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Volunteering and Depression among Older Adults: An Empirical Analysis Based on CLASS 2018

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ABSTRACT

Introduction: Older adults are prone to high levels of depression due to their deteriorating physical functions and shrinking social networks after retirement. Volunteering as an important social activity is essential for alleviating depression by building social network. This paper aims to examine the effect of volunteering on depression among older adults by using China Longitudinal Aging Social Survey (CLASS 2018) data. **Methods:** This study uses descriptive analysis and chi-square tests to show differences in demographic factors of older adults' volunteerism participation, followed by bivariate correlation analysis to examine the correlation between the vital variables. Afterward, stratified linear regression analysis is used to research the significant level and impact between volunteering and degree of expertise, frequency, and variety of participation. **Results:** 8,459 older adults are included in study. The research reveals that older adults who are younger, live in urban areas, are married, or have a higher degree of education tend to have fewer depressive symptoms. Meanwhile, participation in volunteering (OR = 0.90, 95% CI: 0.8, 1.1, $p < 0.001$), as well as that demands specialized skills (OR = 0.51, 95% CI: 0.30, 0.2, $p < 0.001$), more frequency of participation (OR = 1.85, 95% CI: 1.53, 2.18, $p < 0.001$), and a wider variety of activities (OR = 0.21, 95% CI: 0.12, 0.29, $p < 0.001$), all have a positive influence on depression levels. **Discussion/Conclusion:** Older adults who participate in voluntary services have lower depression symptoms and should be encouraged to use their professional skills and increase participation frequency and variety in this process. This article suggests that governments should help older adults participate in voluntary services by time bank which will further strengthen social ties, rebuild social networks and alleviate depression symptoms of older adults.

KEYWORDS

Volunteering; depression; mental health; older adults; China; time banking



1 Introduction

In the process of global population aging, the mental health of older adults has become increasingly important. According to the Mental Health Behavior Plan (2013–2020) released by the World Health Organization (WHO), about 15% of people aged 60 and above suffer from mental disorders, and depression is the most common disease [1]. There are two reasons why older adults are more likely to be depressed. The first reason is that the physical functions of older adults are continuously deteriorating. Besides, the social network of older adults shrinks after retirement, which causes loneliness, disappointment, and depression [2]. Depression affects the mental health, social integration of older adults [3] and physical function, such as cognitive impairment, and depression will inevitably increase the risk of suicide and death [4].

Older adults can improve their quality of life through “participation, health and security” [5], suggesting by the Active Ageing Policy Framework, which was published by WHO at the Second World Assembly on Ageing in April 2002. Volunteering provides an essential opportunity for social inclusion of older adults. It can reduce depression, promote health, and enhance well-being, so volunteering is regarded as a vital method to achieve active aging [6]. Nowadays, research about the participation of older adults in volunteer services is increasing rapidly. These researches mainly focus on the impact effect, impact mechanism, and empirical analysis of volunteering on depression among older adults [7–9]. It has been found that older adults participating in volunteering can compensate for the social roles lost after retirement and help to maintain and expand social support networks [10]. Furthermore, Volunteering plays a significant role in shaping the positive self-perceptions of aging, improving the older adult’s self-esteem, self-identity, life satisfaction, and subjective well-being [11,12].

As one of the countries with the largest ageing population globally, the process of population aging in China is accelerating. According to the Seventh National Population Census in China, the total number of people aged 60 and older was 264 million, accounting for 18.7% of the total population. Besides, the number of people aged 65 and above was 191 million, accounting for 13.5% of the total population [13]. At the same time, the prevalence of depression and depressive symptoms among older adults in China was rising. The research found that the depression detection rate of older adults with mild cognitive impairment in 2016–2021 (34.6%) was higher than the data from 2011–2015 (23.5%) [14].

To deal with the population aging, China has formulated the Fourteenth Five Year Plan and the Long-Term Goals for the year 2035 that it first proposed the implementation of an active aging strategy, and it advocated older adults should participate in voluntary services to utilize their human capital and achieve their social value. Therefore, it is essential to research whether volunteering participation of Chinese older adults impacts their depression symptoms. That also can provide an empirical analysis to actively respond to population aging and offer a new way for depression mitigation in China. Under these targets, this article will review relevant literature systematically and put forward four research hypotheses.

2 Literature Review and Hypotheses Development

2.1 Literature Review

Depression is a complex emotional experience when people encounter difficulties, discomfort, pessimism, anxiety and so on [15]. Depression is one of the most common mental symptoms among older adults. It is associated with a variety of diseases, which can affect the quality of life and increase the family care pressure and social burden. The mechanism of depression, physical health, social support, adverse events, personality characteristics and other factors can induce depression symptoms when people get older [16]. Psychosocial resources such as a sense of control and social support are considered protective factors against depression [17]. Building a good social support network can help improve the mental health level of older adults and effectively reduce depression symptoms [18]. Therefore, it is significant for older adults to promote their mental health through active social participation and interaction.

