

The role of social ties in functional and emotional health of older adults for healthy ageing: a cross-sectional WHO Study on global AGEing and adult health (SAGE)

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Abstract

Objective This study aimed to examine the impact of social capital on the functional and emotional health of elders and to determine whether social capital mediate the associations of socioeconomic inequalities of functional and emotional health.

Methods A Study on global AGEing and adult health (SAGE) wave 1 was conducted in eight provinces in China. A total of 7403 people of 60 years and above were included in the study sample. The primary predictor was structural social capital, measured by social ties. The outcomes included functional health and emotional health.

Findings Multivariate analyses showed that social ties were positively associated with both functional ($\beta=-0.227$; 95% CI: -0.259, -0.194, $P<0.001$) and emotional health ($\beta=-0.131$; 95% CI: -0.163, -0.098, $P<0.001$). In stratified analysis, these associations were significant across women and men, and across rural and urban respondents. SES had a direct association with both functional and emotional health, whilst an indirect association with social ties.

Interpretation We found that a higher level of social capital was associated with better functional and emotional health. Functional and emotional health status was directly correlated with socioeconomic status, mediated by social capital. To promote healthy aging, future interventions could be developed to strengthen elders' social capital.

Introduction

Highlights:

- Social capital was associated with better functional and emotional health, which were consistent between men and women and between rural and urban respondents.
- Functional and emotional health was mediated by social capital and was better for population with strong socioeconomic status.
- Requisite of future interventions to reinforce social capital status of ageing population.

China has the largest and fastest-growing aging population in the world [1]. Population aging is driven by improvements in longevity and health. China's life expectancy at birth increased from 71.4 years old in 2000 to 76.5 years old in 2016, while the healthy life expectancy (HALE) at birth increased from 64.8 to 68.7 (64.8 in 2000 and 68.7 in 2016) [2]. However, the increased gap between life expectancy and HALE indicates a rising need for care. The provision of care is likely to be eroded by social and economic transitions which are changing traditional care arrangements for older people in China. Thus, both research and policies are interested in identifying resources that can contribute to extend the number of years associated with good health.

Functional and mental health are core elements of healthy aging. Recent studies reported poor functional and mental health among Chinese elders. According to China Health and Retirement Longitudinal Study (CHARLS), 38.1% of 60 or above aged people had difficulties in at least one activity of daily living (ADL) or instrumental activity of daily living (IADL). Among the 38.1%, almost 23.8% of these elders need help in the daily activities [3]. In addition, both depressive symptoms and diagnosable major depressive disorder were prevalent among elders in China. According to a meta-analysis, the pooled prevalence of depressive symptoms in older adults in China was 23.6% [4]. According to the China Mental Health Survey, the 12-month prevalence of major depressive disorder was 3.0% among 65 or above aged people [5]. According to an earlier study, the 1-month prevalence of major depressive disorder was 3.8% among 55 or above aged people [6]. The treatment rate among older adults with depressive symptoms or major depressive disorder was extremely low [7–8].

The importance of social capital has gained recognition in aging studies associated with risk factors and protective factors in China, which primarily focused on the central role of family. Social capital is a multidimensional concept, and there are two main schools of thoughts regarding its definition. The first school is influenced by Putnam who defined social capital as “features of social organization such as networks, norms and social trust that facilitate coordination and cooperation for mutual benefit [9].” The second school draws on the work of Bourdieu who defined social capital as “the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition [10].” The former conceives social capital as a social feature while the latter focuses on individuals’ resources as a result of their social networks.

Though there is no consensus about which methods are the most appropriate to measure this multidimensional concept [11–13], the measurements should consider cultural factors and the characteristics of the society [14]. Most of the previous literature studies on Chinese elders has focused on individual social capital, and some further emphasized the “structural/cognitive” distinction of social capital. Structural social capital subsumes behavioral manifestations of social capital, such as participation in formal associations, while cognitive social capital encompasses attitudinal manifestations, namely trust and reciprocity between individuals [15]. Thus, social participation (e.g., the number of organizations to which the respondent belongs) and trust were often used as proxy measures for social capital [16–18].

