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Research Article

Loneliness or Sociability: The Impact of Social Participation on the Mental Health of the Elderly Living Alone

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Background. China will inevitably enter a medium, severe, or deep aging society in the future, and the number of elderly people living alone is also increasing. Mental health is a major issue for older people living alone. With the deepening of aging, social participation has become an important way to promote mental health and improve the quality of life of the elderly. *Methods*. This study uses data from Chinese Longitudinal Health Longevity Survey (CLHLS). Based on the CLHLS data of 2018, this paper uses multiple ordered logistic models to measure the mental health level of elderly people living alone through two dimensions of depression and anxiety and carries out a heterogeneity analysis on the mental health level of elderly people living alone. *Results*. The analysis of 2477 elderly people living alone shows that the increase of social participation in simple communication can reduce the degree of depression and anxiety of elderly people living alone, and the decrease of social participation in self-recreation can reduce the degree of depression and anxiety of elderly people living alone. In addition, the heterogeneity analysis found that the heterogeneity of social participation was more significant among the elderly living alone with different genders, ages, places of residence, and self-care abilities. *Limitations*. This study has some limitations, and CES-D-10 is a screening tool and cannot fully determine the presence of depression in high-rise older adults living alone. *Conclusions*. In the future, primary healthcare-targeted interventions can be provided according to the different degrees of depression and anxiety of elderly people living alone.

1. Introduction

According to the data of the seventh national census, by 2020, the population aged 60 and over accounted for 18.70%, of which the population aged 65 and over accounted for 13.50%. The proportion of the population aged 65 and over increased by 4.63 percentage points [1]. Compared with the growth of 1.82 percentage points from 2000 to 2010, the growth rate of the elderly population in China is obvious, but the average annual growth rate of the total population in 2020 is lower than that in 2010. With the slow growth of the total population and the rapid growth of the elderly population in sharp contrast, China will inevitably enter a medium, heavy, or deep aging society. Dang mentioned that in 2020, there were 494.16 million households in China, with an average population of 2.62 per household and a decrease of 0.48 compared with 3.1 in 2010. This indicates that the size of households is shrinking, and there are a large number of special families such as solitary families and empty nest families, showing an increasing trend. In 2015, the proportion of the elderly living alone in China was 13.1%, and the proportion of the elderly living only with their spouses was 38.2%, totaling 51.3%, an increase of 16.2 percentage points over 2000 [2].

In traditional Chinese culture, "more children, more happiness" is a deep-rooted concept in the hearts of the elderly, and living alone represents a miserable life in old age. The elderly living alone not only live separately from their children but also from their spouses who have passed away or divorced. Compared with the empty nesters, they are a more vulnerable group. Mental health status has an important impact on the daily life of the elderly and is also closely related to the occurrence of physical diseases. It can improve the mental health status of the elderly and is of great significance for reducing the incidence of disease, controlling the progress of disease, and reducing the medical and

health burden of families and society. The 14th Five-Year Plan for healthy aging has clearly listed mental health as a serious challenge facing the current aging work and emphasized the important role of mental health for the elderly at various levels. With the deepening of aging, social participation has become an important way to promote the mental health of the elderly and improve their quality of life.

2. Literature Review

There are few studies on the social participation of the elderly living alone in China, and there are many studies on the mental health of the elderly living alone, but there are very few studies on social participation for the mental health of this specific group of elderly living alone. The elderly living alone is a vulnerable group that the World Health Organization (WHO) focuses on, and their mental health problems have also attracted much attention. Chen and Wang et al. believe that the elderly living alone are the most prominent group of mental health problems in the elderly group. Living alone reduces the interpersonal communication and social support of the elderly in their daily life, and the visits or companionship of relatives and friends are relatively low. When the elderly living alone are eager to integrate into the outside world, their needs are not met. They are more likely to develop symptoms of anxiety and depression, and poor mental health problems lead to an increasing risk of illness and accidental injury [3, 4]. However, some foreign researchers say that living alone is not without any benefits for the elderly. Compared with the elderly living with their spouses or children, the elderly living alone will participate more actively in social activities, participate more in society, enrich their daily lives, and have more life experiences [5]. Living alone gives the elderly more free time to explore social activities outside the family. Living with children may cause family conflicts, make family relations tense, and reduce the subjective well-being of the elderly.

The social participation of the elderly can be defined from many perspectives, such as participating in social activities [6], establishing social networks [7], producing social value [8], and exchanging resources [9]. These definitions emphasize the functionality of social participation. Social participation is an important part of active aging, which aims to help older persons reintegrate into society, not only in work and daily sports but also in social, economic, political, cultural, spiritual, social affairs, and other fields of social participation. The Political Declaration of the Second World Conference on Ageing in Madrid in 2002 stated: "To seek the full integration and participation of older persons in society; to enable older persons to contribute more effectively to the development of their communities and societies; and to continuously improve the care and support needed by older persons." "In this context, supporting the elderly to participate in social activities has become an important implementation path to alleviate the aging of the population." At present, there are many research results on the impact of social participation on the health of the elderly, but there is still a lack of different perspectives. From the perspective of research objects, scholars pay more attention to the overall elderly, but less attention to the individual elderly living alone. In terms of research content, most of the studies on the elderly living alone focus on external factors such as their economic situation, family support, nursing services, and government policies, while the internal adjustment effect of their own is rarely involved.

