

# Correlation Between Depressive Symptoms And Quality Of Life, And Associated Factors For Depressive Symptoms Among Rural Elderly In Anhui, China

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**Purpose:** We aimed to assess the current status of depressive symptoms and quality of life (QoL) among rural elderly in central China (Anhui Province) and explore their correlation and associated factors for depressive symptoms.

**Methods:** A multi-stage random sampling method was used to obtain 3349 participants (aged  $\geq 60$ ): 1206 poor and 2143 non-poor. The 30-item Geriatric Depression Scale (GDS-30) and five-dimensional European quality of health scale (EQ-5D) were employed to evaluate depressive symptoms and QoL, respectively.

**Results:** The prevalence of depressive symptoms was 52.9%, and that in the poor group (62.3%) was significantly higher than the non-poor group (47.6%). The GDS-30 score was  $12.40 \pm 7.089$ , and the poor group scored significantly higher ( $14.045 \pm 6.929$ ) than the non-poor group ( $11.472 \pm 7.011$ ). The EQ-5D score was  $0.713 \pm 0.186$ , and the poor group ( $0.668 \pm 0.192$ ) scored significantly lower than the non-poor group ( $0.738 \pm 0.178$ ). There was a significant negative correlation between depressive symptoms and QoL ( $r = -0.400$ ,  $P$ -value  $< 0.05$ ). The following factors were associated with depressive symptoms: poverty, low EQ-5D score, female gender, older age, illiteracy, unemployed, chronic diseases, and hospitalization in previous year.

**Conclusion:** Rural elderly in central China have a high prevalence of depressive symptoms and low QoL. Poverty was associated with a higher prevalence of depressive symptoms and lower QoL.

**Keywords:** depressive symptoms, quality of life, rural elderly, central China

## Introduction

Aging is an inevitable social problem around the globe, and China has the world's largest elderly population. According to the National Bureau of Statistics, in 2018, the population aged 60 years and over in China was 249.49 million (17.9% of the total population), with more than two-thirds living in rural areas.<sup>1</sup> It was predicted that the proportion of elderly persons aged 60 and over in China will exceed 30% of the total population by 2050.<sup>2</sup> With this rapid growth, increasingly more elderly persons are suffering from age-related mental diseases. Depression is the most common mental disorder found in the elderly population around the world, putting tremendous pressure on the social health service system.<sup>3</sup> In addition, with the medical and social developments for the aging population, elderly persons seek to

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have not only a long life but also high quality of life (QoL). Thus, researchers are increasingly interested in assessing depressive symptoms and QoL in older adults.

Depression is an important public health problem in the elderly population, as late-life depression might have serious consequences, such as an increased risk of suicide.<sup>4</sup> In addition, it is anticipated that depression will become the second most common cause of disability in the world by 2020.<sup>5</sup> The worldwide prevalence of depressive disorders varies between 4.5% and 37.4%.<sup>6</sup> However, in recent years, especially in rural China, the prevalence of geriatric depression far exceeds this rate. A study on geriatric depression in rural China showed a prevalence rate of 30.8%.<sup>7</sup> Previous research found that being female, older, illiterate, solitary, and cognitively impaired were risk factors for geriatric depression.<sup>8–11</sup>

The QoL of elderly persons has become another important public health problem because of demographic changes as a result of aging. Studies found that the QoL scores of elderly persons were lower than those of non-elderly individuals.<sup>12</sup> Although QoL has been widely investigated for many years, there are scarce relevant research data on the QoL of the rural elderly population in central China. Most previous studies were mainly based on Chinese urban residents or special disease groups. Assessment scales mainly included the 12-Item Short-Form Health Survey (SF-12), the 36-Item Short-Form Health Survey (SF-36), and the World Health Organization Quality of Life (WHOQOL)-BREF and mainly aimed to identify factors influencing QoL.<sup>13–15</sup>

Previous studies revealed that QoL is an important factor affecting depression in the elderly.<sup>16</sup> However, the impact of QoL on the psychology of the elderly is difficult to assess. There is currently a feasible method to assess the correlation between depression and QoL.<sup>17</sup> However, there is limited research on this correlation among the rural elderly population of central China.

