



The Differential Effects of Household Income on Depressive Symptoms in Older Adults with Different Personality Traits

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Abstract. Background and Objective: With the accelerating population aging in China, late-life depression has emerged as a prominent public health concern. Household income, a core socioeconomic indicator, may exert heterogeneous effects on mental health outcomes among older adults conditional on individual personality traits. This study empirically analyzes the differential associations between household income and depressive symptoms in older adults with distinct personality characteristics, and explores the moderating role of personality traits in the income – depression linkage. The findings aim to inform the development of targeted mental health intervention strategies for the elderly population.

Methods: Data were drawn from the 2018 China Family Panel Studies (CFPS), covering a final sample of 3,625 adults aged 60 years and older. Depressive symptoms, the dependent variable, were assessed using the 8-item Center for Epidemiologic Studies Depression Scale (CES-D8). The core independent variable was official household per capita income, and the moderating variables encompassed the Big Five personality traits. Based on social stratification theory, stress theory, and life-cycle consumption theory, hierarchical binary logistic regression models were adopted to examine the main effects of household income and personality traits, as well as their interactive effects on depressive symptoms.

Results: (1) Household income exhibited a significant negative gradient association with depressive symptoms. Compared with the low-income group, both the middle-income group (OR = 0.624) and high-income group (OR = 0.496) showed significantly lower risks of depression ($p < 0.001$). (2) Personality traits yielded significant main effects on depressive symptoms. Neuroticism served as a prominent risk factor (OR = 1.290, $p < 0.001$), whereas conscientiousness (OR = 0.911), extraversion (OR = 0.951), and agreeableness (OR = 0.926) acted as protective factors. Openness was identified as a marginal risk factor for depression (OR = 1.048, $p < 0.01$). (3) Moderation analyses revealed significant modifying effects of specific personality traits. Conscientiousness exerted a marginally significant moderating effect on the income – depression association (high income $\times$ conscientiousness: $\beta = -0.123$, $p = 0.065$), further reducing depression risk among high-income older adults. Neuroticism significantly moderated this association (high income $\times$

neuroticism: $\beta = 0.131$, $p = 0.021$, $OR = 1.140$); each one-unit increase in neuroticism was associated with a 14% elevation in depression risk, attenuating the protective effect of high income. Similarly, extraversion showed a significant moderating effect (high income $\times$ extraversion: $\beta = 0.157$, $p = 0.013$, $OR = 1.170$), weakening the negative income – depression linkage. By contrast, agreeableness and openness showed no significant moderating effects. (4) Heterogeneity analyses indicated that middle income significantly reduced depression risk across all subgroups. High income exerted significant protective effects on rural males, urban females, and urban males (with the strongest effect observed in rural males), while its protective impact on rural females failed to reach statistical significance.

Conclusion: Household income is a robust protective factor against depressive symptoms in older adults, yet its protective magnitude is contingent on individual personality traits. Older adults with high neuroticism, low conscientiousness, low extraversion, and low agreeableness are more susceptible to income fluctuations and constitute key target populations for precise mental health interventions. These findings suggest that public health policies and social interventions should shift from universal service models to targeted strategies. Prioritizing economic support for low-income, high-neuroticism older adults, combined with cognitive behavioral therapy and behavioral activation interventions, can optimize mental health outcomes among the elderly.

Keywords: Household Income; Depressive Symptoms; Age Heterogeneity; Mental Health

1 Introduction

1.1 Background

National mental health is a cornerstone of the Healthy China 2030 strategy. As social transformation accelerates and living rhythms change^[1], mental health issues have transcended individual well-being to affect human resource sustainability, social cohesion, and long-term national development. However, depressive symptoms have become increasingly prevalent among both young and elderly populations, yet the underlying mechanisms may differ fundamentally across the life course.

Youth (18–35) face multiple role transitions—from student to worker, from child to spouse and parent—that create significant psychological strain. According to the 2022 National Mental Health Survey, the detection rate of depression risk among 18–24 year olds reached 24.1%, and 12.3% among 25–34 year olds^[2], both significantly higher than older age groups. Mental health problems in youth can lead to reduced productivity, cognitive decline, chronic diseases, and even suicide, imposing substantial costs on individuals, families, and society.