Mental health is receiving more and more attention as an important part of health [10]. Depression, as a part of mental health disorders, is the main cause of mental health-related diseases in the global burden of disease [11]. Unlike other elderly people, the most important characteristic of elderly people who live alone is that they are alone, not only taking care of their bodies but also planning their lives. Studies have found that elderly people living alone are more likely to suffer from mental illness than those living with their families [12]. In the past, studies on the mental health of the elderly living alone mainly focused on different regions [13], different genders [14], and the relationship between depression and related factors [15]. These studies only take the level of depression as the criteria for mental health evaluation [16], and some scholars have positioned the criteria on life satisfaction, happiness, and attitude towards aging [17]. Few scholars have comprehensively evaluated the mental health level of the elderly from different dimensions. On this basis, this paper conducts in-depth research on the current situation of the vulnerable group of the elderly living alone and explores the impact of social participation on the mental health of the elderly living alone from two dimensions, depression and anxiety.

3. Data, Variables, and Methods

3.1. Data. This paper uses the Chinese Longitudinal Healthy Longevity Survey (CLHLS) database to analyze the impact of social participation on the mental health of the elderly living alone. CLHLS is a follow-up survey on all aspects of the elderly jointly organized by the Center for Healthy Aging and Development of Peking University and the National Development Institute. The survey sample is representative of China, and its data quality has been widely recognized by the academic community. The latest CLHLS follow-up survey (2017-2018) covers the basic status of the elderly and their families, socioeconomic background and economic status, mental health and quality of life self-assessment, cognitive function score, social activity participation, and other aspects, the content of the questionnaire is very rich, the quality is relatively high, and the quality of the questionnaire is relatively high. It is consistent with the need for mental health analysis of the elderly living alone in this paper. The 2018 China Follow-up Survey on Factors Affecting the Health of the Elderly (CLHLS) contains health-related information on the elderly aged 65 years and over in more than 500 sample areas in 23 provinces (districts and municipalities), totaling 15872 samples. After screening the elderly living alone, a total of 2477 samples were selected as the final subjects, including 913 men, 36.9%; 1564 women, 63.1%.

3.2. Variable Definition

3.2.1. Dependent Variable. The mental health of the elderly living alone is the dependent variable of this study. Considering the level of mental health, this paper takes the study of Wu and Hui as an example, uses two variables of depression and anxiety to comprehensively judge the level of mental health of the elderly living alone, and explores the impact of social participation on the mental health of the elderly living alone from these two dimensions [18]. The CLHLS was used for depression, and the Center for Epidemiologic Studies Depression Scale (CES-D) was used in the questionnaire. The five answers to each question "always, often, sometimes, rarely, never" are assigned 1 to 5 points, respectively, and "Are you full of hope for your future life? Do you feel as happy as you did when you were young?" "How is your sleep quality now?" Three questions were assigned corresponding negative values, and the remaining seven questions were scored positively. Finally, the scores of 10 questions were added together. The higher the total score, the lower the depression of the respondents. The academic community generally assigns a score of 10 as the boundary, and on the basis of existing research, this paper assigns a value of 2 to a score of 10 to 32, indicating a strong degree of depression; a value of 1 to a score of 33 to 40, indicating a moderate degree of depression; and a value of 0 to a score of 41 to 50, indicating a low degree of depression.

The seven questions of the SAS scale in CLHLS were used to judge anxiety. The frequency of symptoms mentioned in the following questions in the past two weeks was investigated by the questionnaire. The answers of "no, a few days, more than half of the time, almost every day" were counted as 0, 1, 2, and 3 points, respectively. Finally, the scores of the seven questions were added up. The higher the score, the more anxious the respondents were. On the basis of existing research, this paper assigns a score of 0, which indicates a low level of anxiety; a score of 1 to 6, which indicates a moderate level of anxiety; and a score of 7 to 21, which indicates a high level of anxiety.

3.2.2. Independent Variable. The independent variable of this paper is the social participation of the elderly living alone. In the study of social participation types, taking the studies of He et al. and Mannell as examples [19, 20], according to the CLHLS questionnaire, "Are you currently engaged in/participating in the following activities?" Among the questions, "visiting and communicating with friends" are classified as simple communication, "Taijiquan," "square dance," and "other outdoor activities" are classified as fitness exercises, and "planting flowers and keeping pets," "reading books and newspapers," and "raising poultry and livestocks" are summarized as self-entertainment. "Participating in social activities (organized activities)" is classified into organizing groups, "housework (taking care of children)" is classified into family care, and "playing cards or mahjong" is classified as intellectual participation, totaling six categories of social participation. As long as they participate in one of the categories of social participation activities, they are counted as 1; otherwise, they are counted as 0.