Anhui Province is located in the central part of China. The terrain consists of plains, hills, and mountains, with a geographical area of 140,100 km<sup>2</sup>. The per capita gross domestic product was 47,712 CNY (about 7210 dollars) in 2018,<sup>18</sup> and the level of economic development was at a medium level in China. At the end of 2018, the resident population of the province was 63.236 million, of which the proportion aged 60 and over was 18.34%, and the proportion aged 65 and over was 12.97%.<sup>19</sup> As in other provinces in China, aging has become a serious social problem. Anhui Province is the first province in China to implement a comprehensive reform of the primary health care system.

Compared with western China, the health service level in Anhui Province is good, but it is lower relative to eastern China.<sup>20</sup>

We conducted this study to assess the current status of depressive symptoms and QoL among rural elderly (aged  $\geq 60$ ) in central China (Anhui Province) and explore their correlation and associated factors for depressive symptoms. We believe our findings will provide a scientific theoretical reference for further improving the physical and mental health of rural elderly, and promoting grass-roots public health services in central China.

## Methods

### Study Design And Sample

A multi-stage sampling survey method was used to randomly select one county in the northern, central, and southern regions of Anhui Province in central China, respectively, from January to July 2018 for the current study. In each county, two towns were randomly selected, in each of which three villages were randomly chosen. This made a total of 18 villages as survey sites. In each of the selected villages, 50 households were randomly selected according to the list of poor households (the per capita net income of rural households in China was less than 2736 CNY in 2013). Simultaneously, non-poor survey households were selected among the neighbors of poor households in a ratio of 1:1.5. Participants were elderly persons (aged  $\geq 60$ ) from the poor and non-poor households. Among the households surveyed, all of the elderly aged 60 years and over were the participants. The investigation was conducted with the assistance of local health care committees, village committees, and village doctors. Questionnaires were completed through a face to face interview conducted by specially trained investigators visiting the participants' homes.

We surveyed 3491 elderly persons (900 poor households and 1350 non-poor households) and obtained 3349 valid questionnaires (1206 poor and 2143 non-poor elderly respondents). The effective response rate was thus 95.93% (3349/3491).

Persons aged 60 years and over and living at their residence for at least 1 year participated in the survey. Exclusion criteria included having cognitive impairments and language communication barriers as well as being unavailable for the investigation.

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics

Committee of Anhui Medical University. All respondents provided written informed consent and volunteered to participate in the survey.

## Assessment Instruments

### 30-Item Geriatric Depression Scale (GDS-30)

The GDS-30 is a tool for measuring depressive symptoms in elderly adults and has been widely used in different countries around the world.<sup>21,22</sup> Each item in the scale is a question that respondents need to answer using “Yes” or “No”. Scale items 1, 5, 7, 9, 15, 19, 21, 27, 29, and 30 are scored with 1 point for “No” and 0 points for “Yes”; the remaining 20 items are scored with 1 point for “Yes” and 0 points for “No”; thus, the total score ranges from 0 to 30 points. Previous research confirmed that the GDS-30 scale has high sensitivity (70.6%) and specificity (70.1%) in a Chinese sample aged 60 years and over, and internal consistency was confirmed by a Cronbach’s  $\alpha$  value of 0.890.<sup>23</sup> Elderly individuals with a GDS-30 score higher than or equal to 11 are considered to have depressive symptoms.<sup>24</sup>

### Five-Dimensional European Quality Of Health Scale (EQ-5D)

The Chinese version of the EQ-5D scale was employed to assess the QoL of respondents. Previous research confirmed that the scale had good reliability and validity in a Chinese elderly sample.<sup>25</sup> Internal consistency was confirmed by a Cronbach’s  $\alpha$  value of 0.7026.<sup>26</sup> The scale consists of the EQ-5D health state description system and the EQ-visual analogue scale (EQ-VAS) scores. The EQ-5D health state description system consists of five dimensions: mobility (M), self-care ability (SC), usual activities (UA), pain/discomfort (PD), and anxiety/depression (AD). The respondents self-rate the level of problem severity in each dimension using three levels: no problems, moderate problems, and extreme problems, coded as 1, 2, and 3, respectively. The EQ-VAS is a 20-cm visual scale, from 0 (representing the worst health condition in mind) to 100 (representing the best health condition in mind); respondents rate their health status on that day using the most appropriate point on the visual scale.