Simultaneously, population aging has become a major social challenge. The Seventh National Census reported 260 million people aged 60 and above (18.7% of the total population), an increase of 5.44 percentage points since 2010.^[3] The World Health Organization reports that over 20% of adults aged 60+ suffer from mental

disorders, and 6.6% of disability is attributable to mental disorders, accounting for 17.4% of healthy life years lost^[4]. Older adults experience physiological decline and social role changes, making them highly vulnerable to mental health problems.

Household income—a core indicator of socioeconomic status—affects mental health through multiple pathways: material resource access, healthcare affordability, life stress exposure, and social comparison^[5]. However, the effect of income on mental health may vary by life stage. Despite growing research, no study has systematically compared the income–depression relationship between young and elderly populations within the same analytical framework.

1.2 Research Objectives

This study aims to:

- Describe the current status of depressive symptoms among youth and elderly;

- Estimate the effects of household income on depressive symptoms separately for each group;

- Directly test whether income's effect differs significantly between the two age groups;

- Provide evidence-based recommendations for age-differentiated mental health interventions.

1.3 Research Significance

Theoretically, this study integrates life-cycle consumption theory, social stratification theory, and stress theory to explain age heterogeneity in income's mental health effects. It moves beyond single-group studies to reveal life-stage specificities.

Practically, it supports precise policy-making by showing that youth and elderly require different combinations of economic support and psychological services, guides professional social work interventions, and helps optimize family and community support systems.

2 Methods

2.1 Data Source and Sample

Data came from the 2018, 2020, and 2022 waves of the China Family Panel Studies (CFPS), a nationally representative survey. After merging and cleaning, we retained individuals who participated in all three waves and met age criteria: youth (18–35) and elderly (≥ 60). The final balanced sample comprised 2,068 young adults and 2,268 older adults (4,336 person-year observations).

2.2 Variables

Depressive symptoms (dependent): CES-D8 scale (0–24). Scores ≥ 9 indicate clinically relevant depressive tendency.

Household income (independent): Official per capita household income (yuan/year), log-transformed in models. For descriptive comparisons, income was divided into low (<25th percentile), middle (25th–75th), and high (>75th) groups.

Control variables: Gender, age, marital status, urban/rural residence, education, employment, self-rated health, family size, and year fixed effects.

2.3 Statistical Analysis

Random effects models were used to account for individual heterogeneity and to preserve time-invariant variables (including age group). First, separate models were estimated for youth and elderly. Second, a pooled model with an age-group $\times$ income interaction term directly tested whether income's effect differed significantly between groups. Subgroup analyses by gender and urban/rural residence were conducted.

2.4 Random Effects Models

Panel data models address unobserved individual heterogeneity. Fixed effects models eliminate all time-invariant variables (including age group), making them unsuitable for comparing predetermined groups. Therefore, we used random effects models, which allow estimation of both time-varying and time-invariant covariates and are more efficient.

3 Results

3.1 Random Effects Models

Table 1 presents results for youth. Only high income was significantly associated with lower depressive symptom scores ($\beta = -0.035$, $p = 0.016$). Middle income showed no significant effect. Being male, having a spouse, good self-rated health, and larger family size were protective. Depressive scores increased significantly in 2020 and 2022 relative to 2018.

Table 1. The Effect of Income on Depressive Symptoms among Youth

Variable	Coefficient	Std. Error	p-value
Income group (ref: Low income)			
Middle income	-0.020	0.002	0.108
High income	-0.035	0.015	0.016

Table 2 shows results for the elderly. Both middle ($\beta = -0.051$, $p < 0.001$) and high income ($\beta = -0.070$, $p < 0.001$) were strongly protective, with high income producing a larger effect. Being male, having a spouse, good health, and urban residence were protective. Family size was not significant for the elderly.

Table 2. The Effect of Income on Depressive Symptoms among Elder

Variable	Coefficient	Std. Error	p-value
Income group (ref: Low income)			
Middle income	-0.051	0.010	<0.001
High income	-0.070	0.014	<0.001

3.2 Interaction Test (Age Group $\times$ Income)

In the pooled model (Table 3), high income significantly reduced depressive symptoms overall ($\beta = -0.035$, $p = 0.016$). The elderly had higher depression scores than youth ($\beta = 0.050$, $p = 0.012$). Critically, both interaction terms were significantly negative: middle income $\times$ elderly ($\beta = -0.039$, $p = 0.019$) and high income $\times$ elderly ($\beta = -0.049$, $p = 0.010$). This confirms that the protective effect of income on depressive symptoms is significantly stronger for the elderly than for youth.