3.2.3. Control Variables. When choosing the control variables, this paper refers to the previous research practices, considering the demographic characteristics, lifestyle, health status, and socioeconomic characteristics of the elderly living alone. First, demographic characteristics include gender, age, residence, marital status, and education level. Among them, the age was divided into the oldest old (over 80 years old) and the youngest old (65 to 79 years old); the education level was based on the "years of education" in the CLHLS questionnaire, "less than 9 years" was counted as uneducated, and "more than 9 years" was counted as educated. Second, regarding the lifestyle of the elderly living alone, select the CLHLS questionnaire "whether smoking," "whether drinking," and "whether regular exercise" three questions as a consideration. Third, health status is divided into self-rated health and self-care ability. Self-rated health is selected from the CLHLS questionnaire "How do you think of your health status now?", count "bad" or "very bad" as 0, "fair" as 1, and "good" or "very good" as 2; self-care ability is based on the questionnaire "Have you been restricted in daily life activities due to health problems in the last 6 months?" Count "with restrictions" as 1 and "without restrictions" as 0. Fourth, the socioeconomic characteristics are measured by selecting "which of the following types do you live in the local area" in the questionnaire, and counting "relatively difficult/very difficult" as 0, "general" as 1, and "relatively rich/very rich" as 2. The definition and descriptive statistics of each variable are shown in Table 1.

3.3. Model Construction.

In this paper, SPSS software is used, and the multivariate ordered logit model is used as the benchmark regression model to study. In the CLHLS2018 questionnaire, the answers to the questions related to the dependent variable have more than two categories and the categories have a high- and low-order relationship; in addition, the parallel line test is carried out for each model, and the p value is greater than 0.05, which proves that the model is suitable for multivariate ordinal analysis. Therefore, the selection of a multivariate ordered logit model meets the research needs of this paper. In this paper, four regression models were constructed, model 1 and model 2 took the degree of depression as the dependent variable, and model 3 and model 4 took the degree of anxiety as the dependent variable. Model 1 and model 3 examine the impact of social participation categories on the mental health of the elderly living alone after controlling demographic characteristics and health status. Model 2 and model 4 are based on model 1 and model 3 to observe the impact of social participation categories on the mental health of the elderly living alone after further controlling lifestyle and socioeconomic characteristics.

In this paper, mental health is divided into two dimensions: depression and anxiety, which are analyzed, respectively. Among them, the degree of depression was divided into mild, moderate, and severe depression according to its score, which was counted as 1–3; the degree of anxiety was divided into mild, moderate, and severe depression according to its score, which was counted as 1–3, all of which belonged to ordinal multiclassification variables. In this paper, SPSS was

Table 1: Definition of variables and descriptive statistics.

Variable		Definition	Mean	Sd
Mental health variables	Degree of depression	The CES-D depression scale was administered (mild = 0; moderate = 1; severe = 2)	0.980	0.727
	Anxiety	SAS anxiety scale was used (mild = 0; moderate = 1; severe = 2)	0.470	0.656
Social participation	Simple interaction class	Do not attend = 0; drop in with friends = 1	0.640	0.479
	Fitness exercise class	No participation = 0; participation in Taijiquan/square dance/other outdoor activities = 1	0.350	0.477
	Self-entertainment class	No participation = 0; planting flowers and raising pets/reading books and newspapers/raising poultry and livestock/watching TV and listening to radio = 1	0.720	0.449
	Organization group class	No participation = 0; additional social activities = 1	0.130	0.334
	Family care class	No participation = 0; housework, childcare = 1	0.730	0.444
	Intellectual participation class	Not participating = 0; playing cards or mahjong = 1	0.160	0.365
Demographic characteristics	Gender	Male = 0; female = 1	0.630	0.483
	Age	Younger elderly (65–79 years old) = 0; oldest elderly (over 80 years old) = 1	0.720	0.447
	Place of residence	Town = 0; country = 1	0.490	0.500
	Marital status	Unmarried = 0; married = 1	0.090	0.279
	Level of education	Uneducated = 0; educated = 1	0.390	0.488
Lifestyle	Smoking	No = 0; yes = 1	0.150	0.354
	Drink	No = 0; yes = 1	0.140	0.350
	Physical exercise	No = 0; yes = 1	0.310	0.462
Health status	Self-rated health	Bad = 0; fair = 1; good = 2	1.310	0.710
	Ability to take care of oneself	Unrestricted = 0; restricted = 1	0.320	0.467
Socioeconomic characteristics	Economic conditions	Difficult = 0; moderate = 1; rich = 2	0.990	0.540

used to analyze the influence of social participation categories on the mental health of the elderly living alone by using the multivariate ordered logit model as the benchmark model. The logit regression model is defined as follows:

$$\ln \frac{p}{1-p} = a_0 + a_1 X + \varepsilon + C, \quad (1)$$

where a_0 is a constant term, A1 is a correlation coefficient, X represents simple communication social participation, intellectual participation social participation, organizational group social participation, family care social participation, and fitness exercise, respectively, C is a control variable, and ε is a random error term.

