Association between Grandparenting and Cognitive Function in Middle-Aged and Older Chinese: the mediation role of Children’s Intergenerational Support—A nationally representative cohort study

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Research Article

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Abstract

Objectives

As the world's population increases in age, the number of people suffering from cognitive impairment and dementia has increased dramatically. This study aims to investigate the association between grandparenting and cognitive function in middle-aged and older Chinese and explore the mediating effects of children's intergenerational support on grandparenting and cognitive function.

Methods

This study used data from the China Health and Retirement Longitudinal Study (CHARLS). A total of 5882 participants were recruited at the baseline survey in 2011, and 1230 participants completed the follow-up survey over 7 years. The CHARLS included the surveys on grandparenting and cognitive assessments. Grandparenting was categorized as yes and no. Cognitive function was measured by episodic memory and mental intactness. The association between grandparenting and cognitive function was analyzed in cross-sectional and 7-year follow-up models. Finally, the bootstrap method tests the mediating effect of children's intergenerational support.

Results

Both cross-sectional and longitudinal studies presented that grandparenting was positively related to increase the cognitive function in middle-aged and older Chinese (B = 0.231, p < 0.05; B = 0.217, p < 0.05). Children's emotional support and economic support played intermediary roles between grandparenting and cognitive function.

Conclusion

The findings emphasize the importance for policymakers to consider the impact of intergenerational care and family support when implementing new policies related to social services for middle-aged and older Chinese.

Introduction

As the world's population increases in age [1], the number of people suffering from cognitive impairment and dementia has increased dramatically [2]. Worldwide, around 55 million people live with dementia, which is expected to rise to 78 million in 2030 and 139 million in 2050 [3]. It has physical, psychological, social, and economic impacts, not only for people living with dementia but also for their caregivers, families, and society at large [4–6]. Currently, there is no effective treatment for cognitive impairment or dementia [7]. Cognitive impairment and dementia have become significant and increased global health
challenges [8]. In many developing countries, family support remains the primary source of care and support for older people [9]. Therefore, there is an urgent need to rediscover the value and function of the family and provide policy support to meet the needs of older people in China adequately.

Prior studies have investigated grandparenting as an important factor affecting middle-aged and older adults' cognitive function [10–14]. Most cross-sectional design studies have demonstrated the effectiveness of grandparenting in promoting cognitive function in middle-aged and older adults [10–13]. More specifically, a study indicated that providing moderate, not regular grandchildren care or caring one grandchild was more positively associated with cognitive function [11]. In addition, a longitudinal study in America found that grandparent caregiving was associated with better cognitive function at the 4-year follow-up [14]. However, the associations were observed in whites but not in African Americans [14]. Nevertheless, some studies also found that providing highly frequent grandchildren care has a negative impact on cognition [15, 16]. Meanwhile, most research is conducted in Western countries. A few studies on intergenerational care and cognition in middle-aged and older Chinese are cross-sectional design. The temporality is uncertain, and it is difficult to detect changes in the cognition of grandparent caregivers. Thus, the relationship between grandparenting and cognitive function of middle-aged and older Chinese still needs further exploration.

In the context of China's aging society and lacking of long-term care services for the elderly [17], intergenerational care increases the interaction between the elderly and their families. It provides them with more intergenerational support from their children, which is vital for promoting active aging among the elderly [18, 19]. Empirical evidence suggests that intergenerational support from adult children plays a key mediating role between changes in the social dimension and older people's physical and mental health [19–21]. In previous studies, scholars have explored the impact of children's intergenerational support on older people's cognitive function. A study proposed that emotional support from children could improve parental cognition [20]. Another study also suggested that economic support from adult children positively affected older adults' cognitive function [22]. However, up to now, little research has incorporated caring for grandchildren, children's intergenerational support, and cognitive function into the same framework. The potential intermediary mechanism underlying this association still needs further investigation.

Given this, we attempted to examine the relationship between grandparenting and cognitive function of middle-aged and older Chinese, with the mediating effect of children's intergenerational support into account. Specifically, we aimed to investigate the following two hypotheses. Hypothesis 1: We hypothesized that grandparenting may be associated with the better cognitive function of middle-aged and older Chinese. Hypothesis 2: Children's intergenerational support may play a mediating role between grandparenting and cognitive function among middle-aged and older Chinese.