Table 3. The Effect of Income on Depressive Symptoms among Youth and Elderly Populations

Variable	Coefficient	Std. Error	p-value
Income group (ref: Low income)			
Middle income	-0.020	0.013	0.108
High income	-0.035	0.016	0.016
Age group (ref: Youth)			
Elderly	0.050	0.020	0.012
Interaction terms			
Middle income $\times$ Elderly	-0.039	0.016	0.019
High income $\times$ Elderly	-0.049	0.019	0.010

3.3 Heterogeneity

Income's protective effect was strongest among rural elderly women ($\beta = -0.102$, $p < 0.001$) and weakest among urban elderly men ($\beta = -0.054$, $p < 0.001$). For youth, income effects did not differ significantly by gender or urban/rural residence.

Subgroup results by gender and urban/rural residence. For youth, income significantly reduced depressive symptoms in all four subgroups, with coefficients ranging from -0.022 (urban males) to -0.038 (rural males). No statistically significant differences were found across subgroups (interaction $p > 0.05$).

For the elderly, income effects were highly significant in all subgroups but showed a clear gradient. The strongest protective effect was for rural women ($\beta = -0.102$, $p < 0.001$), followed by rural men ($\beta = -0.079$, $p < 0.001$), urban women ($\beta = -0.071$, $p < 0.001$), and urban men ($\beta = -0.054$, $p < 0.001$). Interaction tests confirmed that the effect was significantly stronger for rural residents (urban $\times$ income: $\beta = -0.031$, $p = 0.002$) and for women (gender $\times$ income: $\beta = -0.021$, $p = 0.023$). The rural elderly women's coefficient (0.102) was nearly double that of urban elderly men (0.054).

4 Discussion

4.1 Summary of Main Findings

This study yields three principal findings regarding the income-depression relationship across age groups in China. First, household income serves as a significant protective factor against depressive symptoms for both youth and elderly populations, yet the income threshold at which this protective effect manifests differs markedly between the two groups. For youth, only high income—defined as the top tertile of the household income distribution—confers a statistically significant reduction in depressive symptoms, whereas middle-income status does not produce a discernible protective effect relative to low-income status. For the elderly, by contrast, both middle and high income are associated with significantly lower depressive symptom scores compared to the low-income reference group. Second, the protective effect of income is substantially stronger for the elderly than for youth, a difference that is statistically confirmed by formal interaction analysis between age group and income level. This finding suggests that the mental health returns to income are not uniform across the life course but instead exhibit meaningful age-graded variation. Third, within the elderly population, the protective effect of income is most pronounced among rural women and least pronounced among urban men, indicating that the mental health benefits of economic resources are not evenly distributed even within the same age stratum. These subgroup differences point to the intersecting roles of gender, geographic location, and cumulative life-course disadvantage in shaping the psychological utility of income.

4.2 Theoretical Interpretation: Life-Cycle and Stress Mechanisms

Life-cycle consumption theory provides a powerful explanation. Youth are in the wealth-accumulation phase: their perceived lifetime resources are dominated by the present value of future labor income. Even if current income is modest, a promising career trajectory can generate high expected lifetime wealth, buffering the psychological impact of current income constraints. For youth, income operates primarily through social comparison and developmental expectations, not survival needs. This explains why only high income—which signals superior relative status—significantly reduces depressive symptoms.

In contrast, the elderly are in the wealth-decumulation phase. Future labor income is zero. Their total lifetime wealth is essentially fixed as the present value of financial assets and pension flows^[6]. Current income directly constitutes the resources available for daily living, healthcare, and maintaining dignity. There is no future income to offset a present shortfall. Consequently, income shortfalls trigger immediate and profound economic insecurity, which stress theory (Selye, 1936) identifies as a chronic stressor that elevates cortisol, disrupts metabolism, and increases depression risk.

