Typical Correlation Analysis between Depression Level and Family Social Environment in Elderly People

Xintong Lyu

School of Management, Guangdong University of Science and Technology, Dongguan, Guangdong, 523083, China

lvxintong@gdust.edu.cn

Abstract: This article selects data from the 2018 CHARLS follow-up survey, uses a canonical correlation analysis model to divide relevant variables into phenomenon group and cause group to explore the relationship between the degree of depression and influencing factors in elderly people in China. The results indicate that the poorer the health status of elderly people, the more likely they are to be depressed. The more harmonious the family relationship, the lower the likelihood of depression, and there was no significant correlation between the number of people providing care and depression. Based on this, relevant suggestions are provided to provide theoretical basis and reference for improving the mental health of the elderly.

1. Introduction

At present, how to deal with various social issues brought about by population aging has become a focus of attention. We urgently need to combine reality and conduct more in-depth research to promote aging healthily. The elderly is a high-risk group for depression, which is also recognized as the most common psychological disease in old age[1]. Depression is also closely related to mental health issues[2]. In numerous previous studies, many scholars have categorized the factors that affect the mental health of elderly people into the following categories: age, individual traits, and physical condition[3][4]. Although the psychological health problems of the elderly are directly related to the aging of their physical functions, in recent years, more and more scholars have found that social environment, economic level, family environment, etc. are also key factors leading to depression in the elderly[5][6]. Cohabiting spouses and children have a positive impact on the mental health of elderly people[7][8]. Mutual care between elderly people and cohabiting spouses can generate positive emotions, while children can provide financial support and daily care for them[9][10]. In addition, research has found that a higher level of economic income means more positive emotions and a lower probability of developing depressive symptoms[11]. This paper conducts a canonical correlation analysis of the depression status of the elderly and its influencing environmental factors.

2. Data source and variable selection

2.1. Data source

The sample data for this paper is sourced from the China Health and Retirement Longitudinal Study, hereinafter referred to as CHARLS. The survey adopted a sampling method, covering the middle-aged and elderly population in 28 provinces, cities, and autonomous regions of China. After preliminary analysis of the data, this article selected a sample of elderly people aged 60 and above who lived in households for analysis, and ultimately screened 1170 valid sample data, including 662 female samples and 508 male samples.

2.2. Variable selection

The evaluation index system constructed in this paper includes two parts. One part is the evaluation index system for the degree of depression in the elderly, selecting 10 questions related to

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depression, and using A1 to A10 to represent the first set of indicators. The higher the indicator assignment, the higher the frequency of a certain feeling and behavior. The other part is the environmental evaluation index system for the elderly, which selects 9 indicators including "marital satisfaction", " children satisfaction ", "health satisfaction ", etc. Among them, selecting elderly people's subjective satisfaction can more accurately reflect the degree of harmony in family relationships. Satisfaction issues are measured using a 5-point Likert scale, and 1 and 5 respectively represent extremely satisfied and not at all satisfied. The indicator of " rating of living conditions " is compiled from some questions in the questionnaire on property and housing conditions. The specific indicator description is shown in Table 1.

Table 1 Indicators and descriptions.

Indicator	Description	Mean	Min	Max
A_1	Bothered by things that don't usually bother me	2.234	1	4
A_2	Had trouble keeping my mind on what I was doing	2.292	1	4
A_3	Felt depressed	2.342	1	4
A_4	Felt everything I did was an effort	2.637	1	4
A_5	Felt hopeful about the future	2.412	1	4
A_6	Felt fearful	1.657	1	4
A_7	Sleep was restless	2.545	1	4
A_8	Felt Happy	2.665	1	4
A_9	Felt lonely	1.894	1	4
A_{10}	Could not get "going"	1.831	1	4
B_1	Chidren satisfication	3.525	1	5
B_2	Marriage satisfication	3.283	1	5
B_3	Air quality satisfaction	3.191	1	5
B_4	Life satisfaction	3.134	1	5
B_5	Health satisfaction	2.523	1	5
B_6	Self-Reported health status	2.391	1	5
B_7	Number of people who can provide care and assistance	1.248	1	4
B_8	Number of cohabitation	0.402	0	4
B_9	Rating of living conditions	5.082	2	10

3. Empirical Results and Analysis

3.1. Factor Analysis of Depression Degree Indicator System

Due to the large number of selected indicators and the complex relationship between them, this paper conducts factor analysis on the two parts of indicator systems to determine suitable common factors before conduct typical correlation analysis.

