BMC Geriatrics

RESEARCH Open Access

Adult children's status quo and their non-cohabiting parents' depressive symptoms among community-dwelling Chinese

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Abstract

Background Few studies have focused on how adult children's status quo is related to their non-cohabiting parents' mental health, especially to elucidate its mechanisms in the Chinese transitional context. This study investigated this issue and examined rural-urban differences.

Methods This study used data from the China Health and Retirement Longitudinal Survey 2020. The status quo of adult children was measured by education, income and health status. Depression was measured using the Centre for Epidemiological Studies Depression Scale. Multivariable regression and mediation analyses were performed.

Results Adult children's education, income and health were all significantly associated with lower depressive symptoms in non-cohabiting parents ($p < 0.001$). However, child income was only significant in the rural sample ($p < 0.001$). Mediation analysis confirmed the pathway from children's income and health status to parental depression through meeting frequency. The direct effects of income and health status on parental depression were −0.218 and −0.735 respectively, while the indirect effects were 0.031 and −0.048. Although financial support was closely related to children's status quo, it was not directly related to parents' mental health.

Conclusion Even in the context of non-cohabitation, parents' mental health is still linked to the status quo of adult children. Given that meeting frequency has a significant positive effect on reducing depressive symptoms among elderly parents, future anti-depression policies should take into account the changes in family patterns in China and formulate more policies to facilitate intergenerational emotional support for the elderly.

Keywords Depression, Status quo of adult children, Intergenerational support, China

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Background

The rapid global aging trend presents numerous challenges, with depression emerging as one of the most significant public health concerns, severely affecting the quality of life of older adults [1]. In recent decades, a substantial body of literature has examined the impact of intergenerational support on the mental health of older parents, particularly in societies where intergenerational solidarity hold considerable cultural value [2]. Adult children, as a key source of social support, play an essential role in providing both emotional and practical assistance, typically manifested as financial support, to their elderly parents, which can alleviate psychological distress and reduce depressive symptoms [2]. However, the extent to which adult children can provide adequate support depends on their own capabilities, which are largely determined by their status quo, usually defined by their educational attainment, income, employment and health status [3]. Consequently, a growing body of research has begun to examine the relationship between the status quo of adult children and the mental health of their elderly parents [4, 5].

Social exchange theory as an explanatory framework

Social exchange theory (SET), which weighs the benefits of relationships against their costs, offers a valuable framework for understanding the relationship between adult children's status quo and older parents' mental health [6]. In the case of intergenerational relationships, the theory suggests that the level of support offered will depend on the perceived costs associated with providing care. Adult children in better socio-economic circumstances perceive the costs of providing support as more manageable, as they are more likely to have a stable financial, time and energy base to do so. Such support is not only financial or instrumental, but also includes emotional companionship and psychological support through regular visits [7, 8]. Conversely, if children are experiencing difficulties, they may be unable or unwilling to provide adequate support, leaving elderly parents isolated and without the care they need.

In line with this, empirical studies have accumulated a large body of evidence on how adult children's educational attainment, income and health may influence their parents' mental health. Higher levels of education are associated with greater health literacy, stronger problem-solving skills and greater access to resources, all of which enable adult children to provide better support [4, 9]. Income levels have a direct impact on the financial support that children can provide, affecting parents' access to healthcare, quality of living conditions and overall well-being [2, 10]. In addition, children with sufficient income may have lower stress levels, allowing them to be more active caregivers [11]. Health status is another critical factor, as children in good health are more likely to have the energy, time, and capacity to provide both practical and emotional care.

Changes in intergenerational relationship and rural-urban differences

Filial piety is a fundamental tenet of Confucianism, requiring children to respect and care for their parents. This virtue is traditionally expressed through the financial support, daily care, and emotional companionship that adult children provide to their ageing parents [12, 13]. When children reached adulthood, they formed their own nuclear family but continued to live with their parents to form a stem family. It performs the function of fulfilling filial duties while receiving assistance in childcare, as grandparents actively contribute to the upbringing of grandchildren [14]. A sustained and stable intergenerational relationship exists between adult children and elderly parents, and children can be a major source of support in later life.