Voluntary service refers to unpaid and non-compulsory activities undertaken by an individual either through an organization or directly for others' benefits, and volunteering includes formal and informal methods. Formal volunteer activities refer to the activities organized by social groups, while informal volunteer activities refer to voluntary activities that are not formally organized and spontaneous [19]. Volunteering plays an important role in promoting the older adults' physical and mental health [7]. A study about the relationship between voluntary activities and depression symptoms of older adults under the background of COVID-19 has shown that older adults can actively contribute their human capital to the community by participating in different voluntary activities, improving their self-esteem and self-identity [9]. Previous studies have also shown that volunteering can establish new social connections and build social support networks for older adults, which is beneficial to older adults adapting to different life stages and relieving the mood caused by aging [20].

The influence of volunteering on depression among older adults is usually based on social participation theory and role theory. According to the social participation theory, older adults can improve their mental health by participating in meaningful voluntary activities and contributing to others [21]. The reason is that voluntary work can provide older adults with more opportunities for social interaction and participation, which can help to rebuild an active social network to enhance their mental well-being [8]. Based on role theory, giving rather than receiving is a crucial way to combat loneliness and depression, improving social and self-identity. Moreover, active participation in social roles can promote social support, increase social interaction, and enhance psychological resilience [22]. Meanwhile, the construction of social roles has a compensatory effect on the mental health of older adults by rebuilding their social identity and value [23]. Furthermore, voluntary services can provide the opportunity for older adults to build new social networks, which will help them obtain sufficient social support. That is a protective factor in preventing depression [24]. Therefore, volunteering enriches the social resources of older adults, and volunteer activity is conducive to alleviating negative emotions such as depression and anxiety [25].

Volunteers at the medium level (101–300 h per year) were associated with fewer depressive symptoms than those who did not volunteer [26]. Some scholars found that the different frequencies of participating in voluntary services have different effects on the mental health of senior volunteers [27]. However, short-term voluntary activities cannot lead to changes in the mental health of the older adults, suggesting that older adults should be encouraged to engage in long-term voluntary participation [28]. From the perspective of voluntary service, participating in multiple activities may have more protective effects on depression than engaging in a single activity [29]. In addition, the demographic characteristics of volunteers also have a significant impact on the level of depression. Some studies showed that volunteer activities are negatively correlated with the depression symptoms of older adults, and this relationship is more significant for urban residents [30]. Besides, volunteering has a greater impact on social emotion and mental health of the older volunteers with lower socioeconomic levels. The researcher also points out that there are life course differences in the relationship between voluntary activities and mental health. Older adults benefit more from voluntary services than young people, and their life satisfaction and perceived health are more apparent [31]. Some researchers acclaimed that frequent and diverse participation in voluntary activities can reduce depression, and women benefit more from mental health than men [32]. In general, the involvement of older adults in voluntary activities positively impacts depression symptoms.

2.2 Research Hypothesis

To summarize, participation in volunteer services has a significant effect on depression. However, there is still limited research about the impact of the intensity, type and duration of older adults' voluntary services participation on their depression. It is necessary to supplement the relevant empirical research results in China. Therefore, to increase theoretical research, this study will take the Chinese older adults as research objects and put forward the following hypotheses:

H1: Participation in voluntary services is significantly related to the depression level of older adults.

H2: The depression level of older adults who participated in professional volunteer service is lower.

H3: The depression level of older adults who participated in volunteer service frequently is lower.

H4: The depression level of older adults who participated in more types of volunteer service is lower.

Based on these hypotheses, this article will use data from the 2018 China Elderly Social Tracking Survey to verify the research hypotheses. At the end of this article, it will conclude and provide suggestions. Fig. 1 below demonstrates the overall research framework.