Considering geographic and ethnic factors, we used the Japanese scale utility scoring system, by which the utility score was calculated according to the following formula:  $U(\text{utility scoring}) = 1 - (0.152 + 0.075 * M2 + 0.418 * M3 + 0.054 * SC2 + 0.102 * SC3 + 0.044 * UA2 + 0.133 * UA3 + 0.080 * PD2 + 0.194 * PD3 + 0.063 * AD2 +$

$0.112 * AD3)$ , where 0.152 is a constant term; M2, SC2, UA2, PD2, and AD2 represent the M, SC, UA, PD, and AD, respectively, in the second level (code 1); otherwise the code is 0. M3, SC3, UA3, PD3, and AD3 represent the M, SC, UA, PD, and AD in the third level (code 1); otherwise the code is 0.<sup>27</sup> For example, “21223” stands for a state of having moderate problems in M, UA, and PD, and extreme AD;  $U = 1 - (0.152 + 0.075 + 0 + 0.044 + 0.080 + 0.112) = 0.537$ . The higher the EQ-5D utility score, the better the QoL; while the higher the dimension score, the worse the dimension. The total utility score U ranges from -0.111 to 1.

## Demographic Characteristics

The survey collected key demographic information of participants, including poverty, age, gender, education level, profession status, number of chronic diseases, living arrangement (others refer to living with a spouse and unmarried children, living with a spouse and married children, single elderly living with children, and living with their relatives), and hospitalization within previous year.

## Statistical Analysis

A double data entry procedure was followed by two trained data-entry workers using EpiData 3.1 software (EpiData Association, Odense, Denmark). Data were analyzed using SPSS 16.0 (SPSS, Inc., Chicago, IL, USA). A descriptive analysis was used to describe the demographic characteristics of the sample. The chi-square test was used to compare the demographic characteristics of the two groups (i.e., poor and non-poor). Multiple linear regression was used to adjust for demographic characteristics. Partial correlation analysis was used to analyze the correlation between depressive symptoms and QoL. Binary logistic regression analysis was used to assess the associated factors for depressive symptoms, and the forced introduction method was used to include the independent variables. Covariates with a P-value < 0.2 on univariate analysis were included in multivariable model. A two-tailed P-value < 0.05 was considered to be statistically significant.

## Results

### Sample Characteristics

In total, 3349 respondents comprised the effective sample, including 1206 poor and 2143 non-poor elderly persons. Table 1 shows the demographic characteristics of the two groups. Age ranged from 60 to 97 years (mean age  $71.17 \pm 7.087$  years), with the average age of the poor group

**Table 1** Demographic Characteristics And Depressive Symptoms Of Respondents, N (%)

Variables	Total (n = 3349)	Poor (n = 1206)	Non-Poor (n = 2143)	P-Value
Age				
60–69	1535 (45.8)	504 (41.8)	1031 (48.1)	0.002
70–79	1332 (39.8)	509 (42.2)	823 (38.4)	
≥80	482 (14.4)	193 (16.0)	289 (13.5)	
Gender				
Male	1648 (49.2)	645 (53.5)	1003 (46.8)	<0.001
Female	1701 (50.8)	561 (46.5)	1140 (53.2)	
Education				
Illiterate	2215 (66.1)	832 (69.0)	1383 (64.5)	0.009
Elementary and above	1134 (33.9)	374 (31.0)	760 (35.5)	
Profession				
Unemployed	2146 (64.1)	856 (71.0)	1290 (60.2)	<0.001
Employed	1203 (35.9)	350 (29.0)	853 (39.8)	
Chronic diseases				
0	870 (26.0)	258 (21.4)	612 (28.6)	<0.001
1	1231 (36.7)	445 (36.9)	786 (36.7)	
2	757 (22.6)	307 (25.5)	450 (21.0)	
≥3	491 (14.7)	196 (16.3)	295 (13.8)	
Living arrangement				
Alone	660 (19.7)	257 (21.3)	403 (18.8)	0.165
With a spouse	1440 (43.0)	499 (41.4)	941 (43.9)	
Others	1249 (37.3)	450 (37.3)	799 (37.3)	
Hospitalization				
Yes	1063 (31.7)	476 (39.5)	587 (27.4)	<0.001
No	2286 (68.3)	730 (60.5)	1556 (72.6)	
Depressive symptoms				
Presence	1772(52.9)	751(62.3)	1021(47.6)	<0.001
Absence	1577(47.1)	455(37.7)	1122(52.4)	

