The Impact Of Social Participation On Depression Among The Older Adults: The Mediating Role Of Physical Multi-Morbidity

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Research Article

Keywords: Social participation, Depression, Older adults, Physical multi-morbidity

Posted Date: February 10th, 2022

DOI: <https://doi.org/10.21203/rs.3.rs-1276329/v1>

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Abstract

Background: Social participation and physical multi-morbidity are common influencing factors of mental health conditions in the older adult population. Understanding the trajectories of these will help implement treatments and interventions. With the increasing attention given to geriatric depression in recent years, this study aims to explore the correlation between social participation and depression, and further to detect the mediating effect of physical multi-morbidity.

Methods: We screened 6,421 subjects that met the inclusion criteria from the 2018 wave of the China Health and Retirement Longitudinal Study (CHARLS) database. Social participant and depressive symptoms were assessed using the 12-item self-made scale and 10-item Center for Epidemiological Studies Depression Scale (CESD-10), respectively. Logistic regression and mediating effect model were used to identify the association between the main variables.

Results: We found that 13.4% of the elderly are engaged in heavy social participation and 53.38% of them are not engaged in any social participation. In addition, 8.27% of the elderly have depression and 31.38% have depressive symptoms. Female, rural areas, lower education, more negative marital status, poor health status, and more frequent outpatient and inpatient services were associated with higher depression in the Chinese elderly. CESD-10 is negatively correlated with social participation and positively correlated with physical multi-morbidity. Physical multi-morbidity has a mediating effect in the affection of social participation on depression.

Conclusions: This study preliminary prompted severe depressive symptoms associated with worse social participation intense in a Chinese elderly community population. Higher levels of social participation and a low level of physical multi-morbidity should be maintained in this population, and additional educational activities should be organized among seniors on a large scale.

Background

An increasing number of people entering old age is a problem faced by the whole world, especially in mainland China. It is predicted that by 2050, China's population over 65 years old will reach 400 million, of which the population over 80 years old will reach 150 million[1, 2]. Therefore, in the face of this grim situation, we need to pay attention to a series of challenges brought about by the aging of the population, such as the increase in the risk of cardiovascular disease, dementia, and depression.

The research focused on studying the depression in older adults has increased recently[3]. One possible reason for this is that the proportion of older people in almost every country is increasing every year[4]. In developing countries, depression is a serious public health problem and one of the three major diseases that cause disability[5, 6]. Depression not only reduces the quality of life,[7] but also increases the risk of chronic physical diseases[8]. Older people are often accompanied by the occurrence of unfavorable life changes with age, resulting in feelings of uselessness, loneliness, and helplessness; and, consequently, social withdrawal and other depressive symptoms[9].

Among the determinants of health in society, social participation has become an essential concept[10]. Social participation is a real-life activity related to social relationships, which plays an important role in strengthening social relationships, social support, or social integration, thereby maintaining better health and health outcomes[11, 12], and is considered an important part of active aging. From a theoretical point of view, the positive correlation between social participation and better health outcomes has been tested in some countries and regions, including

China[13], the United States[14], Japan[15], Europe[16, 17], and sub-Saharan Africa[18]. Social participation encourages physical activity, and the social support and networks gained through social participation provide information that helps participants make better health and medical choices. As a result, these participants had a healthier lifestyle and were able to maintain good physical and mental health. In addition, social support and network from social participation can produce a stress-buffering effect and prevent participants from functional decline and mental health problems caused by stress[19, 20].

Another reason for the interest in depression is that a variety of physical health conditions common to aging may increase the risk of mental health problems in older adults. For instance, older adults with one or more chronic conditions are more likely to develop late-onset depression[4, 21]. Physical multi-morbidity (defined as two or more chronic diseases existing at the same time) is appearing more and more in medical practice, and we need to be alert to the risks it brings. One-third of adults in the world suffer from multiple chronic diseases. Among the elderly in developed countries, this proportion is close to three-quarters, and it is expected to increase significantly in the future[22]. In Australia, a study on the prevalence of multiple diseases through general surgery found that 75% of people aged 65-74 have multiple diseases, and this proportion rises to 80% of people aged 75 and over[23]. Compared with patients with a single disease, the management of the medical needs of patients with multiple diseases is more complicated. Therefore, a series of effects of multiple diseases on social and emotional functions need to be considered, and one of the important risks is depression[24].