This method must be tested by parallel lines, that is, to test whether the independent variable coefficients are equal. First, the p value is analyzed. If the p value of the four models is greater than 0.05, it can be proved that the model is meaningful.

4. Empirical Analysis

4.1. Effect of Social Participation on the Mental Health of the Elderly Living Alone. It can be seen from models 1 to 4 in Table 2 that there is a significant correlation between the mental health of the elderly living alone and the types of social participation. The mental health levels of the two dimensions are analyzed separately. Among them, the impact of different types of social participation on the degree of depression is as follows: first, social participation of simple communication shows a significant impact (regression coefficient value = −0.304). It also showed a significance of 0.01 level, which meant that simple communication had a significant negative impact on the degree of depression, and the odds ratio (OR) was 1.356, which meant that when simple communication increased by one unit, the degree of depression changed (decreased) by 1.356 times; second, the social participation of self-entertainment shows a significant impact (regression coefficient = 0.486) and shows a significant level of 0.01, which means that self-entertainment will have a significant positive impact on the degree of depression, and the odds ratio (OR) is 0.615, which means that when self-entertainment increases by one unit, the degree of depression will increase. The change (increase) in the degree of depression was 0.615 times. Third, the study shows that when the social participation of simple communication increases by one unit, the anxiety decreases by 0.233 times, while when the social participation of self-entertainment increases by one unit, the anxiety increases by 0.276 times. The results show that social participation in simple communication can better alleviate depression and anxiety.

According to the results of the regression analysis, social participation is highly selective, and the elderly will choose social participation according to their preferences. Because the object of this study is the elderly living alone, the results of the regression model are also rich in the characteristics of the elderly living alone. Simple communication and self-entertainment belong to the individual-centered social participation mode, which can improve the mental health level of the elderly living alone from different dimensions. First of all, the social participation of simple communication directly benefits the elderly themselves, they can freely choose to talk with friends and travel, they can also choose to visit close neighbors, and regression results show that more social participation of simple communication can reduce the depression and anxiety of the elderly living alone at the same time. Second, when the elderly living alone participate in more self-entertainment social participation, it will aggravate their depression and anxiety, which indicates that self-entertainment social participation will trigger the loneliness of the elderly living alone, making them more prone to mental illness, and then affect the health of the elderly. In the social participation of the organization group, elderly people living alone may be reluctant to communicate with strangers, so participation in community-organized activities or other organized activities has no significant impact on the mental health of elderly people living alone. In the social participation of family care, the participants are more passive, taking care of their children or grandchildren is a socially expected behavior of the elderly, and the elderly regard it as a responsibility, which makes the elderly bear a lot of psychological pressure, and this pressure and restraint will bring negative feedback to the mental health of the elderly. This weakens the positive effect of social participation and makes the depression and anxiety of the elderly unable to be alleviated.

4.2. Robustness Test. The purpose of this study is to explore the impact of different types of social participation on depression and anxiety of the elderly living alone, but there may be some bias in the assessment results due to endogeneity. Therefore, in order to verify the robustness of the final regression model, the article will add two missing variables for re-regression. Considering that some elderly people living alone are forced to choose to live alone for some irresistible reasons, which may lead to greater psychological challenges of depression and anxiety, this study adds the reasons for living alone as an omitted variable. In the questionnaire, "What is the main reason why you live alone?" Those who answered "no children or children can't take care of themselves" were counted as "0," and other elderly people who voluntarily chose to live alone were counted as "1." According to the regression results in Table 3, the influence level after regression is basically consistent with the original model results. Second, from the perspective of the impact of cognitive ability on the mental health of the elderly living alone, cognitive ability is regressed as an omitted variable, and the results are highly consistent with the original model, which proves that the empirical analysis results are robust.

4.3. Heterogeneity Analysis. Considering that the mental health level of the elderly living alone is different in different demographic characteristics, lifestyle, health status and socioeconomic characteristics, and social participation have different effects on the elderly living alone in different situations. This paper analyzes the heterogeneity of the influence of social participation on the mental health of the elderly living alone from 11 control variables, including gender, age,

Table 2: Effect of social participation on the mental health of the elderly living alone results of multiple ordinal logit regression.