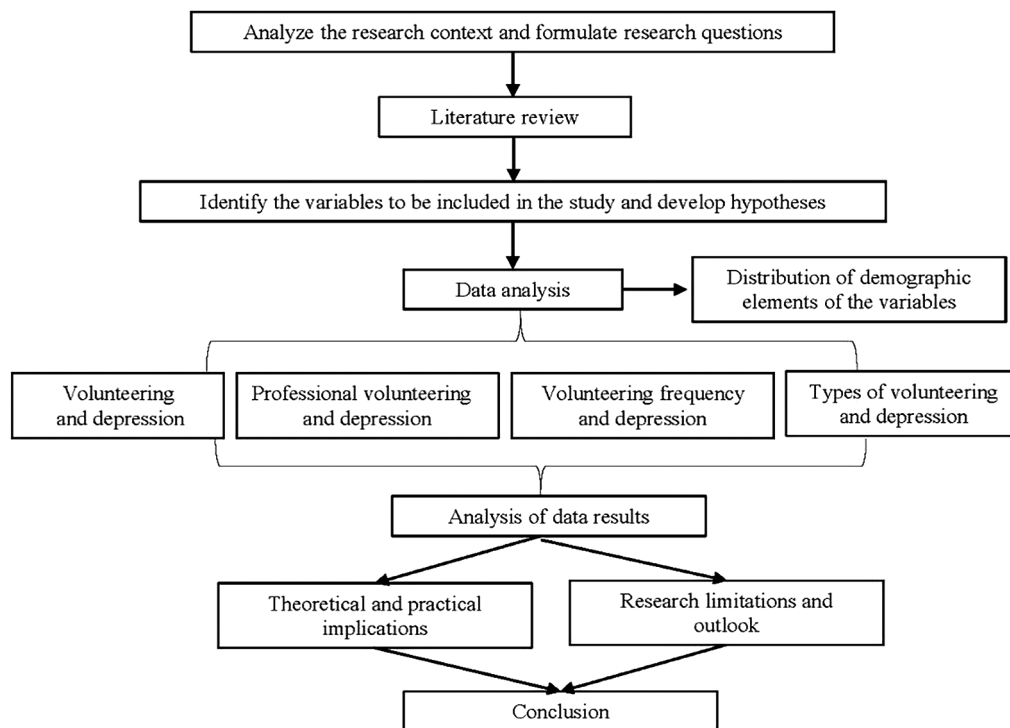


Figure 1: Research framework

3 Method

3.1 Research Subject and Data

Data of this study were obtained from the China Longitudinal Aging Social Survey (CLASS) in 2018, a large-scale nationwide project conducted by the National Survey Research Center at Renmin University of China. It was designed to collect demographic, physical, psychosocial, and economic data regularly and systematically concerning Chinese older adults on both individual and community levels. In detail, A total sample of 11,418 older adults aged 60 years old and above was obtained in CLASS 2018. After data cleaning and deletion of missing values, the survey eventually included 8,459 sample data in this study. Moreover, no new surveys were conducted from 2019 to the present affected by COVID-19, we used the 2018 data as the latest sample for analysis.

In the 2018 questionnaire survey, the CLASS collected demographic information, information on functional health and related services, socioeconomic status, retirement planning, social support, cognitive status, and mental health from interviewed Chinese urban and rural older adults. In this study, we used data on basic personal information and depression levels in the mental health of older adults to develop

descriptive statistics and inferential statistics. This research conducted descriptive statistics and inferences using basic personal information and psychosocial depression levels.

3.2 Measurement

3.2.1 Depression

The dependent variable is the level of depressed mood in older people. Depression levels are treated inversely, with higher scores associated with lower levels of depression. Specifically, the questionnaire uses 12 questions from the CES-D scale (Self-Rating Depression Scale), including “Did you feel good about yourself in the past week?” “Have you felt lonely in the past week?” “Did you feel sad during the past week?” “Did you feel like you had a good time this past week?” “Did you feel like you didn’t want to eat this past week?” “Did you have trouble sleeping this past week?” “Did you feel less useful this past week?” “Did you feel like you had nothing to do this past week?” “Did you find a lot of fun (interesting things) in your life in the past week?”. For each of these questions, the responses were given a score of 1, 2, and 3, representing “no,” “sometimes”, and “often”, respectively; also, the questions “Did you feel lonely in the past week?” and 6 other questions were reversed and summed to obtain a continuous variable. The question options chosen for the dependent variable were taken from the Centre for Streaming Depression Scale (CES-D), a widely used instrument for measuring depressive symptoms [33]. There are 20 survey items, including 16 items describing lower depression symptoms and 4 items relating higher depression.

Additionally, Cronbach’s alpha coefficient is generally used to analyze the reliability of questionnaire items, with higher values indicating greater internal consistency. A Cronbach’s alpha coefficient greater than 0.7 is considered a qualified inter-item agreement. After analysis, Cronbach’s alpha coefficient for question 12 is 0.771, demonstrating decent reliability for questions measuring outcome variables.

3.2.2 Volunteering

The independent variables in the present study are older adults’ participation in volunteering, including whether they participated in volunteering, whether they participated in volunteering that required professional skills, the number of types of volunteering they participated in, and how active they were in volunteering. Specifically, in terms of whether or not they participated in voluntary services, the questionnaires set out “community security patrol”, “environmental hygiene protection”, “coordination of neighborhood disputes”, and for those who have participated in “once or more” of these activities within one year of the survey, a value of 1 is assigned to, and a value of 0 is assigned to those who have not participated in any of these activities. The number of types of volunteering is set as a continuous variable from 0 to 8; the frequency of volunteering was assigned a value of 0 for “did not participate” and “almost every day” is assigned a value of 1, “at least once a week” is assigned a value of 2, “at least once a month” and “several times a year” are assigned the value of 3 and 4, respectively. The combined values of “at least once a month” and “several times a year” were assigned a value of 3 and treated as dummy variables in the linear regression analysis.

