Journal of Affective Disorders 274 (2020) 85–92

Contents lists available at ScienceDirect

Journal of Affective Disorders

journal homepage: www.elsevier.com/locate/jad

Research paper

Attitudes toward aging, social support and depression among older adults: Difference by urban and rural areas in China

Danxia Liu[a], Juan Xi[b], Brian J. Hall[c,d], Mingqi Fu[e], Bo Zhang[f], Jing Guo[g,*], XingLin Feng[g,*]

[a] School of Sociology, Huazhong University of Science and Technology, Wuhan, PR China
[b] Department of Sociology, University of Akron, Akron, USA
[c] Department of Psychology, Global and Community Mental Health Research Group, University of Macau, Macao (SAR), People's Republic of China
[d] Department of Health Behavior, and Society, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, USA
[e] Center for Social Security Studies, Wuhan University, Wuhan, PR China
[f] Department of Neurology and ICCTR Biostatistics and Research Design Center, Boston Children's Hospital, Harvard Medical School, Boston, USA
[g] Department of Health Policy and Management, School of Public Health, Peking University, Beijing, P. R. China

ARTICLE INFO

Keywords:
Attitudes toward aging
Social support
Urban-rural difference
Depressive symptoms

ABSTRACT

Background: The specific impacts of attitudes toward aging on depressive symptoms have not been widely reported in previous studies in China.
Objectives: The aim is to examine the associations between attitudes toward aging, perceived social support, and depressive symptoms among older adults stratified by rural and urban dwelling.
Methods: This study used a cross-sectional data including 7209 participants, among which 64.6% were urban adults and 35.4% were rural adults. Several multiple liner regression models were used to analysis the data. Three social support types were analyzed as moderators of the relationship between the attitudes toward aging and depressive symptoms.
Results: Positive attitudes toward aging ($\beta = -0.139$, $P < 0.001$), negative attitudes toward aging ($\beta = 0.284$, $P < 0.001$) were significantly associated with lower depressive symptoms among older Chinese adults. Support from family ($\beta = -0.087$, $P < 0.001$), friends ($\beta = -0.047$, $P < 0.01$) and the government ($\beta = -0.035$, $P < 0.01$) were all significantly associated with urban older adults' levels of depressive symptoms. Only family support ($\beta = -0.109$, $P < 0.001$) was associated with lower depressive symptoms among rural older adults'. In addition, family support buffered the effect of negative attitudes toward aging on depressive symptoms for all the older adults, while the moderation effects of support from friends and government only worked for urban elderly.
Limitations: A cross-sectional design is limited to establish causal associations.
Conclusions: Addressing depression among older adults should focus on improving attitudes toward aging and expanding the availability of social support. Moreover, deeper reforms are needed to address inequalities between urban and rural areas in China.

1. Introduction

The mental health problems faced by the large and growing older population are a global public health concern. Depression decreases older adults' physical, cognitive and social functioning, and is associated with increased risks of suicide and morbidity, accounting for a high burden of disease in this population (Blazer, 2003). Due to the one-child policy, China faces the most rapid population aging in its history. The number of Chinese citizens aged 65 or above reached nearly 167 million by the end of 2018, representing 11.9 percent of the country's total population (Li, 2019). Therefore, it is necessary to examine the risk factors of depressive symptoms, especially in China.

Existing studies have explored various determinants of depressive symptoms among older adults, such as self-rated health status (Han, 2002), gender (Cole and Dendukuri, 2003), age (Ramírez and Palacios-Espinosa, 2016), living arrangement (Bai et al., 2016), religious belief (Bahrami et al., 2007), socioeconomic status (SES) (i.e. income, job and education) (Lei et al., 2014), social support (Travis et al., 2004), and rural-urban differences (Bian, 2002). However, older adults' attitudes toward aging has less been considered,

* Corresponding authors at: Department of Health Policy and Management, School of Public Health, Peking University, 38 Xueyuan Road, Beijing, 100191, P. R. China.
E-mail addresses: jing624218@bjmu.edu.cn (J. Guo), fxl@bjmu.edu.cn (X. Feng).

https://doi.org/10.1016/j.jad.2020.05.052
Received 25 December 2019; Received in revised form 10 April 2020; Accepted 10 May 2020
Available online 21 May 2020
0165-0327/

especially in China (Bai et al., 2016). Attitudes toward aging is a broad concept defined as people's experiences and perception regarding aging process and being old-aged. Positive attitudes towards aging (PATA) include appreciation of increased wisdom, sense of growth, and maturation. On the contrary, negative attitudes toward aging (NATA) include their perception of physical, psychological and social losses experienced during aging process (Fernández-Ballesteros et al., 2017).

Attitudes toward aging among Chinese older adults appear to be changing in recent years. The tradition of respecting, valuing and taking care of older adults is deeply rooted in China, which forms the basis for positive attitude towards aging in Chinese society (Bai, 2014). However, with the development of urbanization, and the "one-child" policy, the tremendous outflow of labor in China further pushes the younger generation to live separately from their elderly parents. This living arrangement inevitably poses great challenges and difficulties for adult children to provide adequate care for older parents, which results in older adults being seen as a burden. Due to modernization and the perception of elders as being a burden, Chinese older adults' esteem and status has declined, and negative age-related stereotypes have worsened (Chow and Bai., 2011). Research on the association between attitudes toward aging and depressive symptoms among older Chinese adults is needed amidst these social movements.