Previously research of depression in older adults has generally focused on a single pathway of social participation or physical multi-morbidity[25]. The trajectories of depression, social participation, and physical multi-morbidity have rarely been studied simultaneously. Therefore, this study sought to examine the degree to which physical multi-morbidity contributes to the simple bivariate relationship between social participation and depression, thereby providing a more complex and deeper understanding of the relationship between them[26]. In addition, former studies rarely mention the application of new technologies and methods in the social participation of the elderly. However, the definition of social participation in this study adds the dimension of Internet use behavior, trying to explore the social participation of the elderly and its impact from a new perspective.

The aims of our study were (i) to describe the basic characteristics of depression, social participation, and physical multi-morbidity in older adults; (ii) to identify the correlation and strength of depression, social participation, and physical multi-morbidity; (iii) to evaluate the mediating role of physical multi-morbidity between social participation and depression.

Methods

Data collection

This study was based on secondary data obtained from wave 4 of the China Health and Retirement Longitudinal Study (CHARLS). The CHARLS is a longitudinal study assessing the health, social and economic status of nationally representative samples which cover 450 villages and 150 counties in 28 provinces in China[27]. A stratified multi-stage probability proportional to size random sampling strategy was adopted, and the baseline survey was officially launched in 2011, and wave 4 in 2018. According to the purpose of this study, we formulated the inclusion criteria for the study subjects: age ≥ 65 years old; complete 12-item social participant results, and the 10-item Center for Epidemiological Studies Depression Scale (CESD-10) scores. Based on these inclusion criteria, 6,421 older subjects were selected from 19,816 participants in the fourth CHARLS follow-up.

Measurements

Social participation

In CHARLS, respondents were asked to choose which social activities they participated in during the past month, including (1) interacted with friends, (2) played Ma-jong, played chess, played cards, or went to the community club, (3) provided help to family, friends, or neighbors who do not live with you and did not pay you for the help, (4) went to a sport, social, or other kinds of the club, (5) took part in a community-related organization, (6) done voluntary or charity work, (7) cared for a sick or disabled adult who does not live with you and who did not pay you for the help, (8) attended an educational or training course, (9) stock investment, (10) used the internet, (11) other, (12) none of these. Those who reported any of these activities were then asked a follow-up question about how often in the last month did they do (Almost daily=3, Almost every week=2, Not regularly=1). We multiply the number and frequency of social participation to generate a multi-categorical variable for the social participation intensity (0=No, 1-2=Mild, 3 - 4=Moderate, Above 4= Heavy). Previous researches have verified the reliability of this evaluation index[28, 29].

Depressive symptoms

The score of depression was measured with 10 questions from the Center for Epidemiologic Studies Depression Scale (CES-D 10)[30, 31]. Respondents were asked how frequently in the last week they: (1) were bothered by things; (2) had trouble keeping on things; (3) felt depressed; (4) felt everything was an effort; (5) felt hopeful about the future; (6) felt fearful; (7) sleep was restless; (8) was happy; (9) felt lonely, and (10) could not get going. Item 5 and item 8 adopt reverse scoring, and the rest are forward scoring. Responses ranged from 0 to 3, 0 = less than one day, 1 = one to two days, 2 = three to four days, 3 = five to seven days, and were summed to create a total score ranging from 0 to 30. Descriptive analysis of depression scores in the form of continuous variables. In regression analysis, a CESD-10 score ≥ 20 was categorized in the depression group, ≥ 10 in the depressive symptoms group, and < 10 in the no depressive symptoms group[2].

