). Investigation on nutritional status and related factors of elderly patients with depression of psychiatric hospital in Henan Province. Modern Preventive Medicine, 48(13), 2347-2350+2367.

[4] Li, Y., Lu, J., Cheng, Q., & Gu, D. (2020). Association between Social Participation and Depression among Older Adults in China. Population and Development, 26(3), 86-97.

[5] Wang, H., & Zhang, C. (2023). The nonlinear effect of income on the depression levels of the elderly--empirical evidence from CHARLS. Journal of Nanjing Medical University(Social Sciences), 23(5), 442-449.

[6] Hu, J. (2019). Gender Differences in Depression of Older Adults and Its Influencing Mechanism. Journal of China Women's College, 31(4), 64-73.

[7] Si, M., Ai, D., Huang, L., Liang, D., & Xu, J. (2023). Empirical Analysis on the Influential Factors of the Elderly Health in China Based on CHARLS Data. China Health Care Management, 40(7), 552-556.

[8] Hu, X., & Feng, R. (2022). The Effect of Inter-Generational Support on Depression of the Elderly--Analysis of Moderating Effects Based on Internet Using. Journal of Dalian University, 43(6), 93-101.

[9] Tang, D., Chen, R., & Bu, T. (2022). The Impact of Parental Living Arrangement on Child's Mental Health--Empirical Evidence Based on CHARLS Data. Population and Development, 28(3), 141-155+30.

[10] Ling, W., & Hao, Y. (2023). The Impact of the Elderly's Perceptions of Eldercare Responsibility on Willingness to Purchase Elderly Care Services--Empirical Analysis Based on CLASS 2018. *Social Security Research, *(1), 14-24.

[11] Li, C., & He, T. (2023). Influencing Factors of Information Literacy of Primary School Teachers in Longyan City--an Empirical Analysis Based on Ordered Logistic Regression Model. Journal of Longyan University, 41(5), 103-110.