As noted in previous studies, attitudes toward aging as a pre-existed cognitive pattern would affect the way the elderly perceive their life events and the way they cope with them, which were related to the depressive symptoms (Meléndez et al., 2009; Marquet et al., 2019). According to cognitive behavioral therapy (CBT) model of psychopathology, development of depression may be interpreted from activation of cognitive vulnerabilities which are stress-diatheses remain latent until primed by eliciting and detrimental events. And negative attitudes toward aging as the important stress-diathesis will make old people see the aging process in negative way and induce depressive symptoms, while positive attitudes toward aging may restrain older adults' stress-diatheses, further reduce the depression risk (Laidlaw, 2010). A great deal of evidence demonstrated that positive attitudes toward aging among older adults is predictive of lower chance of cardiovascular disease and better hearing and memory performance, resulting in fewer depressive symptoms (Laidlaw, 2010; Kavirajan et al., 2011; Suh et al., 2012). On the contrary, negative attitudes toward aging was found associated with lower levels of self-efficacy, which lead to greater depression and stress (Laidlaw, 2010). However, there may be cultural differences in the relationship between attitudes toward aging and depression. Unlike Western elderly people, Chinese older adults are more likely in thinking of themselves as a burden to their families, leading to depression (Bai et al., 2016). Since healthy aging is a global priority (World Health Organization., 2014), it is crucial to examine the risk factors of depressive symptoms from the perspective of attitudes toward aging among the Chinese elderly.

Social support may modify the effect of attitudes toward aging on depression. According to coping theory, a supportive social environment would strength the link between older adults' positive attitudes toward aging and their mental health (Gyasi et al., 2018). However, with poor social support networks, seniors' negative aging attitudes exacerbate depression compared to those with sufficient social support (Hakulinen et al., 2016). The moderating role of social support may vary by source. In China, social support can be divided into family support, friend support, and governmental support. Family support is a traditional mode of elderly care in China (Tao and Cong, 2014), and the effect of family support on elderly depression is believed to be greater than the support from other sources (Wang et al., 2006). Meanwhile, the impact of friend support on depressive symptoms depends on whether the older adults could take care of themselves (Dan and Kaidi, 2015). In addition, significant disparities and inequalities with regard to government support exist between urban and rural settings in China. In general, urban elderly receive more and better-quality social benefits (Guo et al., 2017b). Thus, sources of social support may modify the effects of one's attitudes towards aging on depression, which has not been investigated yet.

Due to the urban and rural dual structure in China, associations between aging attitudes, social support and depression may vary across urban and rural settings. The rural-urban division works as a major social stratification mechanism in China, producing a lasting impact on people's attitudes toward aging, access to social support, and depression (Bian, 2002). On one hand, huge inequalities on earnings, health resources and economic support across urban and rural areas have been found in China (Guo et al., 2017b). Compared with rural counterparts, urban seniors receive favorable benefits from economic development (Chow and Bai, 2011). As a result, remarkable differences in depressive symptoms produced (Kim et al., 2015). On the other hand, urban and rural older adults have different expectations upon support from families, friends and government (Bai et al., 2016). Also, uneven distribution of social resources, and governmental support particularly, leads to greater differences in accessibility of social services between urban and rural elderly (Afridi et al., 2015). Thus, an examination of the potential differences between rural and urban settings is essential, in attempting to elucidate the association between attitudes towards aging, social support, and depression.

The objectives of this study were to: (1) examine the relationship between attitudes toward aging and depressive symptoms among older Chinese adults; (2) investigate whether the association between attitude towards aging and depressive symptoms is moderated by social support such that negative attitudes would be stronger where less social support is reported in comparison with greater social support; and (3)examine the rural-urban differences in the relations between attitudes toward aging, social support, and depression in this population. Compared with elderly living in urban areas, rural elderly are at a disadvantage since they report less positive attitudes towards aging and have limited social support within their household, which will lead to greater depressive symptoms.

2. Methods

2.1. Data source, procedure and participants

Data were drawn from the 2014 China Longitudinal Aging Social Survey (CLASS). This is a large-scale longitudinal social survey with a national representative sample, conducted by the National Survey Research Center at Renmin University of China. This survey is designed to explore social problems and challenges faced by older adults during the aging process, and to assess the effect of public policies in improving quality of life. To achieve these goals, CLASS selected individuals aged 60 years or older through multi-phased probability sampling. The county-level areas (including counties, county-level cities and districts) were selected as the Primary Sampling Unit (PSU), and village/residential communities were selected as the Secondary Sampling Unit(SSU). The survey covered a total of 476 village/residential committees in 30 provinces/autonomous regions/direct-controlled municipalities. Appropriate weights were used to account for the effects of cluster sampling. Although the CLASS is a longitudinal study, only data from the 2014 panel is open to the public, which is used in this study. Data were collected door to door by trained student interviewers.

Overall, 11,511 individuals participated in the survey, including 6907 urban participants and 4604 rural participants. Among them, 3187 participants did not answer the questions about attitudes toward aging and depressive symptoms due to cognitive problem and data from 567 people were missing due to logistical. In addition, the current study excluded the 245 participants whose information was provided by someone else and thus no information on attitudes toward aging nor depression were collected. Therefore, 7512 subjects provided valid data on attitudes and depressive symptoms. After list-wise deletion, the final sample contains 7209 respondents, including 4658 urban residents and

2551 rural residents.

2.2. Measures

Depressive symptoms were measured by the adapted version of the Center for Epidemiologic Studies Depression Scale (CES-D Scale) (Radloff, 1977). The adapted CES-D Scale contains 12 items with responses from 0 to 2(0 = no; 1 = sometimes; 2 = often) (Li et al., 2017). The total score ranges from 0 to 24, with higher scores indicating greater depressive symptoms. The 12-item scale we adopted including 3 items indicated feelings of positive affect (feeling happy, enjoying life, feeling pleasure), 2 items indicated feelings of negative affect (feeling lonely, feeling upset), 2 items indicated feelings of marginalization (feeling useless, having nothing to do), 2 items indicated somatic symptoms (having poor appetite, having sleeping problems), and 3 items indicated feelings of isolation (feeling unaccompanied, feeling being ignored by others, feeling isolated from others) (Silverstein et al., 2006; Radloff, 1977). This scale has been widely used to measure Chinese older adults, having shown high validity and reliability on Chinese older adults (Cui and Qi, 2016). The Cronbach's alpha for the 12 items in this study was 0.89.