Variables		Degree of depression		Anxiety level	
		Model 1	Model 2	Model 3	Model 4
Independent variable					
Social participation	Simple interaction class	−0.326***	−0.304***	−0.200*	−0.233**
		(0.103)	(0.107)	(0.105)	(0.108)
	Fitness exercise class	0.181*	0.123	−0.066	−0.037
		(0.100)	(0.107)	(0.104)	(0.110)
	Self-entertainment class	0.650***	0.486***	0.337***	0.276**
		(0.118)	(0.123)	(0.112)	(0.117)
	Organization group class	0.173	0.077	−0.021	0.047
		(0.122)	(0.145)	(0.145)	(0.154)
	Family care class	0.070	0.095	0.085	0.152
		(0.115)	(0.119)	(0.115)	(0.118)
	Intellectual participation class	0.159	−0.119	0.023	0.033
		(0.122)	(−0.939)	(0.129)	(0.134)
Control variable					
Demographic characteristics	Gender	0.125	−0.042	0.249***	0.250**
		(0.093)	(0.106)	(0.097)	(0.109)
	Age	0.087	0.129	−0.155	−0.148
		(0.102)	(0.106)	(0.106)	(0.110)
	Place of residence	−0.082	−0.166*	−0.022	−0.058
		(0.091)	(0.095)	(0.092)	(−0.095)
	Marital status	−0.258	−0.256	0.018	−0.012
		(0.159)	(0.163)	(0.165)	(0.171)
	Level of education	−0.050	−0.042	−0.123	−0.124
		(0.091)	(0.094)	(0.093)	(0.096)
Lifestyle	Smoking		0.403***		0.045
			(0.141)		(0.149)
	Drink		0.137		0.078
			(0.236)		(0.146)
	Physical exercise		0.316***		−0.141
			(0.107)		(0.111)
Health status	Self-rated health	−1.201***	−1.057***	−0.864***	−0.758***
		(0.072)	(0.075)	(0.067)	(0.071)
	Ability to take care of oneself	0.292***	0.316***	0.151	0.173
		(0.105)	(0.109)	(0.103)	(0.106)
Socioeconomic characteristics	Economic conditions		−0.654***		−0.435***
			(0.092)		(−0.092)
Cox and snell		0.210	0.239	0.103	0.109
Parallel line inspection		$p = 0.639$	$p = 0.684$	$p = 0.925$	$p = 0.945$

Note. ***, **, and *significant at the level of 1%, 5%, and 10%, respectively; the values in brackets are standard errors.

Table 3: The effect of social participation on the mental health of the elderly living alone.

Variables		Degree of depression	Anxiety level
Add "reasons for living alone"			
Social participation	Simple interaction class	−0.237**	−0.202*
	Fitness exercise class	0.148	−0.075
	Self-entertainment class	0.451***	0.195*
	Organization group class	0.024	0.155
	Family care class	−0.040	0.070
	Intellectual participation class	0.256*	0.147
Increase "cognitive ability"			
Social participation	Simple interaction class	−0.306***	−0.233**
	Fitness exercise class	0.117	−0.037
	Self-entertainment class	0.477***	0.277**
	Organization group class	0.065	0.048
	Family care class	0.088	0.152
	Intellectual participation class	0.116	0.034

*Note.****, **, and *significant at 1%, 5%, and 10% level, respectively.

residence, marital status, education level, smoking, drinking, exercise, self-rated health, self-care ability, and economic status (see Table 4).

The results show that the heterogeneity of the elderly living alone in different genders, ages, residences, and self-care abilities is more significant. The following is a detailed analysis of these four aspects.

From the perspective of gender, the social participation of intellectual participation has a significant impact on the depression of women living alone, while it has no impact on men; the social participation of self-entertainment has a more significant impact on the depression of men living alone than women living alone; there is no difference in the impact on the anxiety of the elderly living alone between different genders. This difference may be due to the different interests of the participants. Men are more willing to participate in the social participation of self-entertainment, while women prefer the social participation of intellectual participation, which can significantly reduce the depression of women living alone. At the same time, self-entertainment social participation can better alleviate the depression of men living alone.

From the perspective of age, the elderly living alone can be significantly affected by the social participation of intellectual participation on the degree of depression; the social participation of simple communication has a significant impact on the degree of anxiety of the young elderly living alone but has no impact on the elderly living alone; the influence of self-entertainment social participation on the anxiety degree of the young elderly living alone is greater than that of the elderly. Compared with the elderly, the young elderly are more willing to go out to communicate with friends and visit relatives. With the increase in age, the elderly living alone are more willing to stay at home or in the community. Therefore, intellectual participation can reduce the depression of the elderly, while simple communication can alleviate the anxiety of the young elderly.

From the perspective of residence, the urban elderly living alone are more affected by the social participation of simple communication and physical exercise in terms of depression; the social participation of intellectual participation has a significant impact on the depression of the rural elderly living alone; self-entertainment social participation has a greater impact on the anxiety of the rural elderly living alone. It may be that the social network of the elderly living alone in cities and towns is more extensive, and the convenience of life also makes them more willing to participate in fitness exercises and visits, so simple social participation in communication and fitness exercises can more significantly improve the mental health of the elderly living alone in cities and towns. The elderly living alone in rural areas are more willing to stay at home to raise livestock and grow flowers, which is more effective in reducing the anxiety and depression of the elderly living alone in rural areas [21].

From the perspective of self-care ability, the social participation of simple communication, intellectual participation, and fitness exercise has a more significant impact on the degree of depression in the elderly living alone with self-care ability; the social participation of self-entertainment has a more significant impact on the degree of anxiety in the elderly living alone without self-care ability. This result is mainly due to the fact that the elderly living alone without restrictions can participate in social activities, while the elderly living alone without self-care ability cannot participate in the activities that need to go out because of their physical limitations so that the social participation of self-entertainment can alleviate the mental health level of the elderly who cannot take care of themselves.