(71.74 ± 7.121 years) being significantly higher than that of the non-poor group (70.84 ± 7.04 years). The proportion of males in the poor group (53.5%) was significantly higher than that in the non-poor group (46.8%). A total of 66.1% of the participants were illiterate, 64.1% were unemployed, and the proportion of illiterate (69.0%) and unemployed participants (71.0%) in the poor group was significantly higher than that in the non-poor group (64.5% and 60.2%, respectively).

A total of 74.0% of the participants had chronic diseases, and the proportion of individuals with two chronic diseases and three or more chronic diseases in the poor group was significantly higher than in the non-poor group. Moreover, 19.7% of the participants lived alone and 43.0% lived with a spouse, and there were no significant

differences in living arrangements between the poor and non-poor groups. Finally, 31.7% of the participants had been hospitalized the year before the survey, and the percentage in the poor group (39.5%) was significantly higher than in the non-poor group (27.4%) (Table 1).

## Depressive Symptoms And QoL

Table 1 also shows the evaluation of the prevalence of depressive symptoms in the survey sample, which was 52.9%. The prevalence of depressive symptoms in the poor group (62.3%) was higher than in the non-poor group (47.6%), and the difference between the two groups was statistically significant (P-value <0.001).

Table 2 shows the evaluation of depressive symptoms and QoL in the sample. The average GDS-30

**Table 2** Depressive Symptoms And QoL Scores (Mean  $\pm$  SD) And Differences Between Poor And Non-Poor Groups By Multivariate Linear Regression

Variables	Poor	Non-Poor	Total	t-Value <sup>a</sup>	P-Value <sup>a</sup>
M	0.051 $\pm$ 0.077	0.034 $\pm$ 0.057	0.041 $\pm$ 0.066	4.323	<0.001
SC	0.016 $\pm$ 0.028	0.009 $\pm$ 0.022	0.012 $\pm$ 0.025	4.455	<0.001
UA	0.034 $\pm$ 0.037	0.024 $\pm$ 0.034	0.028 $\pm$ 0.036	5.457	<0.001
PD	0.063 $\pm$ 0.040	0.052 $\pm$ 0.042	0.056 $\pm$ 0.042	5.479	<0.001
AD	0.034 $\pm$ 0.036	0.022 $\pm$ 0.032	0.026 $\pm$ 0.034	6.714	<0.001
EQ-5D	0.668 $\pm$ 0.192	0.738 $\pm$ 0.178	0.713 $\pm$ 0.187	-7.302	<0.001
EQ-5D VAS	65.803 $\pm$ 13.159	71.266 $\pm$ 18.277	69.299 $\pm$ 16.820	-8.142	<0.001
GDS-30	14.045 $\pm$ 6.929	11.472 $\pm$ 7.011	12.398 $\pm$ 7.089	6.314	<0.001

**Notes:** <sup>a</sup>Adjust for following demographic variables: age, gender, education, profession status, number of chronic diseases, living arrangement, and hospitalization within previous year.

score of the survey sample was  $12.40 \pm 7.089$ , and the poor group's score ( $14.045 \pm 6.929$ ) was higher than that of the non-poor group ( $11.472 \pm 7.011$ ). After adjusting for demographic characteristics, the difference between the two groups was statistically significant (P-value <0.001).