Through factor analysis of 10 indicators evaluating the degree of depression in the elderly, it was found that the KMO value was 0.863 and Sig=0.000, indicating that these indicators are suitable for factor analysis. Then, using the oblique rotation method, three factors were obtained, which together explained 58.99% of the total sample information.

The first factor includes four indicators: A_1, A_2, A_3, and A_4. Based on the content of the indicators and their load coefficients, it can be named as the "willpower activity" factor. The higher the factor score, the higher the degree of willpower decline, and it explains 24.45% of the entire sample information. The second factor includes four indicators: A_6, A_7, A_9, and A_{10}. Based on their load coefficients, they can be named as the "negative emotion" factor, which explains 21.15% of the entire sample information. The third factor includes two indicators: A_5, and A_8, so it can be named the "positive emotion" factor, which explains 13.39% of the entire sample information.

Table 2 Factor loading matrix of depression degree indicator system.

	Factor loading			Factor load after rotation		
	m_1	m_2	m_3	m_1	m_2	m_3
A_1	.691	.041	-.230	.669	.287	-.048
A_2	.607	.199	-.468	.790	.030	.041
A_3	.707	.036	-.279	.711	.264	-.067
A_4	.679	.155	-.219	.677	.267	.065
A_5	.173	.795	.102	.230	.043	.785
A_6	.561	-.029	.414	.149	.678	.067
A_7	.516	-.257	.380	.089	.666	-.160
A_8	-.261	.726	.299	-.232	-.092	.789
A_9	.648	-.049	.351	.231	.649	-.007
A_{10}	.173	.795	.102	.249	.695	.028

To describe the depression situation of the elderly more clearly, the calculated factor comprehensive scores were displayed by gender and residential area classification, as shown in Figure 1. Overall, women in the elderly population have a higher probability of depression than men. From a regional perspective, the more remote the living area is, the higher the probability of depression.
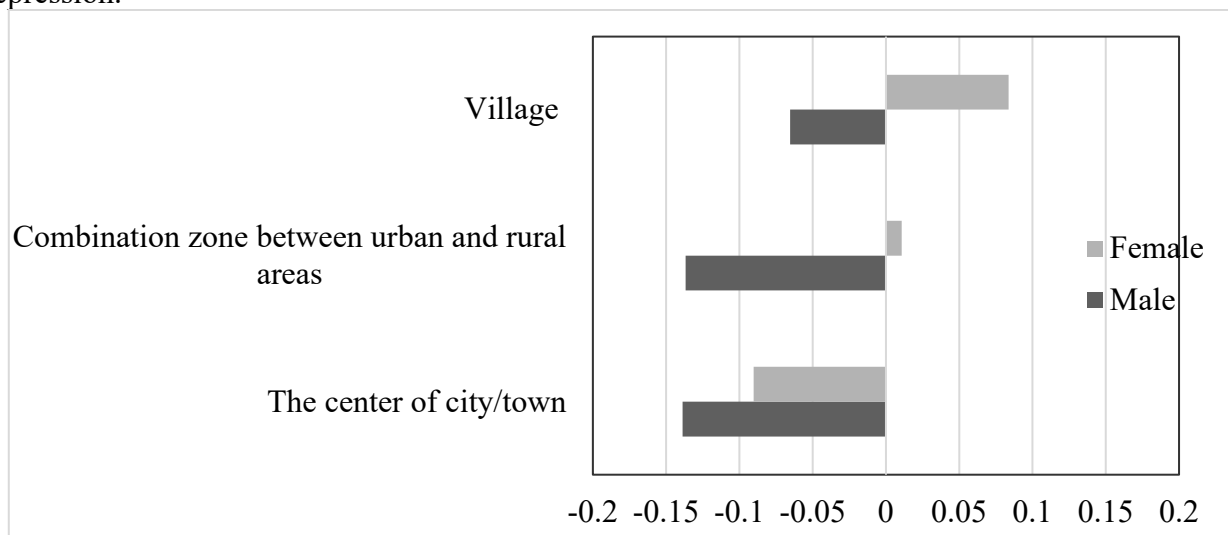

Figure 1 Comparison of average comprehensive scores.

3.2. Factor Analysis of the Environmental evaluation Indicator System

Using the same method, the selected elderly family and social environment evaluation indicators were analyzed, and the results showed that the KMO value was 0.706 and Sig=0.000, indicating that factor analysis is suitable. Then, using the oblique rotation method, four factors were obtained, which together explained 63.23% of the total sample information. Among them, the first factor includes three indicators, namely B_1, B_2, and B_4. According to the meaning of the indicators, it can be named the "family relationship" factor, which explains 21.08% of the entire sample information. The second factor includes B_5 and B_6, so it can be named "health status" factor, which explains 17.78% of the entire sample information. The third factor includes B_7 and B_8, so it can be named the "number of caregivers " factor. The fourth factor includes B_3 and B_9, so it can be named the "living conditions" factor.