5. Discussion

By analyzing the data of the elderly living alone in the CLHLS database in 2018, this paper studies the impact of different types of social participation on the mental health of the elderly living alone. In the paper, the two dimensions of depression and anxiety are used to measure the level of mental health of the elderly living alone, and the regression results show that simple interaction type of social participation can improve both depression and anxiety of the elderly living alone, which is also the same as the results of previous scholars. Simple interaction class is the most dominant form of participation among Chinese elderly people, and relatively speaking, this type of participation is

Table 4: Heterogeneity analysis of the impact of social participation on the mental health of the elderly living alone.

Variables		Degree of depression						Anxiety level					
		Simple interaction class	Fitness exercise class	Self-entertainment class	Organization group class	Family care class	Intellectual participation class	Simple interaction class	Fitness exercise class	Self-entertainment class	Organization group class	Family care class	Intellectual participation class
Gender	Male	0.022	−0.133**	−0.313***	−1.114	0.004	−0.061	0.047	0.050	−0.142*	0.036	−0.051	0.006
		(0.056)	(0.056)	(0.068)	(0.074)	(0.059)	(0.062)	(0.046)	(0.047)	(0.055)	(0.062)	(0.049)	(0.052)
	Female	0.092	−0.095**	−0.219**	−0.006	−0.078	−0.160***	0.018	−0.037	−0.096**	0.006	−0.019	−0.065
		(0.047)	(0.046)	(0.049)	(0.063)	(0.054)	(0.059)	(0.041)	(0.041)	(0.042)	(0.058)	(0.046)	(0.053)
Age	Young age (65–79)	0.127	−0.147**	−0.342***	−0.023	−0.003	−0.098	0.143**	−0.030	−0.263***	−0.027	−0.036	−0.001
		(0.069)	(0.061)	(0.099)	(0.076)	(0.094)	(0.065)	(0.062)	(0.055)	(0.087)	(0.069)	(0.084)	(0.059)
	Old age (above 80)	0.041	−0.090**	−0.237***	−0.060	−0.040	−0.137**	−0.006	−0.007	−0.112	0.052	−0.028	−0.091
		(0.042)	(0.044)	(0.044)	(0.063)	(0.045)	(0.058)	(0.036)	(0.038)	(0.036)	(0.054)	(0.037)	(0.050)
Place of residence	Towns	0.111**	−0.170***	−0.249***	−0.014	−0.058	−0.097	0.010	−0.015	−0.141***	−0.008	−0.017	−0.042
		(0.048)	(0.048)	(0.058)	(0.059)	(0.053)	(0.055)	(0.042)	(0.042)	(0.049)	(0.053)	(0.046)	(0.049)
	Rural	0.008	−0.042	−0.265***	−0.134	0.008	−0.165**	0.059	0.000	−0.112**	0.069	−0.022	−0.041
		(0.055)	(0.053)	(0.055)	(0.083)	(0.060)	(0.068)	(0.046)	(0.046)	(0.045)	(0.073)	(0.049)	(0.059)
Marital status	Unmarried	0.059	−0.108***	−0.231***	−0.054	−0.033	−0.168***	0.021	−0.003	−0.113***	0.023	−0.020	−0.089**
		(0.038)	(0.037)	(0.041)	(0.051)	(0.042)	(0.045)	(0.033)	(0.033)	(0.034)	(0.045)	(0.035)	(0.040)
	Married	0.240	−0.096	−0.330	−0.046	−0.139	0.208	0.122	−0.058	−0.126	0.066	−0.012	0.272**
		(0.129)	(0.114)	(0.188)	(0.151)	(0.131)	(0.127)	(0.109)	(0.100)	(0.148)	(0.133)	(0.114)	(0.110)
Length of schooling	Be uneducated	0.071	−0.096*	−0.228**	−0.050	−0.059	−0.107	0.060	−0.017	−0.095**	−0.038	−0.002	−0.020
		(0.048)	(0.047)	(0.054)	(0.065)	(0.053)	(0.057)	(0.041)	(0.041)	(0.045)	(0.057)	(0.045)	(0.050)
	Educated	0.031	−0.125**	−0.319***	−0.070	−0.010	−0.095	0.012	0.012	−0.179***	0.083	−0.058	−0.021
		(0.058)	(0.057)	(0.064)	(0.077)	(0.064)	(0.068)	(0.050)	(0.050)	(0.053)	(0.067)	(0.054)	(0.060)
Smoking	Yes	0.033	−0.137	−0.232**	0.043	0.066	−0.063	0.044	−0.048	−0.051	0.051	0.116	0.064
		(0.091)	(0.086)	(0.109)	(0.112)	(0.103)	(0.089)	(0.074)	(0.070)	(0.088)	(0.091)	(0.084)	(0.074)
	No	0.067	−0.102**	−0.248***	−0.069	−0.057	−0.123**	0.034	0.002	−0.126***	0.008	−0.039	−0.069
		(0.039)	(0.039)	(0.043)	(0.054)	(0.043)	(0.049)	(0.034)	(0.035)	(0.036)	(0.048)	(0.037)	(0.044)
Drink	Yes	0.173	−0.101	−0.366***	−0.066	0.000	−0.089	0.134	0.024	−0.102	0.016	−0.099	−0.046
		(0.096)	(0.090)	(0.124)	(0.114)	(0.108)	(0.095)	(0.079)	(0.075)	(0.099)	(0.095)	(0.086)	(0.079)
	No	0.054	−0.117**	−0.235**	−0.049	−0.036	−0.113**	0.018	−0.017	−0.118***	0.014	−0.008	−0.034
		(0.039)	(0.039)	(0.043)	(0.054)	(0.043)	(0.048)	(0.034)	(0.035)	(0.036)	(0.048)	(0.037)	(0.043)
Physical exercise	Yes	0.119	−0.094	−0.342***	−0.080	0.015	−0.093	0.135**	0.016	−0.158*	−0.112*	−0.017	0.038
		(0.065)	(0.058)	(0.097)	(0.065)	(0.077)	(0.064)	(0.056)	(0.050)	(0.078)	(0.057)	(0.065)	(0.055)
	No	0.036	−0.064	−0.203**	0.056	−0.038	−0.112	−0.008	−0.021	−0.111***	0.192***	−0.013	−0.100*
		(0.044)	(0.047)	(0.045)	(0.073)	(0.047)	(0.058)	(0.038)	(0.042)	(0.038)	(0.065)	(0.040)	(0.051)
Self-rated health	Not good	−0.102	−0.133	−0.179**	0.280**	−0.015	−0.053	−0.057	0.066	−0.169	0.249	−0.035	0.002
		(0.082)	(0.085)	(0.087)	(0.121)	(0.091)	(0.109)	(0.096)	(0.101)	(0.099)	(0.145)	(0.101)	(0.133)
	General	0.112**	−0.080	−0.185***	−0.120	−0.029	−0.126	0.070	0.026	−0.132**	0.003	0.066	−0.068
		(0.055)	(0.056)	(0.060)	(0.077)	(0.060)	(0.069)	(0.050)	(0.052)	(0.053)	(0.072)	(0.054)	(0.064)
	OK	0.139***	−0.049	−0.269**	−0.075	−0.001	−0.072	0.057	−0.005	−0.058	−0.022	−0.078	0.000
		(0.047)	(0.044)	(0.053)	(0.059)	(0.052)	(0.051)	(0.038)	(0.037)	(0.042)	(0.049)	(0.042)	(0.043)
Ability to take care of oneself	Unlimited	0.152***	−0.109***	−0.220**	−0.103	−0.004	−0.131**	0.079**	−0.025	−0.076	−0.033	−0.002	−0.048
		(0.042)	(0.040)	(0.048)	(0.055)	(0.049)	(0.047)	(0.036)	(0.035)	(0.039)	(0.047)	(0.041)	(0.041)
	Restricted	−0.096	−0.054	−0.265***	0.061	0.062	−0.038	−0.047	0.072	−0.180***	0.123	0.054	−0.004
		(0.069)	(0.071)	(0.070)	(0.098)	(0.069)	(0.090)	(0.063)	(0.066)	(0.061)	(0.092)	(0.062)	(0.084)