The EQ-5D utility score for the whole sample was  $0.713 \pm 0.186$ , and the EQ-5D VAS score was  $69.30 \pm 16.820$ ; the poor group's EQ-5D utility score ( $0.668 \pm 0.192$ ) and EQ-5D VAS score ( $65.80 \pm 13.159$ ) were lower than those of the non-poor group ( $0.738 \pm 0.178$  and  $71.27 \pm 18.277$ , respectively). For each QoL dimension, the scores of the poor group were higher than those of the non-poor group, and the difference between the two groups was statistically significant after adjusting for demographic characteristics (P-value <0.001).

## Correlation Of Depressive Symptoms And QoL

Table 3 shows the partial correlation analysis between depressive symptoms and QoL. After controlling for demographic characteristics, the partial correlation analysis showed a significant negative correlation between depressive symptoms and QoL ( $r = -0.400$ , P-value <0.001), and there was also a significant negative correlation between

depressive symptoms and QoL in the poor and non-poor groups (P-value < 0.001).

## Associated Factors For Depressive Symptoms

Binary logistic regression analysis was conducted with the presence of depressive symptoms as the dependent variable, and poverty, EQ-5D score, gender, age, education, profession, living arrangement, hospitalization in previous year, and number of chronic diseases as independent variables. The results showed that poverty (OR =1.402), low EQ-5D score (OR =0.010), female gender (OR =0.605), older age (OR =1.017), illiteracy (OR =1.340), unemployed (OR =1.234), suffering from chronic diseases (OR =1.101), and hospitalization in previous year (OR =1.445) were associated factors for depressive symptoms among rural elderly persons. Living arrangement had no effect on depressive symptoms (Table 4).

## Discussion

Depression and QoL in rural elderly persons are important public health issues that may have a major impact on primary health care systems. However, there are few studies examining depression and QoL among rural elderly individuals in central China, and the correlation between

**Table 3** Partial Correlation Between Depressive Symptoms And QoL

Variable	GDS Score					
	Total <sup>a</sup>		Poor <sup>b</sup>		Non-Poor <sup>b</sup>	
	r	P-Value	r	P-Value	r	P-Value
EQ-5D score	-0.400	<0.001	-0.365	<0.001	-0.419	<0.001

**Notes:** <sup>a</sup>Control variables: poverty, age, gender, education, profession, living arrangement, hospitalization within previous year, and number of chronic diseases; <sup>b</sup>Control variables: age, gender, education, profession, living arrangement, hospitalization within previous year, and number of chronic diseases.



**Table 4** Binary Logistic Regression Analysis Of Associated Factors For Depressive Symptoms

Variables	B	SE	Wald	P-Value	OR	95% CI
Poverty (Non-poor <sup>a</sup> )	0.338	0.083	16.699	<0.001	1.402	1.192 – 1.649
EQ-5D score	–4.594	0.270	289.358	<0.001	0.010	0.006 – 0.017
Gender (Female <sup>a</sup> )	–0.503	0.086	34.297	<0.001	0.605	0.511 – 0.716
Age	0.017	0.006	8.223	0.004	1.017	1.005 – 1.030
Education (Elementary and above <sup>a</sup> )	0.292	0.089	10.820	0.001	1.340	1.125 – 1.595
Profession (Employed <sup>a</sup> )	0.211	0.085	6.073	0.014	1.234	1.044 – 1.460
Chronic diseases	0.096	0.039	6.105	0.013	1.101	1.020 – 1.188
Living arrangement (Not alone <sup>a</sup> )	–0.129	0.101	1.630	0.202	0.879	0.721 – 1.071
Hospitalization (No <sup>a</sup> )	0.368	0.086	18.166	<0.001	1.445	1.220 – 1.711
Constant	1.784	0.484	13.612	<0.001	5.954	–

Note: <sup>a</sup>Reference group.