Physical multi-morbidity

In this study, we defined multi-morbidity as the presence of two or more physical chronic non-communicable diseases. We used 10 non-communicable diseases to measure physical multi-morbidity, including diagnosed hypertension, dyslipidemia, diabetes or high blood sugar, chronic lung diseases, liver disease, heart problems, stroke, kidney disease, stomach or other digestive diseases, arthritis or rheumatism, and asthma. If the respondents were informed by the doctor and know that he/she has these chronic diseases, the value is "1", otherwise, it is "0". We counted the number of non-communicable diseases for each participant to identify those who had physical multi-morbidity[32].

Sociodemographic factors

A set of sociodemographic factors were included: (1) gender, (2) age (65 - 74, 75 - 84, and ≥ 85 years), (3) area (urban, urban-rural integration, and rural), (4) education level (below the primary school, below the middle school, and high school and above), and (5) marital status (married, non-married, and widowed).

Health status

In CHARLS, self-rated health was obtained by asking respondents, "Would you say your health is very good, good, fair, poor, or very poor?" We redefined "very good", "good", and "fair" as good health and assigned a value of 0; we

redefined “poor” and “very poor” as bad health, and assigned a value of 1[12].

Health care use

Respondents were asked if they (1) had an outpatient clinic or received an on-the-house medical in the past month, (2) received inpatient care in the past year, (3) ever received the home and community care services, and (4) ever received the paid family doctor services (yes=1 and no=0 for each).

Statistical analysis

Statistical analyses were performed using the SPSS statistics (version 24.0 J, IBM SPSS Inc., Chicago, USA). Some covariates contained missing values, and the proportion of missing values was less than 5%. Thus, we replaced the missing data with the mean of their integrity items.

First, we preliminary described the characteristics of the data. The format of categorical variables was n (%), and the continuous variables were expressed as mean (M) $\pm$ standard deviation (SD). Next, T-test and ANOVA tests were applied to compare the differences of study variables on participants’ sociodemographic characteristics. Correlations between every scale and dimension were tested by Pearson correlation.

Linear logistic regression was used to assess the association of social participation and depression in more detail, and the results were expressed as B value and 95% CI. A test of the mediating role of the physical multi-morbidity was conducted by using PROCESS macro for SPSS (Model 1). The program was used to examine the effect of one or more mediating variables on the relationship between the independent and dependent variables[26]. For the differences and correlations, $p < 0.05$ was considered statistically significant.

Results

Ultimately 6421 subjects were enrolled, 3172 (49.40%) were male and 3249 (50.60%) were female; Among them, participants aged from 65 to 74 years old accounted for the most (72.90%). 73.3% of 6421 respondents were living in rural areas, 79.40% had a primary degree, and 75.8% were married. In addition, 4378 (68.20%) subjects reported good health level, 16.9% of 6421 people had an outpatient clinic or received an on-the-house medical in the past month, 21.6% received inpatient care in the past year, just 34 (0.50%) received the home and community care services, and 323 (5.00%) received the paid family doctor services. Sample characteristics of participants are presented in Table 1.

Different distributions of demographic characteristics were found regarding social participation level for age, area, education, health status, and health care use ($p < 0.05$). Depression scores were different among respondents of different gender, area, education, marital status, health status, and health care use ($p < 0.05$). Different distributions of demographic characteristics were found regarding physical multi-morbidity for gender, area, education, health status, and health care use ($p < 0.05$) (Table 1).

A social participation score in the range of 1 to 2 was the mild level, 3 to 4 was the moderate level, and a social participation score above 4 was the high level. We found that 16.35% of the elderly were mild, 16.85% were moderate, and 13.42% were high. A CESD-10 score ≥ 10 was the borderline of possible depressive symptoms, and a CESD-10 score ≥ 20 was the borderline of depression[2]. The results shows that about 31.38% of the older adults had depressive.