The relationship between social capital and health has been established [19]. In context to aging, it was observed that high levels of social capital enable older adults to maintain favorable mental and physical health [20]. However, research on social capital and health among elders in China is relatively limited. Social capital was found to be positively associated with health-related quality of life [12], self-reported health [17], and mental health (e.g., cognitive function) [21], whereas, negatively associated with depressive symptoms [18]. The associations between social capital and health might differ across gender and urban status [22]. Sun et al found stronger association between individual social capital and mental health among women than men [12]. Norstrand et al [22] found that social capital was

significantly associated with physical and emotional health among urban elders, but no significant associations between social capital measures and health among rural elders was found. However, previous studies have mixed findings on the impacts of the structural and cognitive dimension of social capital [23], and were mostly localized. None of the previous study have examined the relationship between social capital and elder's functional health.

To cover the dearth of knowledge, we examined the relationship between structural social capital and functional and emotional health in this study, using a nationally representative sample of elders in China. We hypothesized that having more structural social capital can increase the quality of functional and mental health, after controlling other sociodemographic factors. Functional and emotional health were better for those with higher socioeconomic status (SES), mediated by social capital.

Results

52.5% of the total participants were female, and the mean age of the participants was 69.6 years old. Approximately one third (32.9%) of the participants had no formal education experience, while only 5.4% had an education of 3-year college and above level. More than three-fourth (76.2%) of the participants were married or cohabitated. About 52.8% of the participants were from urban areas, while the rest 47.2% were from rural China. There were statistically significant differences between male and female participants with respect to education level, marital status, household income, and registration. (Table 1)

Table 1
Socio-demographic characteristics of the participants

Variables	All No (%)	Male No (%)	Female No (%)	P#
Mean age (SD)	69.6(7.0)	69.6(7.0)	69.7(6.9)	0.849
Age				0.870
60 ~ 64	2113(28.5)	1019(29.0)	1094(28.2)	
65 ~ 69	1814(24.5)	851(24.2)	963(24.8)	
70 ~ 74	1625(22.0)	770(21.9)	855(22.0)	
75~	1851(25.0)	877(24.9)	974(25.1)	
Education				< 0.001
None	2436(32.9)	683(19.4)	1753(45.1)	
Less than primary school	1323(17.9)	673(19.1)	650(16.7)	
Completed primary school	1445(19.5)	845(24.0)	600(15.4)	
Completed middle school	1048(14.2)	598(17.0)	450(11.6)	
Completed high school	750(10.1)	441(12.5)	309(8.0)	
Completed 3-year college or above	401(5.4)	277(7.9)	124(3.2)	
Marriage				< 0.001
Currently married or cohabited	5635(76.2)	3031(86.2)	2604(67.1)	
Never married, widowed or divorced	1761(23.8)	484(13.8)	1277(32.9)	
Household income quintile				0.011
Q1 (lowest)	1823(24.7)	806(23.0)	1017(26.3)	
Q2	1494(20.3)	709(20.2)	785(20.3)	
Q3	1475(20.0)	716(20.4)	759(19.7)	
Q4	1369(18.6)	684(19.5)	685(17.7)	
Q5 (highest)	1207(16.4)	593(16.9)	614(15.9)	
Registration				0.002
Rural	3497(47.2)	1727(49.1)	1770(45.5)	
Urban	3906(52.8)	1790(50.9)	2116(54.5)	
# Chi-square test (or t-test where appropriate) for comparisons between the male and female				

After controlling for socio-demographic confounders, significant differences in functional health among the participants within different age groups (a decrease trend over age), between the male and female (better for the male), across those with different education levels (an increase trend along with education), household income (better with the increasing household income) and registration (poorer for the rural) was recorded. However, for emotional health significant differences were only found between the male and female (poorer for female), and among those with different household income (better with the increasing household income). (Table 2)