Attitudes towards Aging Scale was used by previous researches among Chinese older adults (Sun and Shi, 2018; Sun, 2016). This scale was first constructed for use in the 2014 China Longitudinal Aging Social Survey (CLASS) (Sun, 2016). Attitudes toward aging were conceptualized with 2 dimensions: positive attitudes toward aging and negative attitudes toward aging (Sun, 2016). The 4 items about negative attitudes toward aging (NATA) included: (1) I think I am old. (2) In my opinion, getting old is a process of constant loss (such as loss of health, friends, relatives and ability). (3) As I get older, I find it more difficult to make new friends. (4) Due to my age, I feel excluded. The response options followed a 5-point Likert-type scale, ranging from strongly disagree (ranked as 0) to strongly agree (ranked as 4). A total score was calculated by the sum of 4 items, with higher scores representing more negative attitudes. The 3 items about positive attitudes toward aging (PATA) included: (1) The older the person, the stronger the ability to deal with life problems. (2) Wisdom grows with age. (3) There are also many pleasant things when you get older. Participants were asked to indicate their level of agreement with a 5-point response scale. A total score was calculated by the sum of 3 items, higher scores represent more positive attitudes. In this study, the Cronbach's alpha for the 4 items about negative attitudes toward aging was 0.71, and that for the 3 items about positive attitudes toward aging was 0.69.

Social support in this study includes family support, friend support and government support. The Lubben Social Network Scale (LSNS) was used to assess the family and friend support (James et al., 2006; Ji and Li., 2017). Three questions were used to measure family support, including "How many family members or relatives do you meet or contact at least once a month?" "How many family members or relatives do you have whom you feel you can talk about your personal issues with ease?" "How many family members or relatives can you count on when you need help?" The responses (0 = none;1 = one;2 = two;3 = three to four;5 = five to eight;9 = nine or more) for the 3 questions were summed up into a total score, with higher total scores indicating more family support. The friend support was measured by 3 questions parallel to the family ones with the same response options. The participants were asked about the number of people who could provide them support, and each item was scored from 0 to 9 (0 = none; 9 = 9 and above), with higher scores indicating more support. In this study, the Cronbach's alpha for the three item subscale for family support was 0.80, and 0.84 for the three item subscale about friend support. The government support subscale contains 10 items with responses from 0 to 1 (0 = no; 1 = yes) regarding support provided including home visits, preferential policies (i.e. taking a bus for free, visiting park for free), home visiting services, elderly service helplines, escort for doctor visits, shopping services, legal aid, household services, home food delivery services, nursing home, and counseling services. The responses (1 = yes; 0 = no) were summed up into a summary score, with higher scores indicating more government support.

Urban-rural residence was measured by asking the participants to report their place of residence, with 0 assigned to rural residents and 1 assigned to urban residents.

Sociodemographic variables included gender (male (1)/ female (0)), education (illiterate/ primary school/junior high school/ high school or technical secondary school/junior college or above), age (in years), religious belief (yes(1)/no(0)), self-reported perceived health status (poor(1)/fair(2)/good(3)) and job (employed(1)/unemployed (0)). Previous studies have found these variables to be associated with depressive symptoms among older adults (Ni et al., 2017; Lai and Daniel, 2009). Living arrangement of the participants was measured by asking how many people they were currently living with at home.

2.3. Statistical analysis

Descriptive statistics for the participants, including the means and standard deviations of the continuous variables, and the distributions of the categorical variables were performed first. T-test and $\chi 2$ test were used to examine the rural-urban differences with the other variables. Then, three multiple liner regression models estimated the association between attitudes toward aging, social support and urban-rural residence and depressive symptoms, respectively. After estimated the regression model for the total sample, separate models for rural and urban subsamples were estimated. Finally, an additional twelve multiple regression models (6 for rural and 6 for urban) were estimated to test the moderation effects of social support on the relationship between attitude variables and depression. Not all models are shown as due to non-significant results. All potentially confounding variables including sociodemographic variables, health-related factors and so on, were adjusted for in the above models. All the variables were added into the regression model using the enter method. We set the alpha at 0.05 for statistical significance in all the tests. Stata Version 14 was used to analyze the data.

3. Results

3.1. Descriptions analyses

Descriptive statistics of the sample was present in Table 1. Of the 7209 participants, the mean age was 69. More than half (54.25%) were men, and approximately 64.61% were urban residents. The average number of people who live together with the participants was 3. Nearly 36.26% had completed primary school, and 23.53% had completed junior high school. In terms of health status, 46.50% reported to be in good health status, 22.94% reported poor health status. In addition, most participants had no religious belief (88.71%) or a paid job (79.68%). On average, the level of the participants' negative attitudes toward aging was 8.85 (range from 0 to 16) and positive attitudes toward aging was 5.31 (range from 0 to 12). The score of the family, friend and government support (range from 0 to 27, 0 to 27 and 0 to10) were 10.75, 8.78, 0.44. In terms of depressive symptoms, the mean score was 5.24, with the total score ranging from 0 to 23. From the Table 1 we can also learn that there were significant differences in terms of attitudes toward aging, social support and socio-demographic characteristics between urban and rural older adults.

Table 2 presents the standardized results of the multiple liner regression analysis on depressive symptoms. After adjusting for other potentially confounding variables, negative attitudes toward aging had a moderately strong significant association ($\beta = 0.321$, $P < 0.001$) with higher levels of depressive symptoms, while positive attitudes toward aging had a moderate association ($\beta = -0.203$, $P < 0.001$) with low level of depressive symptoms. Family support, friend support and government support were moderately related to lower depressive

Table 1
Socio-demographic characteristics of the sample of older adults (N = 7209).