Table 4: Continued.

Variables		Degree of depression						Anxiety level					
		Simple interaction class	Fitness exercise class	Self-entertainment class	Organization group class	Family care class	Intellectual participation class	Simple interaction class	Fitness exercise class	Self-entertainment class	Organization group class	Family care class	Intellectual participation class
Economic conditions	Difficulty	−0.110	−0.017	−0.111	−0.084	−0.027	−0.131	−0.052	0.131	−0.026	0.019	−0.169	0.040
		(0.094)	(0.093)	(0.091)	(0.128)	(0.107)	(0.113)	(0.093)	(0.095)	(0.090)	(0.133)	(0.102)	(0.118)
	General	0.073	−0.102**	−0.223**	−0.012	−0.041	−0.102	0.038	−0.015	−0.093**	0.047	−0.006	−0.017
		(0.042)	(0.042)	(0.047)	(0.061)	(0.046)	(0.052)	(0.036)	(0.036)	(0.039)	(0.053)	(0.039)	(0.044)
	Rich	0.099	−0.047	−0.222	−0.062	−0.178	−0.200**	0.102	0.028	−0.242**	−0.057	−0.104	−0.196**
		(0.088)	(0.083)	(0.117)	(0.092)	(0.098)	(0.090)	(0.077)	(0.072)	(0.098)	(0.082)	(0.083)	(0.079)

Note. ***, **, and *significant at the level of 1%, 5%, and 10%, respectively; the values in brackets are standard errors.

the easiest form for elderly people to achieve, especially in the context of China's humanistic society, where there are more activities between neighbors and relatives. As previous studies have found, activities that require a higher level of skill, a higher level of participation, and a closer connection with others can lead to higher life satisfaction among older adults [20], but the simple interaction type of social participation has a limited effect on geriatric depression because of the low demands on older adults in terms of their physical strength, intellectual ability, and social relationships [22].