Table 3 Factor loading matrix of the Environmental evaluation Indicator System.

	factor loading				Factor load after rotation			
	n_1	n_2	n_3	n_4	n_1	n_2	n_3	n_4
B_1	.609	-.193	.319	-.098	.709	.072	.075	-.079
B_2	.609	-.186	.313	-.234	.746	.038	-.005	.020
B_3	.476	-.348	.107	.428	.391	.215	.161	-.563
B_4	.727	-.036	.063	-.237	.684	.323	-.086	.104
B_5	.735	.083	-.355	.141	.351	.744	-.074	-.103
B_6	.552	.333	-.434	.221	.075	.803	.040	.023
B_7	-.044	.125	.728	.334	.157	-.328	.721	-.088
B_8	.111	.674	.175	.447	-.163	.358	.715	.177
B_9	.167	.654	.189	-.536	.195	.086	.146	.844

3.3. Typical correlation analysis

3.3.1. Typical correlation coefficient and testing

This paper divide willpower activities (m_1), negative emotions (m_2), and positive emotions (m_3) to the phenomenon group, while family relationships (n_1), health status (n_2), number of caregivers (n_3), and living conditions (n_4) to the cause group.Perform canonical correlation analysis using seven factors obtained from factor analysis.

The typical correlation coefficients are shown in Table 4. The first pair of typical variables passed the significance test, with a typical correlation coefficient of 0.518, indicating a typical correlation relationship between the cause group and the phenomenon group.

Table 4 Typical correlation coefficients and the testing.

	canonical correlation	F	DF	Sig.
1	.518	27.922	12.000	0.000***
2	.101	1.834	6.000	0.089*

Note: ***, **, and * respectively represent significance levels of 1%, 5%, and 10%.

3.3.2. Coefficient of typical variable

To clarify the relative magnitude of the two sets of common factors in forming typical variables, it is also necessary to examine the expression of typical variables. The first typical variable from the phenomenon group is:

$$M_1 = -0.605m_1 - 0.604m_2 + 0.517m_3$$

The first typical variable of the causal group is:

$$N_1 = +0.651n_1 + 0.727n_2 - 0.075n_3 + 0.205n_4$$

3.3.3. Typical structural analysis

From the results, in the first typical variable of the phenomenon group, the common factor load coefficients are -0.651, -0.604, and 0.517, respectively. Among them, the coefficients of the "decline in willpower activity " factor and the "negative emotion" factor are negative, which are negatively correlated with the first typical variable M1 of the phenomenon group. Therefore, M1 can describe depression. The coefficients of cause groups n1, n2, and n4 are positive, while the coefficients of n3 are negative and the load coefficient is not high, which can be ignored.

Based on the above analysis, it was found that the degree of depression in elderly people is influenced by the social and family environment. The level of family harmony and personal health status experienced by the elderly greatly affects their depression status. Based on the above analysis, it was found that the degree of depression in elderly people is influenced by the social and family environment. The level of family harmony and personal health status experienced by the elderly greatly affects their depression status. If the elderly's satisfaction with family relationships increases

by 1%, their level of depression will decrease by 33.72%. If their health condition improves by 1%, their level of depression will decrease by 37.66%. In addition, the degree of depression in elderly people is also related to their living conditions, with a 1% improvement in living conditions reducing the degree of depression by 10.61%. Compared to other factors, the number of caregivers who provide support is not significantly related to the level of depression, possibly because the number of caregivers does not simply describe the level of care experienced by the elderly.

4. Conclusion

Health issues are one of the main factors leading to depression in the elderly, and they are also a problem that the elderly population is prone to as they age. Decreased physical function and chronic disease problems may affect the quality of life of elderly people, thereby affecting their mental state. Emphasis should be placed on strengthening medical security for the elderly, while also paying attention to the psychological health issues of the elderly population and promoting health.

Strengthen the construction of national filial piety culture and promote the culture of mutual assistance and friendliness among neighbors. Family relationships, as the foundation of communication among the elderly, greatly affect their mental health. A good and harmonious relationship between husband and wife can bring great comfort to the elderly's mental health.

Increase subsidy support, strengthen the implementation of welfare policies, and ensure the basic livelihood of the elderly, especially those in rural areas. In different residential areas, there are significant differences in living standards and environments, which is also the reason for the different depression conditions of elderly people in different regions. The living standards have a significant impact on the mental health of the elderly, especially in rural areas.

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