3.2.3 Covariables

The control variables were essential demographic elements, including age, gender, marriage status, area of residence, and educational attainment of older people. For gender, “female” was assigned a value of 0, and “male” was given a value of 1. As for the age variable all survey respondents were aged 60 and above, and generally poorly educated in their younger years; for education, given that the CLASS survey respondents in 2018 were older than 60 years old, survey respondents whose education level are “illiterate” are assigned 0, “private school/literacy class” and “primary school” are combined and given 1, “middle school” are designated 2, and for ethnicity, “ethnic minority” was assigned a value of 0 and “Han” was assigned a value of 1; for marriage status, unmarried, divorced and widowed In terms of marriage status, unmarried,

divorced and widowed older adults are combined as “non-married” and assigned a value of 0, while married people with a spouse are considered “marriage” and set a value of 1; in terms of area of residence, the “type of area where the respondent lives” is used to distinguish In terms of place of residence, the “type of area where the respondent lives” is used to differentiate between urban and rural areas, with a value of 0 being assigned to “city/county city central area”, “city/county city peripheral area”, “city/county city urban/rural area” and “city/county town outside the city/county city”. The “town outside the city/county” is combined with “town” and assigned a value of 0. Those living in “rural” are set to “village” and assigned a value of 1.

3.3 Data Analysis

In this part, the demographic distribution of older adults’ participation in volunteering and depressive symptoms are analyzed using descriptive statistics, including means and percentages. Furthermore, bivariate correlation tests are conducted for the variables. Afterward, considering the outcome variables of the study as continuous variables, this paper uses a hierarchical linear regression model for inferential analysis to examine the extent to which volunteering participation affects levels of depressive symptoms.

4 Results

4.1 Descriptive Statistics

Demographic characteristics of the analytic sample are displayed in [Table 1](#). From the total participants who completed the interview, complete data were available for 8459 individuals included in the final analysis.

Table 1: Baseline characteristic of the study population (n/%)

	Overall	Volunteers	Non-volunteers	χ^2	<i>p</i> -value
N	8459	3040 (35.94)	5419 (64.06)		
Age group				12.51	<i>p</i> < 0.01
60–69	4251 (50.25)	1605 (52.8)	2646 (48.83)		
70–79	2947 (34.84)	1012 (33.29)	1935 (35.71)		
80 and above	1261 (14.91)	423 (13.91)	838 (15.46)		
Gender				0.20	0.338
Females	4169 (49.28)	1508 (49.61)	2661 (49.11)		
Males	4290 (50.72)	1532 (50.39)	2758 (50.89)		
Residence				109.20	<i>p</i> < 0.001
Urban	5024 (59.39)	2032 (66.84)	2992 (55.21)		
Rural	3435 (40.61)	1008 (33.16)	2427 (44.79)		
Ethnicity				111.313	<i>p</i> < 0.001
Minority	469 (5.54)	62 (2.04)	407 (7.51)		
Han	7990 (94.46)	2978 (97.96)	5012 (92.49)		
Marriage				19.74	<i>p</i> < 0.001
Non-married	2543 (30.06)	824 (27.11)	1719 (31.72)		
Married	5916 (69.94)	2216 (72.89)	3700 (68.28)		
Education				114.45	<i>p</i> < 0.001
Illiterate	2092 (24.73)	738 (24.28)	1354 (24.99)		
Primary school	3410 (40.31)	1041 (34.24)	2369 (43.72)		
Middle school	2041 (24.13)	827 (27.2)	1214 (22.4)		
High school	916 (10.83)	434 (14.28)	482 (8.89)		

Among them, 3040 have participated in volunteer work, and 5419 do not have volunteer experiences during the year before the survey. To be more specific, younger volunteers were more likely to participate in the volunteer work on average ($\chi^2 = 12.51, p < 0.01$). Besides, compared to the overall gender distribution (49.28% female, 50.72% male), a nearly balanced proportionate of females (49.61%) were volunteers compared to males (50.39%). Similarly, a slightly disproportionate of urban interviews (66.84%) were volunteers as opposed to the rural sample (33.16%) ($\chi^2 = 109.20, p < 0.001$), compared to the overall distribution (59.39% urban, 40.61% rural).

Conversely, the ethnic differences there are 5.54% of the minority and 94.46% of the Han people interviewed ($\chi^2 = 111.313, p < 0.001$). In comparison while only 2.04% of the former and 97.96% of them were volunteers during the year between 2017 to 2018. As for the marriage status, a negligibly disproportionate amount of married older adults (72.89%) were volunteers as opposed to the non-marriage sample (27.11%) ($\chi^2 = 19.74, p < 0.001$), compared to the overall distribution (69.94% married, 30.06% non-married). In terms of the education level, people were more likely to volunteer if they had higher educational attainment ($\chi^2 = 114.45, p < 0.001$), with 14.28 of the interviewers having taken part in the volunteer work but only ac. Still, only 10.83% of the total sample, compared with 24.73 of the interviewees who are illiterate, but 24.28% of them were volunteers.