The stronger effect among rural and female elderly reflects cumulative disadvantage. Rural elderly have weaker pension coverage, poorer healthcare access, and fewer public services. Female elderly face longer life expectancy, higher widowhood risk, and lower lifetime earnings. For these groups, income is not just another resource—it is often the only line of defense against poverty-related despair.

4.3 Comparison with Previous Literature

Our finding that the income effect is strongest among rural elderly women and weakest among urban elderly men is consistent with the "cumulative disadvantage" hypothesis and resonates with prior empirical observations. Studies using CHARLS data have shown that rural elderly women are the most economically vulnerable subgroup in China, with the lowest pension coverage rates, highest poverty rates, and poorest self-rated health (Wang et al., 2018; Zhang & Li, 2020). The mental health consequences of this economic vulnerability have been documented in regional and local studies, though our national-level comparative analysis provides broader generalizability. Internationally, research on socioeconomic inequalities in aging has consistently demonstrated that the health returns to income are larger among disadvantaged groups—those with lower education, racial/ethnic minorities, and women—because these groups have fewer compensatory resources (Kawachi et al., 2010; McMunn et al., 2006). Our findings extend this international literature to the Chinese context, providing empirical support for the proposition that late-life income transfers and social protection policies may yield particularly high mental health returns when targeted toward rural and female elderly populations who have experienced cumulative disadvantage across the life course. From a policy perspective, this suggests that universal pension benefits, while valuable, may produce more equitable mental health outcomes if supplemented by targeted top-ups

for the most disadvantaged subgroups. anticipated but rarely empirically demonstrated using panel data and formal interaction tests.

The stronger effect in rural and female elderly aligns with the “cumulative disadvantage” hypothesis ^[7]. Socioeconomic inequalities widen with age because early-life disadvantages compound over the life course. Our findings suggest that late-life income transfers may be particularly effective for those who have experienced cumulative disadvantage.

4.4 The Null Effect of Middle Income for Youth

A particularly counterintuitive finding in our analysis is that belonging to the middle-income group—relative to the low-income bracket—does not confer a statistically significant reduction in depressive symptoms among young people. This null effect challenges the conventional linear assumption that any increase in financial resources invariably improves mental health, and instead points to the powerful role of psychosocial processes, especially social comparison.

In a hyper-competitive, consumption-driven society, middle-income youth are uniquely positioned to experience relative deprivation (Runciman, 1966). Unlike their low-income counterparts, who may have lower baseline expectations, middle-income youth often possess sufficient material resources to access higher-education environments, professional social circles, and digital media platforms where exposure to high-income lifestyles is pervasive and frequent. This constant upward comparison—amplified by social media and peer networks—can foster feelings of inadequacy, status anxiety, and perceived injustice, effectively offsetting any mental health benefits that their moderate economic advantage might otherwise provide. In this context, the psychological toll of “keeping up” appears to neutralize the protective effect of income until a certain threshold is reached. Only when household income ascends to the highest echelon—where socioeconomic status becomes unambiguously superior and comparative scrutiny is minimized—does income begin to serve as a robust buffer against depressive symptoms. This nonlinear pattern aligns closely with relative deprivation theory and receives empirical support from recent youth-focused studies (Wang & Yuan, 2025; He et al., 2025), which consistently demonstrate that subjective social status, rather than objective income alone, mediates the income–mental health gradient in younger cohorts.

By contrast, this relative deprivation mechanism appears to be markedly attenuated among the elderly. The post-retirement life stage naturally reduces exposure to workplace-based hierarchies, competitive performance evaluations, and career-driven peer interactions. For older adults, social comparison tends to shift toward age-peer groups with more homogeneous economic circumstances, or focuses on non-material domains such as health and family relationships. Consequently, the cognitive and emotional salience of income differentiation diminishes, which may explain why the middle-income effect—whether protective or null—is less pronounced in this population.

4.5 Time Trends

Our longitudinal data reveal a clear and concerning secular trend: both youth and elderly groups experienced significant increases in depressive symptom scores from 2018 to 2022, with the trajectory being notably steeper among the younger cohort (a net increase of 0.066 for youth versus 0.050 for the elderly). This period encapsulates the global COVID-19 pandemic and its cascading socioeconomic aftershocks, which appear to have exerted a disproportionately heavier mental health burden on young adults.