Another finding of this study is that self-entertainment social engagement positively affects the depression and anxiety levels of elderly people living alone, which is somewhat different from the results of previous studies. Previous studies have shown that self-entertainment social participation is to improve "emotional loneliness" through the reinforcement of the "psychological self" through emotional engagement, cognitive stimulation, and maintaining a sense of life manipulation [23]. However, it can also be seen that previous studies have not paid attention to the special group of elderly people living alone; for elderly people living alone, too much self-entertainment social engagement will increase their depression and anxiety, so from the community level, it is more important to encourage elderly people living alone to go out of their homes and interact with outsiders to improve their psychological problems.

All in all, in order to enhance the mental health of elderly people living alone, it is necessary to have concerted cooperation among a number of bodies such as the government, the community, and the family. From the government level, the government should formulate social participation policies in line with the elderly living alone and provide them with financial and facility support. From the community level, when community workers encounter the problem of social participation of the elderly living alone, they should "accurately identify" the object of the problem, allocate limited resources individually and effectively, and prevent the waste of policy and service resources. At the family level, children should give elderly people living alone spiritual and material support and encourage them to actively participate in community activities and social interaction between neighbors and friends.

Through the analysis of the results of the article, I will put forward relevant policy recommendations.

First, in promoting the social participation of the elderly, the government should shoulder an important responsibility. First of all, the government should formulate corresponding policies, strengthen the responsibilities of grass-roots organizations such as communities, and implement appropriate social activities among the elderly living alone to ensure the effective implementation of social activities. Second, the government should provide appropriate financial support to improve the living environment of the elderly and the quality of life of the elderly and to strengthen the publicity of social participation of the elderly living alone, not only to protect the rights of social participation, but also to eliminate social discrimination against the elderly, but also to advocate a new trend of respecting and helping the elderly.

Third, at the community level, the community is not only the main living place for the elderly but also the most frequent platform for the elderly to carry out daily activities. Therefore, the community can actively carry out different kinds of social participation activities and actively guide the elderly living alone. First of all, we can strengthen the infrastructure construction of the community and provide professional venues and equipment to enable the elderly to participate more in community activities. Second, we should make the cultural life of the community more colorful, such as organizing various activities for the elderly, so that more elderly people can participate in these activities, and through the mutual pull between neighbors or friends, we can improve the enthusiasm of the elderly living alone to participate in activities. In addition, for the elderly living alone who do not have the ability to take care of themselves, the community can also carry out personalized and unique activity design, so that social participation activities will not be limited to the elderly who are in good health.

Third, at the family level, children should actively support the elderly living alone to participate in social activities. With the increasing number of children and the increasingly busy work of their children, they have less and less time to visit the elderly living alone, which results in the decline of the mental health level of the elderly living alone [24]. Therefore, as children, their parents should be encouraged to actively participate in social activities, support their social interaction with neighbors or friends, and create conditions for the social participation of the elderly living alone, so as to enrich their daily life.

To sum up, social participation has a positive effect on reducing the risk of depression and anxiety in the elderly. As the process of population aging continues to advance, it is very necessary to enhance the degree of social participation of the elderly in China, as proposed by the Second United Nations World Assembly on Ageing, when dealing with the problem of population aging, and it has become an international consensus that the elderly should participate in society in an all-round way. Active integration of the elderly into society can not only enrich their lives and improve their health but also stimulate social vitality, develop their human resources, and promote the realization of active aging. Therefore, how to design and implement appropriate social participation activities for the elderly is a problem that our country must think about in the future.

6. Limitations

This study has some limitations; the CES-D-10 is a screening tool that does not entirely determine the presence of depression in older adults living alone at the high level. Second, the data are recorded as self-reported, which may be subject to some bias. Finally, this study is a cross-sectional study, and the results cannot be interpreted as causal.

7. Conclusions

According to the data of the 2018 Chinese Health Influencing Factors Survey (CLHLS), the influence of different social participation categories on the mental health level of elderly

people living alone was analyzed based on the multiple ordered logistic model. The level of mental health was measured by depression and anxiety. The heterogeneity of mental health of the elderly living alone was analyzed from four aspects: demographic characteristics, lifestyle, health status, and social and economic characteristics. According to the empirical analysis, the increase in social participation in simple communication can reduce the degree of depression and anxiety of the elderly living alone, while the decrease in social participation in self-recreation can reduce the degree of depression and anxiety of the elderly living alone. In the future primary health care, targeted interventions can be provided according to the different degrees of depression and anxiety of elderly people living alone. More importantly, we need to target this population, consider their possible psychological problems and causes, and provide more comprehensive policies and measures to achieve healthy aging.

Data Availability

The CLHLS data used to support the findings of this study are available from the CLHLS upon request. Database website is https://opendata.pku.edu.cn/dataverse/CHADS.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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