Variables	Total N	%	Urban (n = 4658) N	%	Rural (n = 2551) N	%	P value
Gender							< 0.001
Female	3298	45.75	2266	48.65	1032	40.45	
Male	3911	54.25	2392	51.35	1519	59.55	
Religious belief							0.016
Yes	814	11.29	495	10.63	319	12.50	
No	6395	88.71	4163	89.37	2232	87.50	
Education							< 0.001
Illiterate	1454	20.17	663	14.23	791	31.01	
Literacy class or primary school	2614	36.26	1372	29.46	1242	48.68	
Junior high school	1696	23.53	1303	27.97	393	15.41	
High School or Technical secondary school	899	12.47	794	17.05	105	4.12	
Junior college and above	546	7.57	526	11.29	20	0.78	
Perceived health status							< 0.001
Poor	1654	22.94	831	17.84	823	32.26	
General fair	2203	30.56	1566	33.62	637	24.97	
Good	3352	46.50	2261	48.54	1091	42.77	
A paid job							< 0.001
Yes	1465	20.32	520	11.16	945	37.04	
No	5744	79.68	4138	88.84	1606	62.96	
	Mean	SD	Mean	SD	Mean	SD	
Age	69	7.43	69	7.59	68	7.06	< 0.001
Living arrangement	3	1.83	3	1.78	3	1.92	< 0.001
Total negative attitudes toward aging[a]	15.54	5.44	14.79	5.37	16.91	5.31	< 0.001
Positive attitudes toward aging	5.31	3.03	5.44	3.01	5.08	3.07	< 0.001
Negative attitudes toward aging	8.85	3.91	8.23	3.88	9.99	3.72	< 0.001
Family support	10.75	5.93	10.70	5.81	10.83	6.14	0.374
Friend support	8.78	7.65	8.99	7.54	8.39	7.84	0.002
Government support	0.44	0.70	0.58	0.76	0.17	0.45	< 0.001
Depressive symptoms score	5.24	4.42	4.67	4.14	6.26	4.72	< 0.001

Note: a. Total negative attitudes toward aging was combined negative attitude towards aging and reversed positive attitude towards aging, with higher scores predicting more negative attitudes.

Table 2
Multiple liner regression analysis of the relationship between attitudes toward aging, social support and depressive symptoms among Chinese older adults.

	All B	β	SE(β)	Urban B	β	SE(β)	Rural B	β	SE(β)
Negative attitudes toward aging	0.321	0.284***	0.02	0.297	0.262***	0.02	0.357	0.316***	0.03
Positive attitudes toward aging	−0.203	−0.139***	0.01	−0.166	−0.114***	0.02	−0.247	−0.169***	0.03
Family support	−0.074	−0.099***	0.01	−0.065	−0.087***	0.02	−0.081	−0.109***	0.02
Friend support	−0.014	−0.025+	0.01	−0.027	−0.047**	0.02	0.002	0.004	0.02
Government support	−0.198	−0.031*	0.01	−0.221	−0.035**	0.01	−0.073	−0.011	0.03
Residence (Ref: urban areas)									
Rural areas	0.220	0.024	0.02						
Gender (Ref: Female)									
Male	−0.246	−0.028+	0.02	−0.243	−0.027+	0.02	−0.271	−0.030	0.03
Age	0.000	0.000	0.02	0.003	0.004	0.02	0.001	0.002	0.03
Living arrangement	−0.089	−0.037*	0.02	−0.089	−0.037*	0.02	−0.083	−0.034	0.03
Education (Ref: Junior college and above)									
Illiterate	1.303	0.118***	0.02	1.126	0.102***	0.03	2.325	0.211**	0.08
Literacy class	0.981	0.035+	0.02	0.652	0.023	0.02	2.269	0.081+	0.04
Primary school	0.837	0.089***	0.02	0.818	0.087***	0.02	1.793	0.192*	0.09
Junior high school	0.460	0.044*	0.02	0.456	0.044*	0.02	1.361	0.130	0.09
High School /Technical	0.258	0.019	0.02	0.212	0.016	0.02	1.295	0.097	0.07
Religious belief (Ref: None)									
Yes	0.316	0.023	0.01	0.379	0.027+	0.01	0.231	0.017	0.03
Perceived health status (Ref: Good)									
General	0.686	0.071***	0.01	0.568	0.059***	0.01	0.869	0.091**	0.03
Poor	2.525	0.240***	0.02	2.371	0.225***	0.02	2.680	0.255***	0.03
A paid job (Ref: Yes)									
None	0.251	0.023	0.02	0.073	0.007	0.02	0.311	0.028	0.02
N	7209	7209	7209	4658	4658	4658	2551	2551	2551
R^2	0.293	0.293	0.293	0.259	0.259	0.259	0.305	0.305	0.305

Note: + $p < 0.1$.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$; B: the unstandardized coefficients; β: the standardized coefficients. All reported results are weighted by proper sample weights.

Table 3
Multiple liner regression analysis of the interaction effect of attitudes toward aging and social support on depressive symptoms among Chinese older adults.