Methods

Participants and setting
Data were extracted from the China Health and Retirement Longitudinal Study (CHARLS), which was an ongoing nationally representative survey in China. The CHARLS was conducted in 2011 (wave 1) and included 17,705 Chinese residents aged 45 and over from 28 provinces using a multistage probability-proportional-to-size (PPS) sampling technique. The CHARLS assessments including community residents' social, economic, and health circumstances. Subsequently, three follow-up assessments were performed in 2013 (Waves 2), 2015 (Waves 3), and 2018 (Waves 4). The CHARLS was approved by the Ethical Review Committee of Beijing University, and all the respondents signed informed consent forms [23].

This study used the data from the 2011 CHARLS baseline survey and all three follow-up assessments. We restricted individuals who met any of the following criteria at baseline: (1) aged ≥ 45 years at baseline; (2) completed a questionnaire about grandparenting; (3) completed cognitive assessments. In addition, we excluded participants with no follow-up data. The number of respondents who completed the baseline survey was 5882, and 1230 for the 7-year follow-up (see Fig. 1).

Measures

Grandparenting

The following question is used to measure grandparent caregiving in the CHARLS questionnaire: During last year, did you spend time taking care of your grandchildren? Allocating 1 to the respondents who answered yes and 0 to those who answered no.

Cognitive function

According to previous studies [24, 25], cognitive function is measured by two dimensions: episodic memory and mental intactness. Episodic memory is assessed using word recall tests. In the word recall tests, examiners read a list of 10 Chinese nouns, and respondents are instructed to repeat the words in any order immediately (immediate recall) and to recall the same list of words 4 minutes later (delayed recall). The episodic memory score is calculated as the average of the immediate and delayed recall scores, ranging from 0 to 10. Mental intactness is evaluated by ten items from the Telephone Interview of Cognitive Status test (TICS-10) and a pentagon-drawing test [26]. In CHARLS, mental status questions included serial subtraction of 7 from 100 (up to 5 times), date (month, day, year), day of the week, season, and intersecting pentagon copying test, for a total of 11 points. Total cognitive scores are calculated as the sum of the scores of episodic memory and mental intactness and ranged from 0 to 21, with higher scores indicating better cognitive function [27].

Children’s intergenerational support
Children's intergenerational support is measured from two aspects, children's emotional and financial support [28]. In CHARLS, children's economic support is measured by asking the respondent about the total amount of money and goods received from children in the past year. In order to avoid the influence of extreme values, the value of this variable is added "1" and then logarithm (that is, \( \ln(x + 1) \)) in the empirical analysis of this paper. According to the CHARLS questionnaire, children's emotional support is measured by the frequency of contact with parents: "How often do you communicate with children you do not live with?" In this study, the ten options of the questionnaire were reclassified into five options, which are "hardly", "seldom", "almost monthly", "almost weekly" and "almost every day", and assigned a value of 0–4 in turn. In addition, we assign a value of 5 if respondents were living with their children. The total contact frequency score is 5, with higher scores indicating the higher contact frequency with their children.

**Covariates**

Control variables included age (≥ 45 years), gender (female = 0, male = 1), education level (illiterate = 0; primary school = 2; middle school = 3; high school or above = 4), activities of daily living (ADLs): No = 0; Yes = 1, if the respondent has any difficulties in dressing, bathing, and showering, eating, getting in and out of bed, using the toilet, and controlling urination and defecation. Depressive symptoms are measured by the 10-item Center for Epidemiologic Studies Depression Scale (CES-D). The total score on the scale is between 0–30 points, with the higher scores indicating the more depressive symptoms.

**Statistical analysis**

Descriptive statistics were used to present the baseline characteristics of the enrolled participants. Continuous variables were expressed using mean ± standard deviation (mean ± SD), while percentages were used for categorical variables. Chi-square tests and independent sample T-test were performed to compare the differences between participants with and without grandchildren caregiving at the baseline survey.

In this study, we estimated two regression models: cross-sectional and 7-year follow-up models. Multivariate linear regression analysis was performed in the cross-sectional model. For the 7-year follow-up model, we conducted a generalized linear mixed model (GLMM) to analyze the association between caring for grandchildren and cognitive function of middle-aged and older adults.