4.2 Correlation Analysis

Table 2 shows the descriptive statistics and correlations of study variables, including independent variable dependent ones, and Spearman's correlation coefficient was used to examine the correlation between the variables pairwise. Overall, participation in volunteering, participation in volunteering that requires professional skills, more frequent involvement, and a wider variety of volunteering are statistically significantly associated with lower levels of depression, with $p < 0.001$ or $p < 0.01$ in all bivariate correlation analyses, demonstrating statistical significance.

Table 2: Descriptive statistics and correlations of study variables

	M	SD	1	2	3	4	6
1 Volunteering or not	0.363	0.481	1				
2 Volunteering requires professional skills	0.208	0.406	0.671***	1			
3 Frequency of participation	0.892	0.803	0.679***	0.971***	1		
4 Number of types of volunteering	1.635	2.690	0.794***	0.968**	0.973**	1	
6 Depression symptoms	27.858	16.642	0.057**	0.142**	0.120**	0.118***	1

Note: ***, ** representing $p < 0.001, p < 0.01$, respectively.

4.3 Regression Analysis

A hierarchical linear regression model was used, with Model 1 incorporating control variables based on fundamental essential factors, and Models 2 to 5 included the four independent variables, separately. To be more exact, the first panel of Table 3 shows the effects of volunteering on depression influenced by some of the control factors. In detail, the severity of depression increases as the older adults' age increases (OR = -0.76, 95% CI: -1.02, -0.50, $p < 0.001$). Regarding disparities in place of residence, senior volunteers living in rural regions were less depressed than their urban counterparts (OR = -0.63, 95% CI: -0.81, -0.44, $p < 0.001$). Older adults who were married showed lower levels of depression than those who were non-married (OR = 0.98, 95% CI: 0.78, 1.08, $p < 0.001$). Depression levels were much lower among individuals with middle and high school education, and depressive symptoms were reduced as

educational attainment rose (OR = 1.75, 95% CI: 1.42, 2.08, $p < 0.001$). In addition, there were no statistically significant gender or ethnic disparities.

Table 3: Odds ratio (OR) and 95% confidence (CI) for depression symptoms of older adults

	Model 1				Model 2				Model 3			
	OR	95% CI		<i>p</i> -value	OR	95% CI		<i>p</i> -value	OR	95% CI		<i>p</i> -value
	27.32	26.87	27.77	$p < 0.001$	27.13	26.68	27.57	$p < 0.001$	27.29	26.84	27.73	$p < 0.001$
Age (“60–69”)												
70–79	-0.35	-0.54	-0.16	$p < 0.001$	-0.34	-0.53	-0.15	$p < 0.01$	-0.36	-0.55	-0.17	$p < 0.001$
80 and above	-0.76	-1.02	-0.50	$p < 0.001$	-0.73	-1.00	-0.47	$p < 0.001$	-0.79	-1.05	-0.52	$p < 0.001$
Gender (“Female”)	-0.12	-0.29	0.06	0.196	-0.11	-0.28	0.07	0.232	-0.12	-0.30	0.05	0.163
Residency (“City”)	-0.63	-0.81	-0.44	$p < 0.001$	-0.55	-0.73	-0.36	$p < 0.001$	-0.61	-0.80	-0.43	$p < 0.001$
Ethnicity (“Minority”)	0.11	-0.26	0.48	0.570	-0.09	-0.47	0.28	0.619	0.05	-0.33	0.42	0.807
Marriage statuses (“Non-Married”)	0.98	0.78	1.18	$p < 0.001$	0.95	0.75	1.15	$p < 0.001$	0.97	0.78	1.17	$p < 0.001$
Education (“Illiterate”)												
Primary school	-0.11	-0.33	0.12	0.344	0.0	-0.3	0.2	0.725	-0.10	-0.32	0.12	0.369
Middle school	0.63	0.37	0.89	$p < 0.001$	0.6	0.4	0.9	$p < 0.001$	0.63	0.37	0.89	$p < 0.001$
High school	1.75	1.42	2.08	$p < 0.001$	1.7	1.4	2.0	$p < 0.001$	1.74	1.41	2.07	$p < 0.001$
Volunteering (“Not”)					0.9	0.8	1.1	$p < 0.001$				
Volunteering that requires professional skills (“Not”)									0.51	0.30	0.72	$p < 0.001$
Frequency of participation (“Never participate”)												
Almost everyday												
At least once a week												
At least once a month												
Several times a year												
Number of types of volunteering												
					Model 4				Model 5			
					OR	95% CI		<i>p</i> -value	OR	95% CI		<i>p</i> -value
					27.08	26.64	27.53	$p < 0.001$	27.40	26.95	27.85	$p < 0.001$
Age (“60–69”)												
70–79					-0.31	-0.50	-0.12	$p < 0.01$	27.40	-0.55	-0.17	$p < 0.001$
80 and above					-0.68	-0.94	-0.42	$p < 0.001$	-0.78	-1.04	-0.51	$p < 0.001$
Gender (“Female”)					-0.10	-0.28	0.07	0.250	-0.12	-0.30	0.05	0.173
Residency (“City”)					-0.56	-0.74	-0.38	$p < 0.001$	-0.60	-0.79	-0.42	$p < 0.001$
Ethnicity (“Minority”)					-0.07	-0.44	0.30	0.725	0.03	-0.35	0.40	0.893
Marriage statuses (“Non-Married”)					0.95	0.75	1.14	$p < 0.001$	0.97	0.78	1.17	$p < 0.001$
Education (“Illiterate”)												
Primary school					-0.02	-0.24	0.20	0.834	-0.10	-0.32	0.13	0.394
Middle school					0.62	0.36	0.88	$p < 0.001$	0.63	0.37	0.89	$p < 0.001$
High school					1.71	1.38	2.04	$p < 0.001$	1.73	1.40	2.06	$p < 0.001$
Volunteering (“Not”)												