Table 2
Functional and emotional health by socio-demographic characteristics

Variables	Functional		Emotional	
	Mean(SD)	β (95% CI)#	Mean(SD)	β (95% CI)#
Age				
60 ~ 64	1.16(0.40)***	0	1.24(0.52)***	0
65 ~ 69	1.21(0.47)	0.039(0.004, 0.074)*	1.25(0.55)	-0.005(-0.040, 0.031)
70 ~ 74	1.29(0.58)	0.123(0.085, 0.150)***	1.26(0.55)	-0.006(-0.043, 0.031)
75~	1.53(0.75)	0.340(0.302, 0.378)***	1.33(0.63)	0.047(0.009, 0.085)*
Gender				
Male	1.27(0.57)***	0	1.23(0.52)***	0
Female	1.32(0.59)	0.029(0.002, 0.057)*	1.30(0.60)	0.055(0.027, 0.082)***
Education				
None	1.44(0.69)***	0	1.35(0.64)***	0
Less than primary school	1.26(0.51)	-0.093(-0.131, -0.054)***	1.26(0.54)	-0.046(-0.085, -0.007)*
Completed primary school	1.26(0.56)	-0.041(-0.080, -0.001)*	1.24(0.53)	-0.030(-0.070, 0.010)
Completed middle school	1.20(0.50)	-0.060(-0.106, -0.013)*	1.23(0.52)	-0.014(-0.060, 0.033)
Completed high school	1.18(0.43)	-0.067(-0.120, -0.014)*	1.21(0.51)	-0.004(-0.057, 0.050)
Completed 3-year college or above	1.14(0.36)	-0.096(-0.163, -0.030)**	1.11(0.35)	-0.070(-0.136, -0.003)*
Marriage				
Currently married or cohabited	1.26(0.55)***	0	1.25(0.54)***	0

SD: standard deviation; CI: confidence interval;

*P < 0.05; **P < 0.01; ***P < 0.001;

#Multiple linear regression analyses after controlling for all socio-demographic factors including age, gender, education level, household income, registration, marital status.

Variables	Functional		Emotional	
Never married, widowed or divorced	1.39(0.65)	0.012(-0.021, 0.044)	1.34(0.62)	0.032(0.000, 0.064)
Household income quintile				
Q1 (lowest)	1.43(0.69)***	0	1.40(0.66)***	0
Q2	1.32(0.58)	-0.069(-0.108, -0.031)***	1.32(0.61)	-0.062(-0.101, -0.024)**
Q3	1.29(0.58)	-0.082(-0.121, -0.042)***	1.26(0.55)	-0.125(-0.164, -0.085)***
Q4	1.20(0.47)	-0.138(-0.180, -0.097)***	1.19(0.47)	-0.187(-0.228, -0.145)***
Q5 (highest)	1.15(0.42)	-0.175(-0.220, -0.131)***	1.12(0.38)	-0.254(-0.298, -0.209)***
Registration				
Rural	1.35(0.63)***	0	1.31(0.59)***	0
Urban	1.24(0.52)	-0.075(-0.105, -0.044)***	1.23(0.53)	-0.013(-0.044, 0.018)
SD: standard deviation; CI: confidence interval;				
*P < 0.05; **P < 0.01; ***P < 0.001;				
#Multiple linear regression analyses after controlling for all socio-demographic factors including age, gender, education level, household income, registration, marital status.				

There was a decrease trend on social ties over age. The participants with a higher education level usually had tighter social ties as compared to those with lower education levels. Similarly, social ties increased with increase in the participant's household income. Rural participants were found with tighter social ties than their urban counterparts. Significant differences were identified for variables like age, education, household income, and registration after controlling for socio-demographic confounders. (Table 3)