The PROCESS macro for SPSS 25 was used to conduct the mediation analysis to investigate whether children's intergenerational support mediates the effect of grandparenting on the cognitive function [29]. The mediating effect was tested using a bootstrap estimation approach with 5000 repetitions. The indirect effect was considered significant when the 95% CI did not contain 0.

All statistical analyses were performed with the IBM SPSS Statistics version 25. \( P < 0.05 \) is statistically significant.
Results

Baseline characteristics

Table 1 shows the baseline characteristics of the 5882 participants. The mean (SD) age at baseline was 59.37 (± 8.09) years; 50.7% of participants were female. The average total cognitive score was 10.44 ± 4.11, and the average score of depressive symptoms was 8.80 ± 6.42. Of all participants, most of them had a primary school educational level (44.8%), no difficulty in activities of daily living (83.6%), and had weekly contact with children (35.9%). For the entire sample, 48.7% of participants were involved in taking care of grandchildren, and most caregivers were female (52.3%). What’s more, differences between non-caregivers and caregivers in sociodemographic characteristics and health status were also significant ($P<0.05$). Compared to participants who did not provide grandchildren care, those who took care of grandchildren had lower depressive symptoms scores and higher total cognitive scores.
Table 1
Baseline characteristics of participants

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total</th>
<th>Caregiver</th>
<th>Non-caregiver</th>
<th>$P$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N = 5882</td>
<td>2864 (48.7)</td>
<td>3018 (51.3)</td>
<td></td>
</tr>
<tr>
<td>Cognitive function mean ± SD</td>
<td>10.44 ± 4.11</td>
<td>10.75 ± 4.05</td>
<td>10.14 ± 4.13</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Age mean ± SD</td>
<td>59.37 ± 8.09</td>
<td>58.04 ± 6.99</td>
<td>60.63 ± 8.83</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Gender</td>
<td>0.019</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>2984 (50.7)</td>
<td>1498 (52.3)</td>
<td>1486 (49.2)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>2898 (49.3)</td>
<td>1366 (47.1)</td>
<td>1532 (50.8)</td>
<td></td>
</tr>
<tr>
<td>Educational level</td>
<td>0.007</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>1538 (26.1)</td>
<td>689 (24.1)</td>
<td>849 (28.1)</td>
<td></td>
</tr>
<tr>
<td>Primary school</td>
<td>2636 (44.8)</td>
<td>1314 (45.9)</td>
<td>1322 (43.8)</td>
<td></td>
</tr>
<tr>
<td>Middle school</td>
<td>1126 (19.1)</td>
<td>572 (20.0)</td>
<td>554 (18.4)</td>
<td></td>
</tr>
<tr>
<td>High school or above</td>
<td>582 (9.9)</td>
<td>289 (10.1)</td>
<td>293 (9.7)</td>
<td></td>
</tr>
<tr>
<td>Depressive symptoms mean ± SD</td>
<td>8.80 ± 6.42</td>
<td>8.55 ± 6.34</td>
<td>9.04 ± 6.49</td>
<td>0.005</td>
</tr>
<tr>
<td>Activities of Daily Living</td>
<td>0.001</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>4920 (83.6)</td>
<td>2443 (85.3)</td>
<td>2477 (82.1)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>962 (16.4)</td>
<td>421 (14.7)</td>
<td>541 (17.9)</td>
<td></td>
</tr>
<tr>
<td>Contact Frequency</td>
<td>&lt; 0.001</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seldom</td>
<td>688 (11.7)</td>
<td>248 (8.7)</td>
<td>440 (14.6)</td>
<td></td>
</tr>
<tr>
<td>Hardly</td>
<td>209 (3.6)</td>
<td>81 (2.8)</td>
<td>128 (4.2)</td>
<td></td>
</tr>
<tr>
<td>Almost every month</td>
<td>1252 (21.3)</td>
<td>572 (20.0)</td>
<td>680 (22.5)</td>
<td></td>
</tr>
<tr>
<td>Almost every week</td>
<td>2112 (35.9)</td>
<td>1005 (35.1)</td>
<td>1107 (36.7)</td>
<td></td>
</tr>
<tr>
<td>Almost every day</td>
<td>886 (15.1)</td>
<td>469 (16.4)</td>
<td>417 (13.8)</td>
<td></td>
</tr>
<tr>
<td>Living together</td>
<td>735 (12.5)</td>
<td>489 (17.1)</td>
<td>246 (8.2)</td>
<td></td>
</tr>
</tbody>
</table>