(Continued)

Table 3 (continued)

	Model 4			Model 5		
	OR	95% CI	<i>p</i> -value	OR	95% CI	<i>p</i> -value
Volunteering that requires professional skills (“Not”)						
Frequency of participation (“Never participate”)						
Almost everyday	1.85	1.53	2.18			<i>p</i> < 0.001
At least once a week	0.95	0.56	1.33			<i>p</i> < 0.001
At least once a month	0.65	0.35	0.95			<i>p</i> < 0.001
Several times a year	0.65	0.40	0.90			<i>p</i> < 0.001
Number of types of volunteering				0.21	0.12	0.29 <i>p</i> < 0.001

Note: ***, **, * representing $p < 0.001$, $p < 0.01$, $p < 0.05$, respectively.

The results of testing hypotheses 1, 2, 3, and 4 are shown in Table 3. Hypothesis 1 states that “Volunteering or not” is significantly associated with depression levels in older people, which means that those who volunteered had lower levels of depression. The second panel of Table 3 shows the effects of volunteering on depression are significant. According to these figures, volunteering had a positive impact on depression (OR = 0.21, 95% CI: 0.12, 0.29, $p < 0.001$); that is, volunteering was associated with fewer depressive symptoms for all age groups. Hypothesis 2 states that “Participation in professional volunteering” is substantially connected with lower depression levels in older adults, with those who engaged in professional volunteering having lower depression symptoms. Results of the model demonstrate that volunteering with professional skills positively impacted depression (OR = 0.9, 95% CI: 0.80, 1.10, $p < 0.001$), as volunteering professionally was associated with less depression.

The third hypothesis states that a higher frequency of participation would be related to lower levels of depression. This hypothesis receives support in the fourth panel in Table 3, which consistently shows that the association between volunteering and depression is significant when volunteering more frequently (OR = 1.85, 95% CI: 1.53, 2.18, $p < 0.001$), especially for those who volunteer daily. The fourth hypothesis proposes that the number of types of volunteering is significantly associated with depression levels in older adults, with more types of volunteering being associated with lower levels of depression. The effects model in Table 3 enables us to ensure that the number of the kinds of volunteering was positively correlated with lower levels of depression (OR = 0.21, 95% CI: 0.12, 0.29, $p < 0.001$), with more types of volunteering being associated with lower levels of depression in older people.

Consequently, hypotheses H1a, H1b, H1c, and H1d are valid.

4.4 Endogeneity Test

As for the robustness of the results, the instrumental variable method was used to do endogeneity tests on the regression results further. The instrumental variables selected in this study were the acceptance of community elderly service resources and the number of chronic diseases of the older people. In order to test the validity of the instrumental variables, they were tested by the under-identification test, the weak instrumental variable test, and the over-identification test.

Specifically, in the unidentifiable test, if the *p*-value is less than 0.01, which means that the instrumental variables are identifiable. In the weak instrumental variable test, the result is more significant than 10% maximal IV relative bias, indicating that the instrumental variables are not weak instrumental variables. In addition, it is necessary to use over-identification test for instrumental variable to judge that all instrumental variables satisfy the condition of homogeneity. If the test *p*-value is more significant than

0.1, the results cannot reject the original hypothesis, and all instrumental variables are exogenous vice versa. The results of the tests were as follows (see Table 4).