Table 3
Social ties of the participants

Variables	Social ties	
	Mean(SD)	β (95% CI)#
Age		
60 ~ 64	1.68(0.39) ^{***}	0
65 ~ 69	1.65(0.40)	-0.013(-0.037, 0.012)
70 ~ 74	1.62(0.41)	-0.030(-0.056, -0.003)*
75~	1.52(0.39)	-0.118(-0.145, -0.091) ^{***}
Gender		
Male	1.63(0.40)*	0
Female	1.61(0.39)	0.001(-0.018, 0.021)
Education		
None	1.57(0.39) ^{***}	0
Less than primary school	1.63(0.39)	0.038(0.010, 0.065) ^{**}
Completed primary school	1.63(0.40)	0.041(0.012, 0.069) ^{**}
Completed middle school	1.64(0.40)	0.068(0.035, 0.101) ^{***}
Completed high school	1.68(0.41)	0.116(0.078, 0.153) ^{***}
Completed 3-year college or above	1.68(0.38)	0.116(0.069, 0.163) ^{***}
Marriage		
Currently married or cohabited	1.63(0.40) ^{***}	0
Never married, widowed or divorced	1.58(0.39)	0.016(-0.007, 0.039)
Household income quintile		
Q1 (lowest)	1.55(0.40) ^{***}	0
Q2	1.61(0.40)	0.047(0.020, 0.075) ^{**}
Q3	1.63(0.39)	0.075(0.047, 0.103) ^{***}

SD: standard deviation; CI: confidence interval;

*P < 0.05; **P < 0.01; ***P < 0.001;

#Multiple linear regression analyses after controlling for all socio-demographic factors including age, gender, education level, household income, registration, marital status.

Variables	Social ties	
	Mean(SD)	β (95% CI)#
Q4	1.65(0.39)	0.086(0.057, 0.116)***
Q5 (highest)	1.68(0.39)	0.131(0.100, 0.163)***
Registration		
Rural	1.65(0.40)***	0
Urban	1.59(0.40)	-0.121(-0.143, -0.100)***
SD: standard deviation; CI: confidence interval;		
*P < 0.05; **P < 0.01; ***P < 0.001;		
#Multiple linear regression analyses after controlling for all socio-demographic factors including age, gender, education level, household income, registration, marital status.		

Both univariate and multivariate analyses revealed statistically significant differences between social ties and functional health, as well as between social ties and emotional health. In stratified analysis, these associations remained significant across women and men, and across rural and urban respondents. (Table 4)

Table 4
The association between social ties and functional and emotional health

Health	Social ties	
	β (95% CI)#	β (95% CI)※
All respondents		
Functional health	-0.284(-0.316, -0.251)***	-0.227(-0.259, -0.194)***
Emotional health	-0.159(-0.191, -0.126)***	-0.131(-0.163, -0.098)***
Male respondents		
Functional health	-0.291(-0.337, -0.244)***	-0.239(-0.285, -0.192)***
Emotional health	-0.166(-0.209, -0.122)***	-0.144(-0.188, -0.100)***
Female respondents		
Functional health	-0.274(-0.320, -0.228)***	-0.216(-0.262, -0.171)***
Emotional health	-0.147(-0.194, -0.100)***	-0.119(-0.167, -0.071)***
Rural respondents		
Functional health	-0.340(-0.392, -0.288)***	-0.271(-0.322, -0.220)***
Emotional health	-0.170(-0.220, -0.120)***	-0.134(-0.184, -0.084)***
Urban respondents		
Functional health	-0.256(-0.297, -0.215)***	-0.190(-0.231, -0.149)***
Emotional health	-0.164(-0.207, -0.122)***	-0.127(-0.170, -0.083)***
***P < 0.001;		
#Univariate analyses;		
※Multiple linear regression analyses after controlling for all socio-demographic factors including age, gender, education level, household income, registration, marital status.		

The mediating effect of social ties on socioeconomic status and functional and emotional health associations was analyzed. SES had a direct association with both functional and emotional health, whilst an indirect association through social ties. The goodness of fit indices for the model (functional health) were as follows: $\chi^2 = 8554$, $df = 96$, $P < 0.001$, $RMSEA = 0.077$, $CFI = 0.711$, and $PCFI = 0.502$; while for emotional health model, $\chi^2 = 8535$, $df = 96$, $P < 0.001$, $RMSEA = 0.076$, $CFI = 0.699$, and $PCFI = 0.493$. The model construction including latent and observed variables is given in the supplemental file. (Table 5)