	Model 1(Urban)			Model 2(Urban)			Model 3(Rural)		
	B	β	SE(β)	B	β	SE(β)	B	β	SE(β)
Negative attitudes toward aging	0.408	0.360***	0.04	0.376	0.332***	0.03	0.503	0.445***	0.06
Positive attitudes toward aging	−0.163	−0.112***	0.02	−0.165	−0.113***	0.02	−0.250	−0.171***	0.03
Family support	0.016	0.022	0.03	−0.065	−0.087***	0.02	0.036	0.048	0.05
Friend support	−0.028	−0.048**	0.02	0.039	0.067*	0.03	0.002	0.003	0.02
Government support	−0.218	−0.034**	0.01	−0.212	−0.033**	0.01	−0.066	−0.010	0.03
Negative attitudes toward aging x Family support	**−0.010**	**−0.154*** **	**0.04**				**−0.012**	**−0.189****	**0.06**
Negative attitudes toward aging x Friend support				**−0.008**	**−0.138*** **	**0.04**			
N	4658	4658	4658	4658	4658	4658	2551	2551	2551
R^2	0.262	0.262	0.262	0.263	0.263	0.263	0.309	0.309	0.309
	Model 4(Rural)			Model 5(Urban)			Model 6(Urban)		
	B	β	SE(β)	B	β	SE(β)	B	β	SE(β)
Negative attitudes toward aging	0.419	0.371***	0.05	0.294	0.260***	0.02	0.296	0.262***	0.02
Positive attitudes toward aging	−0.249	−0.171***	0.03	−0.330	−0.226***	0.03	−0.240	−0.165***	0.03
Family support	−0.083	−0.111***	0.02	−0.143	−0.192***	0.03	−0.065	−0.087***	0.02
Friend support	0.067	0.116*	0.06	−0.027	−0.046**	0.02	−0.068	−0.117***	0.03
Government support	−0.059	−0.009	0.03	−0.235	−0.037**	0.01	−0.225	−0.035**	0.01
Negative attitudes toward aging x Friend support	**−0.007**	**−0.114***	**0.06**						
Positive attitudes toward aging x Family support				**0.014**	**0.162*** **	**0.04**			
Positive attitudes toward aging x Friend support							**0.008**	**0.095****	**0.03**
N	2551	2551	2551	4658	4658	4658	4658	4658	4658
R^2	0.307	0.307	0.307	0.263	0.263	0.263	0.261	0.261	0.261

Note: $^{+}$ $p < 0.1$.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$; B: the unstandardized coefficients; β: the standardized coefficients. All the results are weighted by proper sample weights, and potential confounding variables have been controlled.

symptoms. In urban older adults, family support (β = −0.087, $P<0.001$), friend support (β = −0.047, $P<0.01$) and government support (β = −0.035, $P<0.01$) all had strong significant association with their depressive symptoms. While in rural older adults, only attitudes toward aging and family support had strong significant association (β = −0.109, $P<0.001$) with their depressive symptoms.

The interaction effects of social support and attitudes toward aging on depressive symptoms were shown in Table 3. In model 1–6, four interaction variables (negative attitudes toward aging x family support, negative attitudes toward aging x friend support, positive attitudes toward aging x family support and positive attitudes toward aging x friend support) along with other confounding variables was added into the liner regression model. It was demonstrated that the above four interactions variables have all significant association with urban older adults' depressive symptoms. More family support and friend support would buffer the adverse impact of negative attitudes toward aging on depression and strength the protective effect of positive attitudes toward aging (see, Fig.1a–f). In addition, as reported in Table 3, the moderating effect of social support for rural older adults was not as effectively as for their urban counterparts. Only family support and friend support had a significant modifying effect on the relationship between negative attitudes toward aging and depression among rural older adults (see, Fig.1c-d).

Simple slope tests demonstrated that for urban older adults with high family support, higher negative attitudes towards aging was associated with higher levels of depressive symptoms, $b_{simple}=5.08$, $p<0.001$. For urban older adults with high friend support, lower negative attitudes towards aging was associated with lower levels of depressive symptoms, $b_{simple}=3.15$, $p<0.001$. For rural older adults with low family support, higher negative attitudes towards aging was

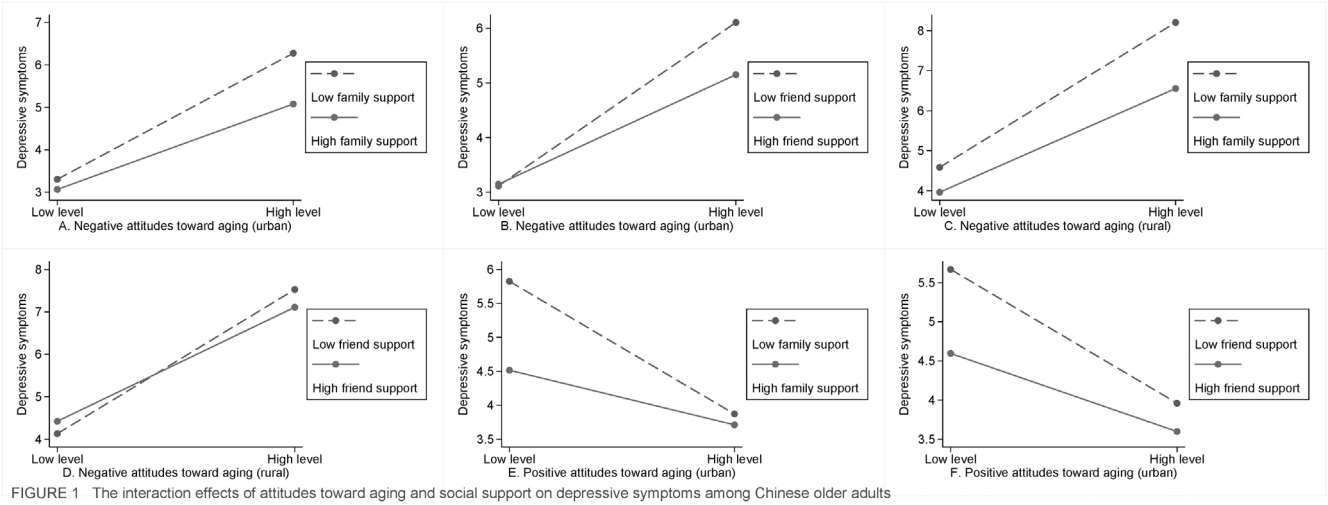

FIGURE 1 The interaction effects of attitudes toward aging and social support on depressive symptoms among Chinese older adults

Fig. 1. The interaction effects of attitudes toward aging and social support on depressive symptoms among Chinese older adults.

associated with more depressive symptoms, $b_{simple} = 8.21$, $p < 0.001$. For rural older adults with low friend support, lower negative attitudes towards aging was associated with less depressive symptoms, $b_{simple} = 4.13$, $p < 0.001$. And for urban elderly with high family support, higher positive attitudes towards aging was associated with less depressive symptoms, $b_{simple} = -3.71$, $p < 0.001$. For urban older adults with high friend support, lower positive attitude towards aging was associated with higher level of depression, $b_{simple} = -4.60$, $p < 0.001$.