Association of grandparenting and cognitive function in middle-aged and older adults.
Table 2 reported the results of cross-sectional and 7-year follow-up models of the relationship between grandparenting and cognitive function of middle-aged and older adults. As shown in model 1, the results of the cross-sectional model showed that grandparenting had significant positive association with cognitive function of middle-aged and older adults (B = 0.231, \( p < 0.05 \)). The result of the 7-year follow-up model was consistent with the cross-sectional model, suggesting a favorable cognition impact of grandchildren care (B = 0.217, \( p < 0.05 \)). In addition, other control variables also had a significant impact on the cognitive function. Children's emotional and economic support, and educational level significantly positively affected the cognitive function of middle-aged and older adults. In contrast, ADLs and depressive symptoms negatively affected the cognitive function of middle-aged and older adults.
Table 2
Association of caring for grandchildren and cognitive function of middle-aged and older adults.

<table>
<thead>
<tr>
<th>Cognitive function</th>
<th>Model 1: Cross-sectional (N = 5882)</th>
<th>Model 2: 7-year follow-up (N = 1230)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B (95% CI)</td>
<td>B (95% CI)</td>
</tr>
<tr>
<td>Caring for grandchild</td>
<td>0.231 (0.053, 0.408)*</td>
<td>0.217 (0.018, 0.417)*</td>
</tr>
<tr>
<td>(Reference: No)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>0.345 (0.156, 0.534)**</td>
<td>0.701 (0.486, 0.916)**</td>
</tr>
<tr>
<td>Age</td>
<td>-0.034 (-0.046, -0.023)**</td>
<td>-0.071 (-0.084, -0.058)**</td>
</tr>
<tr>
<td>Educational level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary school</td>
<td>3.072 (2.845, 3.299)**</td>
<td>3.192 (2.933, 3.452)**</td>
</tr>
<tr>
<td>Middle school</td>
<td>4.563 (4.281, 4.846)**</td>
<td>4.564 (4.239, 4.889)**</td>
</tr>
<tr>
<td>High school or above</td>
<td>5.547 (5.205, 5.889)**</td>
<td>5.424 (5.070, 5.779)**</td>
</tr>
<tr>
<td>ADLs</td>
<td>-0.924 (-1.174, -0.674)**</td>
<td>-0.383 (-0.641, -0.126)**</td>
</tr>
<tr>
<td>(Reference: No)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depressive symptoms</td>
<td>-0.099 (-0.114, -0.085)**</td>
<td>-0.086 (-0.102, -0.070)**</td>
</tr>
<tr>
<td>Economic support</td>
<td>0.031 (0.008, 0.055)*</td>
<td>0.047 (0.020, 0.073)**</td>
</tr>
<tr>
<td>Emotional support</td>
<td>0.173 (0.108, 0.237)**</td>
<td>0.201 (0.133, 0.270)**</td>
</tr>
<tr>
<td>(Contact frequency)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Model 1: Outcomes of multivariate linear regression; Model 2: Outcomes of generalized linear mixed model (GLMM)

*** p < 0.001, ** p < 0.01, * p < 0.05

Mediation effect test

Table 3 provides the results of mediation analyses and Fig. 2 demonstrates the model process of children's intergenerational support mediated the relationship of grandparenting with cognitive function of middle-aged and older adults. As shown in Table 3, model 1, the upper and lower bounds of the bootstrap 95% confidence interval of the children's emotional support's indirect effect did not contain 0, so it was considered that there was a mediating effect [30]. Similar results were observed for model 2, the
The confidence interval of the children’s economic support’s indirect effect did not contain 0, and there was also a mediating effect.

For Fig. 2, model 1, after controlling for age, gender, and other potential confounders, path a showed that grandparenting had a significant positive effect on children’s emotional support (B = 0.293, \( p < 0.001 \)). Path b showed that children’s emotional support significantly improved cognitive function (B = 0.200, \( p < 0.001 \)). Path c was the total effect of grandparenting responding primarily to cognition (B = 0.295, \( p < 0.01 \)), and c’ displayed the positive effect of grandparenting on cognitive function, including the mediating children’s emotional support (B = 0.237, \( p < 0.05 \)). The mediating effect (indirect effect, \( ab = c - c' \)) of children’s emotional support was 0.059.