Table 5
Estimated coefficients for structural equation model

Path	Estimates	S.E.	C.R.	P
Functional health				
Social ties←SES	0.035	0.007	5.233	< 0.001
Functional health←SES	-0.125	0.018	-6.816	< 0.001
Functional health←social ties	-0.455	0.037	-12.328	< 0.001
Emotional health				
Social ties←SES	0.035	0.007	5.296	< 0.001
Emotional health←SES	-0.114	0.021	-5.520	< 0.001
Emotional health←social ties	-0.333	0.040	-8.265	< 0.001
SES: socioeconomic status; S.E.: standard error;				

Discussion

In this study, a nationally representative sample of elders in China was used to examine the relationship between structural social capital and functional and emotional health. A positive association between higher level of social capital with functional and emotional health was observed, as we hypothesized. Such effects were consistently significant across men and women, and rural and urban respondents. Generally speaking, the participants with higher SES were found to have better functional and emotional health mediated by structural social capital.

Our findings showed that the structural dimension of social capital is important for the functional and emotional health of older Chinese adults, which suggested that structural social capital served as a protective factor against poor functional and emotional health. Previous literature have reported little associations between the structural dimension of social capital and elders' self-reported general health, mental health, and health-related quality of life [17, 23]. Notably, all previous studies on measuring structural social capital through social participation revealed null associations. A study reported by Cao et al [25] found negative associations between depression and structural social capital proxied by social network. Thus, measuring of structural social capital by both social participation and social network can be considered as a possible explanation.

Results showed that some subgroups of elders were particularly vulnerable. Elders with lower levels of education or household income might have poor functional health, and also have worse emotional health. In conclusion, older adults with lower SES were at higher risk of poorer functional and emotional health. The tight connections across SES, social capital, and functional and emotional health suggested

the social capital as a cornerstone through which low SES leads to poor functional and emotional health. It is thus of great importance to assess social capital as a means to analyze older adults at greater risk of poor health, both functional and emotional. Contrary, a course for action would be implied to public health policy makers for reducing the health gaps among older adults with different SES. Comprehensive strategies such as maintaining contact with social ties should give high priority to addressing and targeting social capital with low SES.

This study has several limitations. First, this is a cross-sectional study, causal relationships could not be inferred from the provided data. For instance, the possibility of reverse causality could not be eliminated. Although having social ties might be beneficial for elders' functional and emotional health, but poor functional and emotional health status might also limit the ability to maintain social ties. Future research is required to explore the temporal relationship between social capital and functional and emotional health. Second, the variable measurement of this study was based on the questionnaire of SAGE-China wave 1. Its accuracy and relevance need further consideration. Third, the measurements of functional and emotional health were self-reported which might introduce recall bias. Fourth, differences in the measurement of social ties across different studies warrant comparisons of current study findings with that of similar studies. Last but not the least, unmeasured confounders such as insurance and genetic profiles were not considered in the present study which may suggest the existence of residual confounding.

Along with the increased number of older adults in China, there is an urgent need to keep older people active and healthy which is a major goal in both policy and research. This study suggested the importance of elders' social ties outside their family which can be considered to improve both functional and emotional health of people with increasing age. Traditional Chinese culture emphasizes the expected obligations of the adult children to care for their aged parents, as stated in a popular saying in China: "we need to raise children in order to get needed help in old age (in Chinese *yangerfanglao*)." In the era of rapid industrialization and urbanization, the number of potential caregivers was largely limited by the shrinking family size. However, social ties outside elder's family could be linked to their health. From public health standpoint, future community-level interventions could be advanced to help elders, especially those who were the most disadvantaged to achieve healthy aging. Opportunities created for social interaction among older adults could act as a means to increase social capital, better functional and emotional health. As an alternative, from a clinical perspective, raising an issue of social capital could help identify older adults at higher risk of functional and emotional health.

Declarations

Ethics approval and consent to participate:

This study was approved by the Ethics Committee of the Chinese Center for Disease Control and Prevention (200601). Participant informed consent was obtained before the survey.

Consent for publication:

Not applicable

Availability of data and materials:

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests:

The authors declare that they have no competing interests.

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Authors' contributions:

LHT and WF designed the study. LD is responsible for data analysis. WHX assisted manuscript writing. LHL provided intellectual input to the study and edited the manuscript. XH and GYF performed literature search and data screening.

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