4. Discussion

In the context of an urban-rural social division, this study explored the relationship between attitudes toward aging, social support and depressive symptoms among older Chinese adults. We found that elderly Chinese with negative aging attitudes were at increasing risk of depression, while positive aging attitudes and available social support associated with reduced depressive risks, which is consist with studies in developed countries (Bennett and Gaines., 2010; Hakulinen et al., 2016). Moreover, social support buffered the association between attitudes toward aging and depressive symptoms, but with an important urban-rural difference. For urban elderly residents, support from family, friends and governmental programs not only effectively protected them from depressive symptoms, they also cushioned them from the adverse impacts of internalized negative stereotypes about getting old. Compared with urban elderly, older adults in rural areas relied more on family support. Their conception of aging had a stronger mental health impact on them compared to that of their urban counterparts, but they have less sources of effective support to cope with it. These findings support the research hypothesis proposed in the introduction section, and provide possible intervention pathways for Chinese elderly under concern.

Consistent with existing studies (Suh et al., 2012; Bai et al., 2016), this study revealed that attitudes toward aging was associated with depression symptoms among older adults. According to cognitive theory (Suh et al., 2012), older adults who internalize negative aging attitudes are inclined to ruminate selectively, focusing on negative aspects of the aging process (Bai et al., 2016). Thus, people with negative aging attitudes are more likely to suffer from depression. This finding suggests that fostering positive aging attitudes and positive self-image are key cognitive resources that may prevent depression in older adults. Changing their default aging stereotypes, i.e., attributing all negative experiences to aging is of utmost importance (Bai and Chow, 2011). For instance, psych-education programs with older adults can foster opportunities to attain scientific understanding of the aging process, to encourage more balanced and positive perspectives on ageing. Another way to establish positive aging attitudes is to encourage more social participation. Less engagement in social activities is associated with feelings of unworthiness among elderly, and this associate with higher risk of depression (Lee and Kim., 2014). Preventative interventions that focused on improving the social environment and social networks of older adults are effective to reducing depression (Gyasi et al., 2018).

Furthermore, this study suggests that older adults with support from family, friends and government were at reduced risk of depression. This is in line with existing studies which calls for the importance of social support in reducing mortality and depression, and in health promotion (Holt-Lunstad et al., 2015; Hakulinen et al., 2016). Reasons for the social support protection could be attributed to the following. Firstly, social support enables people to set up a positive self-image and higher self-efficacy, thereby reducing depression (Gyasi et al., 2018). It offers individuals opportunities to establish companionship, attachment and intimacy with others (Hakulinen, 2016), which is helpful for people to release their negative emotions during the aging process (Glass., 2000). Also, social support could improve individuals' adaptive and functional coping styles and offer them necessary resources (Muramatsu et al., 2010). In general, better connections with others buffer the harmful impact of stressful life events, and then ameliorate older adults' aging stereotypes and its impact on risk of depression (Hakulinen et al., 2016). Thus, focusing on mental health promotion, it may be advisable for governments to introduce programs to help elderly with their social connection.

Moreover, several interaction effects were found in this study, which suggests that rural elderly are at a disadvantage since they perceived lower level of positive attitudes to aging and their social support within their household is limited. Compared with elderly in urban areas, whose depressive risk could be protected by family, friends and governmental support, those in rural areas are living with insufficient friend support and inadequate governmental protection. Rural elderly are at higher risk in developing depressive symptoms. Within a migrating society, elderly in rural areas bare heavy duties in taking care of their grandchildren, since leaving children behind has become a common choice for migrant workers in rural areas (Bai et al., 2016). In most circumstances, friendships between rural elderly are established within their communities, and their friends face the same dilemma and can provide limited resources for them to better cope with the depression (Zhang, 2020; Li, 2018). Therefore, friend support may not provide significant benefits to protect rural elderly against depression. What's more, since there has been a long tradition of uneven distribution between rural and urban areas in Chinese society (Guo et al., 2017a), and governmental support is insignificant in protecting rural elderly from depression. Compared to their urban counterparts, older adults in rural areas receive fewer pension and welfare delivery from the government, saying nothing of mental health services. These findings suggest that mental health promotion for rural elderly should be made a priority in further public programs, especially to allocate more public resources to them and cultivate their positive attitudes toward aging.

Finally, this study suggests that people who are less educated, living alone, in poor health and marriage status tend to report higher level of depression. Previous studies have shown that education could extend people's knowledge and wisdom about aging, as well as life skills and self-efficacy to alleviate their depressive symptoms (Francis et al., 2007; Guo et al., 2017a). Older adults with better health status and living with others had fewer depressive symptoms and more positive attitudes toward aging (Lai, 2007; Oladeji, 2011). These findings are helpful to target individuals with higher mental health risks in further intervention services.

There are important implications of our findings for public health policy. Efforts to address depression among older adults including early depression detection, prevention, and psychological intervention programs are needed. Firstly, it is necessary to develop community level inventions to create friendly social environment for older people and build positive attitude towards aging for the whole society (Nelson, 2005). Counseling services may help to improve attitudes and enhance healthy aging (Bai and Chow, 2011). Secondly, strategies to enlarge older adults' social support networks are important. For example, For example, programs focusing on strengthen family relationships of older people which would increase their family support. Other sources of assistance such as frequent home visits provided by community-based healthcare teams are needed, along with day treatment centers, in-home services, and residential care facilities (Yao, 2006). To enhance elderly mental health, early intervention programs including financial security, health maintenance, adaptation to loss and relationship change, and future care arrangement before they enter old age is crucial. Finally, despite multi-pillar pension schemes, it is imperative that policy efforts should provide rural older adults more social support and improve their poor health status and financial situation.