For youth, the pandemic disrupted multiple foundational life domains simultaneously. Widespread job market contractions led to record youth unemployment and underemployment, eroding financial security at a critical career-entry stage. Educational disruptions—including prolonged remote learning, campus closures, and delayed graduations—fractured social networks and diminished institutional support structures that are vital for identity formation and social skill development. Moreover, pandemic-induced social isolation likely intensified the very social comparison processes discussed earlier, as young people turned to digital platforms where curated, high-achieving lifestyles remained omnipresent, further exacerbating feelings of falling behind. In contrast, while the elderly also suffered from increased isolation and health anxieties, their relative insulation from labor-market volatility and educational transitions may have somewhat buffered the acute psychosocial shocks of the pandemic.

The persistent upward slope in depressive symptoms across both age groups, even as pandemic restrictions eased, signals that these mental health deteriorations are not merely reactive but may reflect enduring structural and psychological scars. This trend warrants urgent, continued monitoring and calls for age-targeted policy interventions. For youth, policies should prioritize job creation, mental health counseling in educational institutions, and digital well-being initiatives that mitigate harmful social comparison. For the elderly, strengthening community-based social support and accessible tele-mental health services remains imperative. Without sustained policy attention, these widening mental health disparities risk translating into long-term productivity losses, increased healthcare utilization, and reduced quality of life across generations.

5 Conclusion

Household income is an important protective factor against depressive symptoms in both age groups, but its protective strength and threshold vary significantly across the life course. The elderly, particularly rural women, derive greater mental health benefits from income than youth, consistent with life-cycle consumption theory and the cumulative disadvantage hypothesis. For youth, only high income confers protection, likely reflecting the role of social comparison and developmental expectations. These findings suggest that public policies should move beyond a universal approach towards age-differentiated and subgroup-targeted strategies: strengthening pension transfers and economic support for rural and female elderly,

while addressing relative deprivation and improving career prospects for youth. Integrated interventions combining economic support with psychological services may yield optimal mental health gains across age groups. From a social work perspective, these findings underscore the need for comprehensive, life-course-sensitive approaches that address both the material and psychological determinants of mental health.

References

1. Allison, P. D. (2009). *Fixed Effects Regression Models*. SAGE Publications. <https://doi.org/10.4135/9781412993869>.
2. Boyce, C. J., Brown, G. D. A., & Moore, S. C. (2010). Money and happiness: Rank of income, not income, affects life satisfaction. *Psychological Science*, 21(4), 471–475. <https://doi.org/10.1177/0956797610362671>.
3. Central Committee of the Communist Party of China, State Council. (2016). *Healthy China 2030 Planning Outline*. Beijing: People's Publishing House. https://www.gov.cn/zhengce/2016-10/25/content_5124174.htm.
4. Chen, Z. Y., Guo, F., & Fang, Y. (2023). *2022 National Mental Health Survey Report: Current Status, Influencing Factors, and Services*. Beijing: Social Sciences Academic Press. http://psy.china.com.cn/2025-04/29/content_43093074.htm.
5. Dannefer, D. (2003). Cumulative advantage/disadvantage and the life course: Cross-fertilizing age and social science theory. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 58(6), S327–S337. <https://doi.org/10.1093/geronb/58.6.S327>.
6. He, H., Jiao, J., & Wang, X. (2025). Are young people living alone more depressed? An empirical study based on CFPS 2012–2022 panel data. *Population Journal*, 47(3), 50–64. [10.16405/j.cnki.1004-129X.2025.03.004](https://doi.org/10.16405/j.cnki.1004-129X.2025.03.004).
7. Kawachi, I., Adler, N. E., & Dow, W. H. (2010). Money, schooling, and health: Mechanisms and causal evidence. *Annals of the New York Academy of Sciences*, 1186(1), 56–68. <https://doi.org/10.1111/j.1749-6632.2009.05340.x>.
8. McMunn, A., Nazroo, J., & Breeze, E. (2006). Inequalities in health at older ages: A longitudinal investigation of the onset of illness and survival effects in England. *Age and Ageing*, 35(1), 45–51. <https://doi.org/10.1093/ageing/afj002>.

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