The results of Pearson correlation shows that the respondents' depression declined with increased social participation ($r=-0.160$, $p<0.01$). In addition, respondents' depression increased with increased physical multi-morbidity ($r=0.158$, $p<0.01$). An investigation of a large-scale Chinese elderly population declared that gender, age, area, and education had a significant effect on depression[2]. Thus, we included them in linear regression as covariates. Moreover, considering that marital status, health status, and health care use also contributed to the depressive symptoms of individuals, they were also included in the linear regression model. The results illustrate that lower social participation score ($B=-0.089$, $P<0.000$), higher physical multi-morbidity score ($B=0.504$, $P<0.000$), female ($B=1.747$, $P<0.000$), rural area ($B=0.620$, $P<0.000$), lower education ($B=-0.848$, $P<0.000$), more negative marital status ($B=0.482$, $P<0.000$), more negative health status ($B=4.247$, $P<0.000$), higher frequent of outpatient ($B=-0.543$, $P<0.000$) and hospitalized ($B=-0.834$, $P<0.000$) were associated with higher depression performance (Table 2).

In addition, in order to further explore the possible mediating role of physical multi-morbidity in the influence of social participation on depression, we conducted a hierarchical regression analysis of physical multi-morbidity as a mediating factor. When the predictor variable and the mediating variable are both continuous variables, the two variables are centrally processed, and then a hierarchical regression analysis is performed. If the interactive regression coefficient is significant, the mediating effect is significant.

Table 3 shows that the standard regression coefficient of social participation * physical multi-morbidity has reached a significant level ($B=-0.035$, $t=-2.872$, $p<0.01$), indicating that physical multi-morbidity has a mediating effect in the effect of social participation on depression in the elderly. In addition, this linear regression model also shows that social participation can negatively predict depression in the elderly ($B=-0.164$, $t=-13.459$, $p<0.001$), and physical multi-morbidity can positively predict depression in the elderly ($B=0.162$, $t=13.294$, $p<0.001$).

Discussion

Based on data from a large public database of elderly people in the Chinese community, we initially explored the relationship between social participation, physical multi-morbidity, and depressive symptoms and its possible influencing factors. In summary, this study initially hints that the depressive symptoms are associated with lower social participation and more physical multi-morbidity in the Chinese elderly community population.

Depression affects the daily life and social functions of the elderly; this is particularly important in today's increasingly aging Chinese population [7, 30]. Previous large-scale population studies have shown that in addition to environmental factors, low levels of social participation and high levels of physical multi-morbidity may be important predictors of mental health[13, 33]. A previous study that also used this large database, included people over 60 years of age, and concluded that the prevalence of depression in the elderly was 4.46%; However, we found that the prevalence of depression rose to 8.27% by analyzing people ≥ 65 years. We adopted a CESD-10 score ≥ 20 as the standard, which is more stringent than the previous study CESD-10 score ≥ 16 [2, 34], which may indicate that the prevalence of depression in China may become more serious with age.

In terms of demographic characteristics, females' depression scores were significantly higher than those of males. Previous researchers have also reported that women have a higher proportion of depression. Gang's research showed that the proportion of women reporting depression is almost four times that of men[35]. As expected, marital status seems to have an important influence on depression scores. Compared with people who are currently married, participants who are divorced/widowed and never married have a higher rate of depression. Obviously, elderly couples can enjoy each other's company in their daily activities and get support when they are emotionally

isolated. Therefore, continued marital status can be used as a buffer for mental illness in later life. In addition, elderly people with low education and living in rural areas have higher depression scores, which may be due to their lower economic level, limited capital and methods for emotional venting, and more susceptibility to illness or stress in life. Finally, the elderly who do not have adequate health conditions and who frequently visit and stay in hospital have higher scores for depression. This is mainly due to the fact that they are troubled by physical diseases, which are prone to negative emotions and lose interest in life.