Abbreviations: SE, standard error; OR, odds ratio; CI, confidence interval.

depressive symptoms and QoL in this population has not been previously reported. The results of this study provide a scientific theoretical basis and reference values for the prevention and control of depressive symptoms in rural elderly persons in central China.

## Prevalence Of Depressive Symptoms

The results of the current study showed that the prevalence of depressive symptoms among rural elderly persons in central China was 52.9%, which is higher than previously reported rates of depression in rural Chinese elderly also using the GDS-30. For example, He G et al<sup>28</sup> reported a prevalence of depression of 36.94% among elderly persons in rural China, and another survey in rural China reported 18.1%.<sup>29</sup> The high prevalence of elderly depressive symptoms may be due to the rapid development of urbanization in China in recent years. The rural youth labor force has flocked to urban areas, resulting in a rapid increase in the proportion of rural elderly persons and weakening the family's economic and spiritual support for elderly persons.

Using the same measurement tool, Park J et al<sup>30</sup> reported a prevalence of depression in the elderly population in Korea was 30.3%; Arslantas D et al<sup>31</sup> found that the prevalence of depression among elderly persons in Turkey was 45.8%; moreover, the prevalence of

depression in Mexico elderly adults reported by Ortiz GG et al<sup>32</sup> was 29.1%. The prevalence of depressive symptoms in rural elderly individuals in central China was higher than the above findings. The reasons may be as follows: First, the social security system for the elderly in rural areas in China is imperfect. Financial support from their children is the main form of support available to the elderly in rural areas, which is often unstable and unreliable. To a certain extent, this support system has increased the psychological burden on the elderly. Second, the concept of filial piety in Chinese traditional culture is crucial to the social support of rural elderly: children are the main source of social support for parents and families. However, with the rapid development of urbanization in China, rural young and middle-aged laborers have been flocking to cities, and the lack of family members to care for the rural elderly in daily life may be another reason for the high prevalence of depressive symptoms.

This study also found that the prevalence of depressive symptoms in poor elderly persons was higher than that in non-poor elderly persons, which is similar to the findings of Fang M et al.<sup>33</sup> The poor economic situation of poor elderly persons may lead to negative attitude towards life, affect mental health, and generate a vicious circle, which may lead to depressive symptoms.

## QoL

The utility score of EQ-5D in our study was  $0.713 \pm 0.186$ , which is lower than that reported by Zhou Z et al<sup>17</sup> using the same scale with rural Chinese elderly in different living arrangements (living with a spouse: 0.8652, living alone: 0.8427, living with a spouse and adult children: 0.8652, single elderly living with adult children: 0.7720). Parker L et al<sup>34</sup> used the EQ-5D with community elderly persons in the UK and reported a value of  $0.78 \pm 0.2$ . Moreover, Chen Y et al<sup>35</sup> found that the education level was related to the QoL of elderly persons. The low QoL score in this study may result from the lower education level of rural elderly persons in this study. In addition, a low education level may indirectly affect individuals' employment opportunities and even income.<sup>36</sup> Our analysis also found that the QoL of the elderly with low economic level was also low. It may be that a low-income level cannot provide an adequate material life basis or medical services for the elderly, which affects their QoL.

## Correlation Of Depressive Symptoms And QoL

A significant negative correlation between depression and QoL has been demonstrated in previous cross-sectional studies.<sup>37–39</sup> Sivertsen H et al<sup>5</sup> and González-Celis AL et al<sup>40</sup> found a negative correlation between depression and QoL, consistent with the results of this study. As age increases, to some extent, elderly persons experience a decline in the function of the body organs due to biological and psychological changes, which leads to a gradual decrease in QoL.<sup>5</sup> The psychological burden of elderly persons may be worsened by the long-term low QoL, leading to the occurrence or aggravation of depressive symptoms.