Several limitations in this study should be acknowledged. Firstly, this study is a cross-sectional design and therefore it is not possible to establish causal associations between depressive symptoms and other variables. Secondly, confounding may be still being present since some factors have not been controlled in this study. Such as, family relationship should be considered in the future study. It is supposed that

harmonious family relationship may contribute to older adults' psychological well-being, and negative aspects of the relationship will show adverse effects on their mental health. Thirdly, questionnaires about depressive symptoms are based on self-report, instead of clinical diagnosis. Finally, the Cronbach's alpha along some of the scales were moderate in this study, thus the findings should be interpreted with caution due to potential reliability problems. Despite these limitations, the current study has a large and representative sample of Chinese elderly inhabitants, which provides key insights into the development of mental health intervention programs in China.

5. Conclusion

Findings of this study demonstrated that attitudes toward aging and social support are significantly associated with depressive symptoms among Chinese older adults. Key differences were observed between rural sample and urban elders. It is imperative to implement programs to establish positive attitudes toward aging and reduce negative ones among Chinese elderly and fosters more social support. In addition, further reform to reduce inequities between urban and rural areas is needed.

Funding

None.

Data availability statement

We used data from the 2014 China Longitudinal Aging Social Survey (CLASS 2014), which is sponsored by Renmin University of China and is available at http://class.ruc.edu.cn/index.php?r=Index/index.

Contributors

JG designed and conceived the paper. DL, JX, BH, JG, & XLF drafted the manuscript. MF, BZ was involved in revising the manuscript. All authors were involved in writing the manuscript and approve of its final version.

Conflict of Interest

The authors have no competing interests to report.

Acknowledgments

The authors wish to thank all those who kindly volunteered to participate in the study.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jad.2020.05.052.