Some scholars suggested that clinical research should consider confounding factors such as the demographic characteristics of participants[36]. Therefore, we included age, gender, region, education level, marital status, health status, and health service utilization into the regression model of this study. The first main conclusion of this research shows that more frequent participation in community-related activities was associated with lower depression scores, and not affected by other factors. Social participation provides individuals with opportunities to obtain different types of support through interaction with others and developing relationships. This may explain why social participation affects the level of depressive symptoms in the study sample. In our study, most participants reported participating in community activities once a week. Weekly or daily participation may allow individuals to have more frequent contact with others, thereby forming, maintaining, or expanding social relationships and helping to obtain social support when needed. Jovana et al [37] have pointed out that participants who participate in positive activities or participate in activities that make them feel confident may experience fewer depressive symptoms, because these activities may provide participants with pleasant emotions or actively strengthen their roles in community activities, reducing the susceptibility to depressive symptoms. Besides, social participation in this research is not limited to traditional social activities. With the development of network technology, Internet use behavior is also included in the category of social participation. This reminds us of the importance of diversifying the ways in which older people participate in society and their acceptance and use of new technologies, such as smartphones and computers.

In addition, this study shows that as the number of physical multi-morbidity increases, the depression of the elderly will increase accordingly. The robust nature of the relationship is demonstrated in that significant relationships between physical multi-morbidity and depression were found across gender, areas, educational backgrounds, marital status, and health status. Considering the growing number of people in the world who are affected by physical multi-morbidity, this relationship deserves considerable attention[38]. This relationship may be explained by the following factors: suffering from some chronic diseases hinders people from achieving their life goals, and then has a considerable impact on their mental well-being[39]. The other way round, studies have pointed out that depression may cause other adverse outcomes in patients with chronic diseases. Such it is considered to be a risk factor for suicide death in the elderly[40, 41], suggesting the importance of chronic disease prevention and control and routine depressive symptoms screening for the elderly.

Finally, the influence of social participation on depression in the elderly can be weakened according to the decrease in the number of physical multi-morbidity. In contrast, the increase of physical multi-morbidity played an antimediating effect in the influence of social participation on depression. Based on this idea, this study believes that in the intervention of elderly depression, we should not only pay attention to improving the social participation of the elderly, but also strengthen the prevention and screening of chronic diseases, and provide comprehensive elderly care and public health services[42]. Through relatively simple changes in health care services, such as the use of joint disease guidelines and targeted screening and prevention, it may be possible to greatly improve health and cost outcomes[43].

There are some limitations to this study. First of all, our research was based on the latest cross-sectional analysis of the 4th wave of the CHARLS database, it is difficult to draw conclusions about causality. Second, our judgment of depression is based on the CESD-10 scale, which is still different from the true diagnosis of depression. Finally, given that the present study used cross-sectional data, a longitudinal analysis of the relationships among social participation, physical multi-morbidity, and depression in the elderly is needed to provide deeper insight into the nature of the relationships among these variables and depression.

Conclusions

This study is the first in China to use a large-scale database to examine the relationship between the elder's social participation, physical multi-morbidity, and depression. The results showed that among the Chinese elderly, higher levels of social participation were associated with lower levels of depressive symptoms, and fewer physical multi-morbidity were associated with lower levels of depression. In addition, this study suggests that social participation and the prevention and treatment of chronic diseases may play an important role in improving the mental health of the elderly. The significance of social participation and preventive health care must be taken into consideration when conducting mental health interventions for the elderly in the future.

Abbreviations

CHARLS: China Health and Retirement Longitudinal Study; CESD-10: 10-item Center for Epidemiological Studies Depression Scale; M: Mean; SD: Standard Deviation.

Declarations

All methods were carried out in accordance with STROBE Statement and regulations.

Acknowledgements

Not applicable.

Authors' contributions

WH drafted the manuscript. RL and LC contributed to its refinement. WH and RL performed the statistical analysis. WZ interpreted the analytical data and supervised the whole process. All authors read and approved the manuscript.

Funding

Not applicable.

Availability of data and materials

The datasets used and analysed during the current study are available in

<http://charls.pku.edu.cn/>.