## Associated Factors For Depressive Symptoms

This study found that poverty, low QoL, older age, female gender, illiteracy, unemployed, suffering from chronic diseases, and hospitalization in the previous year were associated factors for depressive symptoms among rural elderly, and studies have reported similar results.<sup>41,42</sup>

Consistent with the findings of Grant BF et al,<sup>43</sup> this study found that older persons have a higher prevalence of depressive symptoms. With increased age, elderly persons' physical function declines, and vulnerability to chronic diseases and negative emotions increase, leading to depressive symptoms.<sup>44</sup>

The prevalence of depressive symptoms among rural elderly women was higher than among men, which is consistent with the findings of Bossola M et al.<sup>45</sup> In rural China, elderly women lose the role of traditional housewives when they age, especially after their husbands die, and they are often alone with reduced family support, which increases the possibility of depressive symptoms.<sup>41</sup>

The higher prevalence of depressive symptoms in elderly persons with lower education level and those unemployed is consistent with studies by Grant BF et al<sup>43</sup> and Kong XY et al.<sup>46</sup> Elderly persons with lower education level, who have fewer social resources than those with higher education, have lower self-care awareness and less able to adjust their emotions when experiencing negative life events.<sup>47</sup> At the same time, a low education level may also affect the employment of elderly persons, resulting in poverty.

In addition, this study found that the prevalence of depressive symptoms in elderly persons who had been hospitalized in the previous year and those with chronic diseases was higher, consistent with the findings of Song AQ et al<sup>48</sup> and Lebowitz BD et al.<sup>49</sup> This may be because elderly individuals suffer from chronic diseases, which have long disease courses and are difficult to cure; thus, they need to be hospitalized frequently. Long-term medical expenses not only increase the family's economic burden but also the psychological burden of the elderly, which can lead to the occurrence or aggravation of depressive symptoms in the long term.

However, this study found that rural elderly persons with different living arrangements did not differ in terms of prevalence of depressive symptoms. Kaneko Y et al<sup>50</sup> showed that the prevalence of depression in elderly persons living alone was higher than those living in other arrangements. The reason for the different results may be that the units of rural communities in China are relatively small. Rural elderly people live in concentrated communities and have close communication with their neighbors in daily life, which means that there is little difference in daily lifestyle between those living alone and those not living alone. In addition, although family help is the main form of support for rural elderly people in China, the basic life of the elderly living alone or not living alone has been effectively protected since the Chinese government established the pension policy for the elderly in 2015.

## Strengths And Limitations

The effective response rate of this study was 95.93%, which is very high. It is well known that the results

obtained from surveys with high response rates and large samples are very reliable. At the same time, many potential associated factors were also investigated, including demographic characteristics, physical condition, and QoL. However, there were some limitations to this study. Most importantly, the included study sample was from Anhui Province in central China, and samples from other provinces in China and other countries should be included in further in-depth studies in the future. Secondly, the cross-sectional nature of this study limits the ability to infer causality. Further limitations include the use of the GDS-30 to measure depressive symptoms not combined with clinical depression diagnosis may cause accuracy of the results. Finally, this study was based upon self-reports, which may increase recall bias and exclude potentially important associated factors for depressive symptoms such as cognitive impairment or disability.

## Conclusion

This was a large cross-sectional study investigating the status of depressive symptoms and QoL among rural elderly in central China, as well as the correlation between depressive symptoms and QoL, and the factors influencing depressive symptoms. Our study provides baseline information for future research and useful data on depressive symptoms and associated factors from China, which helps to better understand its epidemiology in China and compares China with other countries. We found that rural elderly persons in central China had a higher prevalence of depressive symptoms and lower QoL; the prevalence of depressive symptoms in poor elderly persons was higher than in non-poor elderly persons, and poor elderly persons' QoL was lower than that of non-poor elderly participants. Poverty, lower QoL, female gender, older age, illiteracy, unemployed, chronic diseases, and hospitalization within the previous year were associated with depressive symptoms. These findings have a certain significance for health promotion and protection among the elderly population in rural China. It is important not only to perfect the mechanism of the aging security but also to establish elderly leisure and entertainment facilities to improve QoL in rural China. It is also necessary to introduce elderly clinics in medical care services and provide psychological counseling services for early detection and treatment of high-risk depressive symptom groups in order to improve the mental health of elderly persons in rural areas and promote healthy aging.

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## Disclosure

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