References

Afridi, F., Li, S.X., Ren, Y., 2015. Social identity and inequality: the impact of China's hukou system. J. Public Econ. 123, 17–29.
Bahrami, F.R., Farani, A., Younesi, J., 2007. Role of internal and external religious beliefs in mental health and rate of depression in elderly people. Iran. Rehabil. J. 5, 24–29.
Bai, X., 2014. Images of ageing in society: a literature review. J. Popul. Aging 7, 231–253.
Bai, X., Chow, N., 2011. How is the self-image formed and enhanced among older Chinese people: through assimilation or contrast? Asian J. Gerontol. 6, 22–28.
Bai, X., Lai, D.W.L., Guo, A., 2016. Ageism and depression: perceptions of older people as a burden in China. J. Soc. Issues 72, 26–46.
Bennett, T., Gaines, J., 2010. Believing what you hear: the impact of aging stereotypes upon the old. Educ. Gerontol. 36, 435–445.
Bian, Y., 2002. Chinese social stratification and social mobility. Annu. Rev. Sociol. 28, 91–116.
Blazer, D.G., 2003. Depression in late life: review and commentary. J. Gerontol. A Biol. Sci. Med. Sci. 58A, 249–265.
Chow, N., Bai, X., 2011. Modernization and its impact on Chinese older people's perception of their own image and status. Int. Soc. Work. 54, 800–815.
Cole, M.G., Dendukuri, N., 2003. Risk factors for depression among elderly community subjects: a systematic review and meta-analysis. Am. J. Psychiat. 160, 1147–1156.
Cui, Y., Qi, X.Y., 2016. Analysis of the influence of family intergenerational relationship on the psychological welfare of rural migrant parents. Chin. Rural Economy 6, 15–29 (In Chinese).
Dan, T., Kaidi, J., 2015. The effects of family support and friend support on depression among the elderly of different ADL. Stud. Psychol. Behav. 1, 65–69 (In Chinese).
Fernández-Ballesteros, R., Olmos, R., Santacreu, M., Bustillos, A., Schettini, P., Huici, C., Rivera, J.M., 2017. Assessing aging stereotypes: personal stereotypes, self-stereotypes and self-perception of aging. Psicothema 29, 482–489.
Francis, L., Weiss, B.D., Senf, J.H., Heist, K., Hargraves, R., 2007. Does literacy education improve symptoms of depression and self-efficacy in individuals with low literacy and depressive symptoms? A preliminary investigation. J. Am. Board Fam. Med. 20, 23–27.
Glass, T., 2000. From social integration to health: durkheim in the new millennium. Soc. Sci. Med. 51, 843–857.
Guo, J., Guan, L., Liu, C., Fu, M., Wang, X., 2017a. Depression among Chinese older adults: a perspective from Hukou and health inequities. J. Affect. Disorders 223, 115–120.
Guo, J., Liu, C., Wang, X., Qu, Z., Zhang, W., Zhang, X., 2017b. Relationships between depression, pain and sleep quality with doctor visits among community-based adults in north-west china. Public Health 147, 30–38.
Gyasi, R.M., Phillips, D.R., Abass, K., 2018. Social support networks and psychological wellbeing in community-dwelling older Ghanaian cohorts. Int. Psychogeriatr 1–11.
Hakulinen, C., Laura, P., Jokela, M., et al., 2016. Structural and functional aspects of social support as predictors of mental and physical health trajectories: whitehall II cohort study. J. Epidemiol. Community Health 70, 710–715.
Han, B., 2002. Depressive symptoms and self-rated health in community-dwelling older adults: a longitudinal study. J. Am. Geriatr. Soc. 50, 1549–1556.
Holt-Lunstad, J., Smith, T.B., Baker, M., Harris, T., Stephenson, D., 2015. Loneliness and social isolation as risk factors for mortality: a meta-analytic review. Perspect. Psychol. Sci. 10, 227–237.
James, L., Eva, B., Gerhard, G., et al., 2006. . Performance of an abbreviated version of the Lubben Social Network Scale among three European community-dwelling older adult populations. Gerontologist 46, 503–513.
Ji, Y., Li, J., 2017. A study on the relationship between social support and aging attitude of the elderly in China. Chin. Gen. Pract. 7, 852–858.
Kavirajan, H., Vahia, I.V., Thompson, W.K., et al., 2011. . Attitude toward own aging and mental health in post-menopausal women. Asian J. Psychiatr. 4, 26–30.
Kim, H., Kim, H., Byun, B., 2015. Predictors of pain, perceived health status, nutritional risk, social support and self-transcendence on depression among lower income senior citizens. Indian J. Sci. Technol. 8, 178–188.
Lai, Daniel, W.L., 2009. Older Chinese's attitudes toward aging and the relationship to mental health: an international comparison. Soc. Work Health Care 48, 243–259.
Lai, D.W.L., 2007. Attitudes of elderly Chinese toward aging: an international comparison. Int. J. Sociol. Fam. 33, 79–94.
Laidlaw, Ken., 2010. Are attitudes to ageing and wisdom enhancement legitimate targets for CBT for late life depression and anxiety? Nord. Psychol. 62, 27–42.
Lee, S.H., Kim, Y.B., 2014. Which type of social activities decrease depression in the elderly? An analysis of a population-based study in South Korea. Iran J. Public Health 43, 903–912.
Lei, X., Sun, X., Strauss, J., Zhang, P., Zhao, Y., 2014. Depressive symptoms and SES among the mid-aged and elderly in china: evidence from the China health and retirement longitudinal study national baseline. Soc. Sci. Med. 120, 224–232.
Li, C., Jiang, S., Li, N., Zhang, Q., 2017. Influence of social participation on life satisfaction and depression among Chinese elderly: social support as a mediator. J. Community Psychol. 1–11.
Li, F., 2018. Looking for a better life in the new era: living conditions and countermeasures of the rural elderly in China: based on the data of the Fourth Sampling Survey of the Living Conditions of the Urban and Rural Elderly in China. Age Sci. Res. 2, 3–13.
Li, X.R., 2019. The total population has grown steadily, and urbanization has improved steadily. http://www.stats.gov.cn/tjsj/sjjd/201901/t20190123_1646380.html. Accessed January 23, 2019.
Marquet, M., Chasteen, A.L., Plaks, J.E., Balasubramaniam, L., 2019. Understanding the mechanisms underlying the effects of negative age stereotypes and perceived age discrimination on older adults' well-being. J. Aging Health 23, 1666–1673.
Meléndez, J.C., Tomás, J.M., Oliver, A., Navarro, E., 2009. Psychological and physical dimensions explaining life satisfaction among the elderly: a structural model examination. Arch. Gerontol. Geriat. 48, 291–295.
Muramatsu, N., Yin, H., Hedeker, D., 2010. Functional declines, social support, and mental health in the elderly: does living in a state supportive of home and community-based services make a difference? Soc. Sci. Med. 70, 1050–1058.
Nelson, T.D., 2005. Ageism: prejudice against our feared future self. J. Soc. Issues 61, 207–221.
Ni, Y., Tein, J.Y., Zhang, M., Yang, Y., Wu, G., 2017. Changes in depression among older adults in china: a latent transition analysis. J. Affect Disord. 209, 3–9.
Oladeji, D., 2011. Family care, social services, and living arrangements factors influencing psychosocial well-being of elderly from selected households in Ibadan, Nigeria. Educ. Res. Int. 150–161.
Radloff, L.S., 1977. The CES-D scale: a self-report depression scale for research in the general population. Appl. Psych. Meas. 1, 385–401.

Ramírez, L., Palacios-Espinosa, X., 2016. Stereotypes about old age, social support, aging anxiety and evaluations of one's own health. J. Soc. Issues 72, 47–68.
Silverstein, M., Cong, Z., Li, S., 2006. Intergenerational transfers and living arrangements of older people in rural China: consequences of psychological well-being. Int. J. Gerontol. 61B, S256–S266.
Suh, S., Choi, H., Lee, C., Cha, M., Jo, I., 2012. Association between knowledge and attitude about aging and life satisfaction among older Koreans. Asian Nurs. Res. 6, 96–101.
Juanjuan, S., Yun, J., 2016. The influence of Chinese elderly care for grandchildren on aging attitudes. Popul. Dev. 4, 79–86 (In Chinese).
Sun, J., Shi, Y., 2018. The relationship between self-aging attitude of the elderly and supportive behavior of the offspring. Chin. Mental Health J. 1, 55–57 (In Chinese).
Tao, T., Cong, C., 2014. Analysis of the factors affecting the choice of old-age care for the aged: taking Xicheng district of Beijing as an example. Popul. Econ. 3, 15–22 (In Chinese).
Travis, L.A., Lyness, J.M., Shields, C.G., King, D.A., Cox, C., 2004. Social support, depression, and functional disability in older adult primary-care patients. Am. J. Geriat. Psychiat. 12, 265–271.
Wang, X.H., Wang, D.H., Shen, J.L., 2006. Study on the influence of social support on depression in the elderly. Chin. J. Clin. Psych. 1, 73–74 +90. (In Chinese).
World Health Organization, 2014. “Ageing well” must be a global priority. https://www.who.int/mediacentre/news/releases/2014/lancet-ageing-series/en/. Accessed November 6, 2014.
Yao, Y.M., 2006. Care for rural empty-nest elderly in relatively developed regions: a case study of rural Zhejiang province. Popul. Res. 6, 38–46.
Zhang, Z., 2020. Summarization of research on social support network for rural elderly. World Labor Secur. 2, 76–77.