As shown in Fig. 2, model 2, path a showed grandparenting had a significant positive effect on children’s economic support (B = 0.287, \( p < 0.01 \)). Path b showed that children’s economic support significantly improved cognitive function (B = 0.053, \( p < 0.001 \)). Path c represented the link between grandparenting and cognitive function (total effect). When the children’s economic support is included as an intermediary variable in the model, the coefficient of total effect was reduced to c’ (direct effect). The mediating effect (indirect effect) of children’s economic support was 0.015.

<table>
<thead>
<tr>
<th>Pathway</th>
<th>Effect</th>
<th>boots</th>
<th>BootLLCI</th>
<th>BootULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct effect</td>
<td>0.237</td>
<td>0.105</td>
<td>0.030</td>
<td>0.443</td>
</tr>
<tr>
<td>Indirect effect</td>
<td>0.059</td>
<td>0.014</td>
<td>0.034</td>
<td>0.088</td>
</tr>
<tr>
<td>Model 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct effect</td>
<td>0.280</td>
<td>0.105</td>
<td>0.074</td>
<td>0.486</td>
</tr>
<tr>
<td>Indirect effect</td>
<td>0.015</td>
<td>0.007</td>
<td>0.003</td>
<td>0.031</td>
</tr>
</tbody>
</table>

### Discussion

This study examined how grandparents’ cognitive function was associated with grandparenting using a nationwide longitudinal survey in China. The results suggested that grandparenting had a beneficial effect on grandparents’ cognition. Moreover, children’s intergenerational support had mediating effect between grandparenting and cognitive function of middle-aged and older Chinese.

In this study, both cross-sectional and longitudinal studies presented that grandparenting was positively related to increase the cognitive function of middle-aged and older Chinese which was in accordance with the previous study [11, 12]. Under the pressure of modern life, children neglect their emotional support to their parents because of busy work. The lack of emotion will lead to the depression of the middle-aged and elderly. Therefore, taking the task of taking care of grandchildren can alleviate the emotional loss of
middle-aged and elderly people and improve their sense of happiness in life. Grandparenting is an excellent example of a social role and a form of social engagement in later life [31]. Caring for grandchildren could increase grandparents' daily activities, such as having fun with grandchildren and caring for their daily lives. It can help them feel youthful and alive, increasing their social participation and thereby improving their cognitive function [32–34]. Tesky et al. also pointed out that various engagement activities can improve cognition of middle-aged and older adults [35]. Similarly, a randomized pilot trial of 128 older adults placed in public elementary schools in roles designed to meet schools' needs showed that their cognitive activity increased significantly [36]. Moreover, in Chinese traditional filial culture, older people never regard caring for their grandchildren as a burden but rather as a family honor and personal pleasure, thus avoiding negative emotions [37]. A study also indicated that providing grandchildren care can significantly reduce depression in older adults [28]. Empirical studies suggested that depression could increase the risk of dementia [38, 39]. Based on the role enhancement theory, it is believed that caring for grandchildren enhances the satisfaction of the elderly by compensating for the lack of emotional comfort of grandparents, thus contributing to mental health and cognitive function [40, 41]. In addition, providing intergenerational care is a combination of physical and mental work for middle-aged and older people that might contribute to strengthening their mental stimulation and cognitive function. As brain decline is a significant cause of cognitive decline [42], it can be protected by external environmental stimulation. Therefore, participation in stimulating activities or training the brain can make it more flexible and thus improve cognitive function [43, 44].