Table 4: Endogeneity tests and the robustness

	Model 1	Model 2	Model 3	Model 4
Volunteer or not	6.498*** (9.96)	13.96*** (6.91)	16.56*** (6.36)	57.01*** (2.83)
Age group	-0.0636*** (-7.78)	-0.0897*** (-7.62)	-0.0835*** (-6.61)	-0.131*** (-3.70)
Gender	-0.230** (-2.12)	-0.451*** (-3.11)	-0.496*** (-3.12)	-0.314 (-1.22)
Residence	-0.423*** (-3.70)	-0.796*** (-5.50)	-0.890*** (-5.47)	-0.944*** (-3.20)
Ethnicity	-0.647*** (-3.21)	-0.0904 (-0.41)	0.00296 (0.01)	0.564 (1.22)
Marriage	0.772*** (6.33)	0.881*** (5.81)	0.876*** (5.33)	0.661** (2.48)
Education	0.490*** (7.80)	0.592*** (7.31)	0.569*** (6.38)	0.969*** (4.45)
Volunteer or not		-6.946*** (-5.96)	-3.890*** (-3.76)	-9.576** (-2.31)
Frequency of participation			-1.599*** (-6.57)	8.131*** (2.72)
Types of voluntary activity				-26.92*** (-2.82)
_cons	30.83*** (47.66)	33.20*** (35.43)	32.77*** (32.56)	19.19*** (4.82)
<i>N</i>	7931	7931	7931	7931
Under-identification test	284.984 (0.0000)	89.145 (0.0000)	69.896 (0.000)	29.213 (0.000)
Weak identification test	184.151 (8.68)	51.323 (8.68)	41.764 (8.68)	16.127 (8.68)
Overidentification test	0.492 (0.4828)	0.003 (0.9534)	1.629 (0.2018)	2.589 (0.1076)

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Firstly, from the results of all model tests, the p -value of the under-identification test is 0, which indicates that all four models reject the original hypothesis. Secondly, the weak identification test values are all greater than the critical values, which means that the instrumental variables selected in this paper are not weak instrumental variables. Thirdly, the results of the overidentification test show that the p -values of all model tests are more significant than 0.1, thus the original hypothesis cannot be rejected. Therefore, all instrumental variables satisfy the exogenous condition.

In summary, the results of the above three tests prove that the instrumental variables selected in this paper are valid. Combined with the regression results, the core explanation of “whether or not the variable participates in professional volunteering” still positively influences the explanatory variable “depression level” at the significance level in all models. Furthermore, the regression results show that the core explanatory variable “whether or not to participate in professional volunteering” remains at the significance level in all models and has a significant positive effect on the “depression level” variable.

5 Discussion

Due to population ageing progress, there has been growing interest in understanding the associations between volunteering and the mental well-being of the older adults in China. However, in China, there are limited researches focused on the relationship between older volunteers and their depression. And there are few articles researched whether older adults conducting more voluntary activities and professional voluntary services makes sense to alleviate their depression symptom. The variables and indicators this paper used are based on previous and sound researches that not only focuses on older adults. Those variables and indicators can fill the gap of older volunteers researches in China, providing a new research method or framework for older volunteers and their depression. The most important goal of this study is to expand research by examining whether participating more voluntary activities and professional volunteers affect depression in later life. By analyzing data from 8,459 older adults, our results fully supported our hypotheses. As predicted, it would have an impact on their psychological well-being in the future. Besides, volunteering on depression was more substantial when people volunteered more frequently and more significantly when they took part in various kinds of volunteer work. Thus, our study contributes to research on volunteer and psychological well-being in several ways, and we discuss the contributions and implications of these findings.

5.1 Theoretical Implications

Firstly, one of the most notable outcomes of this research is that older adults who volunteered had considerably fewer symptoms of depression. Precisely, several previous studies have demonstrated that older adults’ participation in volunteering is associated with lower levels of depression [34–36] and is beneficial to older adults’ mental well-being [37–40]. Meanwhile, studies have also found that depression may be affected by the levels of social participation [40,41]. The present study extends findings using recent surveys on older people in China, indicating that older adults’ involvement in volunteering may benefit their mental well-being.

This result may be supported by two theoretical approaches. On the one hand, motivation may be inspected from a functionalist standpoint. Researchers have applied functionalism to propose and verify multiple motivation constructs for volunteering. Those researchers suggest six functional dimensions of volunteering: value, learning, growth, professional, social, and protective [42]. Among these 6 functions, these six protective functions, volunteering lowers negative feelings such as guilt, which may be used to expand the rationale that volunteering reduces depression among older adults. On the other hand, social participation theory indicates that older adults’ engagement in production would be helpful to their mental health. Admittedly, the level of participation in social and productive activities was evaluated by including doing unpaid or volunteer community work, performing paid community work, full-time or part-time paid employment, and so forth [43]. As volunteering is socially participative, it adds to psychological efficacy and lowers depression.

Secondly, this study found that older adults’ participation in volunteering varied significantly by demographic factors such as age, gender, marriage status, educational status, and place of residence. It provides an empirical basis for the significant differences in depression across these demographic factors. Studies have found that the higher the age of older adults, the higher their depression symptoms, which

could explain why volunteering works better for younger older adults than for older ones [44]. While rural older adults volunteers are more likely to have higher depression than those living in urban areas, which is consistent with previous research has shown that urban older adults might have lower depression [36], hence this study expands on those findings. In terms of marriage status, married seniors had lower levels of depression than non-married older adults, which is consistent with prior research [34,45], moreover, other research, however, have found a positive relationship between volunteering and depression levels among people who are not in a marriage status [34]. In terms of the education level, previous studies have found that longer education period are associated with lower depression symptoms in older adults, as higher levels of education means longer years of education; therefore, this study can validate previous research [35]. Overall, this study offers more statistical results corroborating earlier studies on the association between demographic variables and volunteering. In fact, in previous studies, whether factors such as gender, age, place of residence, marriage status and education are risk factors or protective factors for depression in older adults, there are various conclusions due to differences in geography, economy and culture, while this paper presents an analysis of the current state of older adults in China [46–53].