Ethics approval and consent to participate

Informed consent was obtained from all subjects and/or their legal guardians. The Biomedical Ethics Review Committee of Peking University approved CHARLS, and all participants were required to provide written informed consent. The ethical approval number was IRB00001052-11015. Participants were not directly involved in planning the study as it was done as a part of a regular demographic health survey.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests

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Tables

Table 1 Characteristics of participants and levels of social participation, depression, and physical multi-morbidity among older people (N=6421)

Health status	Good	4378 (68.20)	3.36±7.79	0.000	7.30±5.67	0.000	0.65±0.96	0.000
	Poor	2043 (31.80)	21.82±5.98		12.53±6.91		1.15±1.27	
Health care use	Outpatient (in the past 1 month)	1082 (16.90)	3.57±8.37	0.001	10.17±6.93	0.000	1.06±1.24	0.000
	Hospitalized (in the past 12 months)	1388 (21.60)	2.49±7.12	0.026	10.66±6.92	0.000	1.20±1.28	0.000
	Home and community care services	34 (0.50)	3.03±4.53	0.900	8.09±6.22	0.436	0.71±1.06	0.593
	Paid family doctor services	323 (5.00)	3.70±9.83	0.036	8.78±7.01	0.609	0.94±1.06	0.027
Variables		Frequency, percentage (%)	Social participation	<i>P</i>	Depression	<i>P</i>	Physical multi-morbidity	<i>P</i>
Total			2.87±7.30		8.96±6.56		0.81±1.10	
Gender	Male	3172 (49.40)	2.88±7.50	0.958	7.73±5.95	0.000	0.77±1.08	0.016
	Female	3249 (50.60)	2.87±7.09		10.16±6.91		0.84±1.11	
Age	65~74 years	4680 (72.90)	3.05±7.66	0.000	8.89±6.58	0.309	0.82±1.11	0.052
	75~84 years	1558 (24.30)	2.54±6.46		9.18±6.62		0.78±1.07	
	≥85 years	183 (2.90)	1.14±2.63		8.82±5.65		0.64±0.91	
Area	Urban	1280 (19.90)	5.51±10.69	0.000	7.22±6.03	0.000	0.91±1.16	0.000
	Urban-rural integration	435 (6.80)	4.86±12.83		7.91±6.56		1.00±1.30	
	Rural	4706 (73.30)	1.97±4.84		9.53±6.61		0.76±1.05	
Education	primary school	5097 (79.40)	2.11±5.08	0.000	9.57±6.67	0.000	0.79±1.08	0.018
	Middle school	836 (13.00)	4.34±8.44		7.07±5.58		0.86±1.12	
	High school and above	488 (7.60)	8.28±16.46		5.88±5.42		0.91±1.19	

Marital status	Married	4867 (75.80)	2.88±7.51	0.488	8.56±6.36	0.000	0.80±1.08	0.432
	Non-married	117 (1.80)	3.62±7.29		9.10±6.79		0.77±1.13	
	Widowed	1437 (22.40)	2.78±7.30		10.32±7.03		0.84±1.14	

Table 2 Regression analysis between social participation and depression

Independent variable	Depression					
	B	β	VIF	adjR ²	F	P
(constant)	6.664			0.206	167.484	0.000
Social participation	-0.089	-0.099	1.090			0.000
Physical multi-morbidity	0.504	0.084	1.088			0.000
gender	1.747	0.133	1.117			0.000
area	0.620	0.076	1.204			0.000
education	-0.848	-0.077	1.260			0.000
Marital status	0.482	0.061	1.126			0.000
Health status	4.247	0.301	1.131			0.000
Outpatient (in the past 1 month)	-0.543	-0.031	1.037			0.006
Hospitalized (in the past 12 months)	-0.834	-0.052	1.094			0.000

Table 3 The mediating model test of physical multi-morbidity

Regression equation (N=6421)		Fitting index		Coefficient significance		
Predictor variable		R ²	F(df)	β	t	p
Step1		0.052	174.962			
Social participation				-0.164	-13.459	0.000
Physical multi-morbidity				0.162	13.294	
Step2		0.053	119.523			
Social participation				-0.160	-13.107	0.000
Physical multi-morbidity				0.163	13.372	0.000
Social participation * Physical multi-morbidity				-0.035	-2.872	0.004

Note: All variables in the model are substituted into the regression equation by standardized variables.