The mediation analyses revealed that the children's intergenerational support had a mediating role in grandparenting and cognitive function of middle-aged and older adults. In agreement with previously published research, grandparents who provide grandchildren care can receive more financial and emotional support from their adult children [18, 28]. Against the backdrop of an inadequate social care system and the reality of increased upbringing costs, intergenerational care from older parents is invaluable and contributes significantly to the development of their children's families. Taking care of grandchildren is a win-win social participation activity, which not only frees adult children from the heavy labor of taking care of minor children, but also contributes to the increasing of family wealth, and makes the elderly feel supported and happy in their old age. Moreover, according to intergenerational exchange theory, older people expect to care for their grandchildren in exchange for financial security and care from their children [28]. Our finding also suggested that grandchildren caregivers who received more emotional support from adult children tended to report better cognitive function. Results are consistent with the findings of Yang and Miao that children's emotional support plays a vital role in improving parental cognition [20]. As a form of social participation, caring for grandchildren could increase the interaction between the elderly and their families, and obtain more intergenerational support from their children, thus improving the cognitive function of the middle-aged and elderly. A study conducted by Shu et al. concluded that children provided care and emotional support could reduce the stress of the elderly, bring good mental health, and thus have a positive impact on health [45]. Furthermore, a study among Chinese older adults demonstrated that receiving emotional support could improve older adults’ life satisfaction [46]. According to Ko and Jung, cognitive function was significantly positively associated with life satisfaction [47]. Regarding financial support, our results found that children's economic support had a positive effect on
cognitive function of middle-aged and older people. This result is contrary to the findings of Yang and Miao that the effect of children’s economic support on parental cognitive status is null [20]. In contrast, our study is consistent with a study in China that children provided informal caregiving and financial support could improve their parents’ cognitive health [48]. Economic resources are fundamental to residents’ lives and directly impact the quality of life and well-being of older people [46]. Children’s economic support could reduce the financial barriers for older parents to access health care and motivate them to promote their health through health care services [48]. Exiting studies conducted in South Korea and Eastern European have shown that older adults receiving financial support and daily care from their children have a positive effect on their physical and mental health [49, 50]. Therefore, researchers contend that financial support from adult children is not only a valuable support resource for meeting the daily and healthcare needs of older people but can also create financial security for older people in poor health and relieve their psychological stress, thus improving their cognitive function. In addition, children’s intergenerational support can be seen as informal social support [48]. A one-year prospective study on the association between social support sources and cognitive function among community-dwelling older adults suggested that social support had a protective effect on the cognitive decline [51].

At present, more and more women are participating in social labor, and social support for child-rearing is seriously inadequate in China [52]. The role and value of intergenerational care cannot be ignored. The society and family should encourage the elderly to help take care of grandchildren, which not only alleviates the care pressure of children's families, but also makes important contributions to the development of society. At the same time, for the elderly who actively take care of their grandchildren, adult children should give them more intergenerational support to relieve the mental and psychological pressures brought by care. With calls for healthy ageing, there is a need to improve the quality of intergenerational relationships and establish positive patterns of intergenerational exchange. Society and families must pay attention to the health problems and living needs of elderly carers. The government should encourage intergenerational communication by providing more adequate family leave and more time for intergenerational communication [53].

The present study has certain limitations. First, our measure of caring for grandchildren is a binary variable, indicating ‘yes’ or ‘no’. We do not consider the number of grandchildren cared for and the intensity of grandchild care. Secondly, Due to data limitations, the age of the grandchildren is not controlled in this paper. The care needs of grandchildren vary considerably by age [54]. Finally, cognition evaluation is somewhat subjective and unstable. There is no clinical diagnosis of cognitive impairment.

**Conclusion**

The results of the present study revealed that grandparenting was significantly positively related to the cognitive function of middle-aged and older Chinese, and children’s intergenerational support played a mediating role between grandparenting and cognitive function. Therefore, policymakers need to consider the impact of intergenerational care and family support when implementing new policies related to social services for middle-aged and older Chinese.
Declarations

Availability of data and materials

The database (CHARLS), which is used in this paper, is publicly available.


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Authors’ contributions

We thank XH, YL, YF, GQ and JZ designed research and conducted research; XH, YL and FY analyzed data and wrote the manuscript; XZ, XG and WW revised the paper, JZ and GQ had primary responsibility for the final content. All authors revised it critically for important intellectual content.

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Conflict of Interest

None reported.

Consent for Publication

Not applicable

Ethics approval and consent to participate

Ethics approval for the study was granted by the Ethical Review Committee of Peking University. The IRB approval number is IRB00001052-11015. Informed consent was obtained at the time of participation. All methods of this study were performed in accordance with the relevant guidelines and regulations. All experimental protocols were approved by Institutional Review Board at Peking University.

References


Figures
Figure 1

Flowchart of participant selection from the China Health and Retirement Longitudinal Study (CHARLS).
Figure 2

The conceptional framework of the mediation models.

Note: All models were adjusted for age, gender, educational level, depressive symptoms, and ADLs.

* p<0.05, ** p<0.01, *** p<0.001