Thirdly, it was discovered that older people's engagement in voluntary work requires specialized skills, the frequency of their participation, and the number of varieties to their involvement had a substantial impact on their depressive symptoms. Previous research has shown that professional volunteers tend to have lower depression symptoms [35] and that the frequency and number of older adults participating in volunteering are inversely related to depression levels [46,54].

Social role theory could explain, on the one hand, the advantages of volunteerism that demand specialized skills in lowering depression symptoms among older adults [38]. It is hypothesized that increasing volunteering by older adults is beneficial for keeping their place in society, which preserves social connection and reduces the sense of loss associated with withdrawal from society as individuals age. In this study, participation in volunteer work requiring professional skills was beneficial to older adults' mental well-being with lower depression. This means that older adults can continue to perform at the same level of expertise as before retirement or in their previous positions, which is a compensation mechanism. Moreover, it has shown that older adults who are socially disconnected can experience feelings of isolation and loneliness [55], which can lead to increased levels of depression and anxiety, and can also reduce subjective well-being [56] and mental health [57]; previous research has also shown that loneliness can lead to depression and hurts quality of life. In conclusion, maintaining social relationships and connections and preserving or even acquiring new social roles in volunteering has a better preventive effect on depression.

On the other hand, activity theory [58] suggests that older adults stay involved in activities that facilitate social connectedness. In particular, giving more than receiving contributes to psychological well-being [59,60], consistent with the present study's findings, it deepens the analysis that participation in volunteering, and greater frequency and variety of participation, help reduce depression, which validates previous theories and studies that a continuum of activity enables older adults to maintain higher psychological effectiveness. Activity theory, therefore, explains why more frequent volunteering and a wider variety of volunteering activities by older adults can reduce depression.

5.2 Practical Implications

The findings of this study have important implications for policymakers responsible for fostering the mental health and well-being of older adults who desire to volunteer. Not only governments should encourage older adults to take part in voluntary activities, but also governments should focus on the frequency and skill of older volunteers.

This study suggests that volunteering can be a viable way for older adults to reduce depression symptoms and improve their quality of life. Indeed, the government can encourage older adults to join in time bank created by Edgar Cahn and it is regarded as a volunteers' time saving and exchanging bank. Volunteers can save their time of voluntary services into time bank, when they need help, they can withdraw time from time bank and exchange services or help from other volunteers. One hour service can earn one time currency or time credit that can exchange one hour service, no matter what service they were provided [61]. Time bank can establish "weak ties" in communities, thus building social networks between disparate groups, such as older adults [62]. Every older adult can take part in time bank and offer services to others, which will promote more older adults to be volunteers. Besides, providing more time bank services can get more time bank savings that will encourage older adults to provide more voluntary services to others. When older adults have enough time currencies in time bank, they can use time currencies to exchange professional service or skill training, which will cultivate older adults to be professional service providers and enable them can take part in various type of voluntary activities. This paper deems that if more time banks can be created by governments, older adults will be easier to be volunteers and they can participate various voluntary activities and to be skillful and active, which must be meaningful for depression alleviation and health promotion [63].

5.3 Limitations and Future Research

However, there are some limitations in this study. Firstly, in this study, we only used data from 2018 for analysis, still, it is hard to analyze the long-term impact of volunteering on depression using only cross-sectional data. Secondly, depression is but one type of mental health problem. Therefore, although our aim was to systematically examine one mental health outcome in detail, research is needed to reexamine related phenomena. Lastly, it is evident that older people's participation in volunteer work affects their level of depression, it is also noticeable that older people's level of depression influences their participation in volunteer work, and thus the correlation between the two should be studied.

Future studies, however, could consider replicating our results using a more objective measure of mental well-being in other contexts. At the same time, the longitudinal survey could be applied if possible. Although this study illustrates that older adults' volunteering is associated with lower levels of depression, whether this is because lower depression symptoms are due to volunteering, or older adults with lower depression symptoms are more likely to volunteer is left for further analysis. In addition, researchers should incorporate more control variables to improve the explanatory strength and fit of the linear regression equation.

6 Conclusion

It has been concluded that volunteering is associated with a positive effect on mental health. Precisely, the study analyzed the impact of volunteering on various demographic groups. It has been found that participation in volunteering had a varying effect on the depression levels of older participants. However, whether they were volunteering for professional skills or not, the frequency and types of volunteering were associated with a significant reduction in depression. Therefore, increasing the voluntary activities number of older adults can play a positively effect on their psychological well-being and mitigate depression, as it can also help them maintain their independence and improve their quality of life.

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