However, rapid urbanization and modernization have significantly transformed family structures in China, resulting increased geographical separation between parents and children [15]. Many adult children no longer live with their parents, even if the physical distance is small [16]. While filial piety-based intergenerational support still remains, its quality and parents' expectations have changed. Emotional support, which relies heavily on real interactions, becomes more difficult to provide in non-cohabiting situations. Adult children are more likely to regard financial support as filial piety, while increased pension schemes reduced older parents' expectations of such support [17]. Given these changes, it is important to understand how intergenerational support affects the mental health of older parents in non-cohabiting contexts.

Meanwhile, it is also crucial to consider the significant rural-urban differences. In China, disparities in economic development, pension coverage, and access to public services have led to distinct patterns of family support between rural and urban households [18]. In urban areas, more comprehensive pension systems provide older adults with greater financial independence, making them less dependent on children than their rural counterparts. There are also differences in the expectations that rural and urban parents have of their children, which in turn influence their mental health. For example, research suggests that financial support from children tends to improve the mental well-being of rural parents because it satisfies filial piety, whereas it may be less effective or even counterproductive for urban parents, possibly due to changing norms of self-sufficiency and independence [18, 19]. These evolving dynamics highlight the need to examine the role of children's status

quo, intergenerational support on parental mental health through the lens of rural-urban differences.

Research gap and aims of the current study

As traditional family structures evolve, many older parents live apart from their children and experience feelings of loneliness and lack of social support, which can trigger depressive symptoms [20]. While previous studies have focused extensively on traditional families [21, 22], the impact of adult children's achievements– such as career success, health and financial stability– on the well-being of separated parents has received limited attention [23]. Moreover, the impact of the status quo of adult children on parents' mental health may be different across China's rural-urban divide [19].

Drawing on social exchange theory and previous relevant work, this study aimed to test a model of adult children's status quo and geriatric depression, with intergenerational support as a mediator in the context of non-cohabitation (Fig. 1). Using data from the China Health and Retirement Longitudinal Study (CHARLS) 2020, the main hypotheses of this study are: (1) elderly depression is directly related to the status quo of non-cohabiting adult children; (2) The link between adult children's status quo and parents' mental health may be mediated by intergenerational support; and (3) the relationship between children's status quo and elderly parents' depression, along with the influence pathways, varies between urban and rural areas.

Social exchange theory emphasizes the reciprocal nature of relationships, and this research extended it by examining how the absence of cohabitation may influence the reciprocal exchanges between adult children and parents. It advanced the understanding of how intergenerational support works in modern family structures and added insights into the mechanisms that influence older people's mental health. Narrowing this knowledge gap is essential given China's rapidly changing demographic and socio-economic landscape.

Methods

Data and sample

The data used in this study were obtained from the China Health and Retirement Longitudinal Study (CHARLS), a longitudinal survey of representative Chinese citizens aged 45 years and older from 450 villages/urban communities across the country with ethical approval. It used a multi-stage PPS randomization strategy to ensure representativeness [24]. Since 2011, this survey has been conducted every two or three years. The datasets have been widely used to analyze aging issues in China [10, 23]. This study used the most recent wave 5 of CHARLS, conducted in 2020 and published in November 2023, with 19,395 respondents.

CHARLS collected data at the individual, household and community level. Older adults' individual information was reported separately, while information about their children and intergenerational support was shared in the household-level dataset. In accordance with the research design, we focused on older parents with living adult children. Figure 2 shows the flowchart of sample selection for this study. We first select 10,634 respondents aged 60 and over. We then randomly selected one non-cohabiting adult child from each household, extracted the child's characteristics and intergenerational support variables from the family information dataset, and merged them with the respondent's personal information. Here, non-cohabitation was defined as respondents

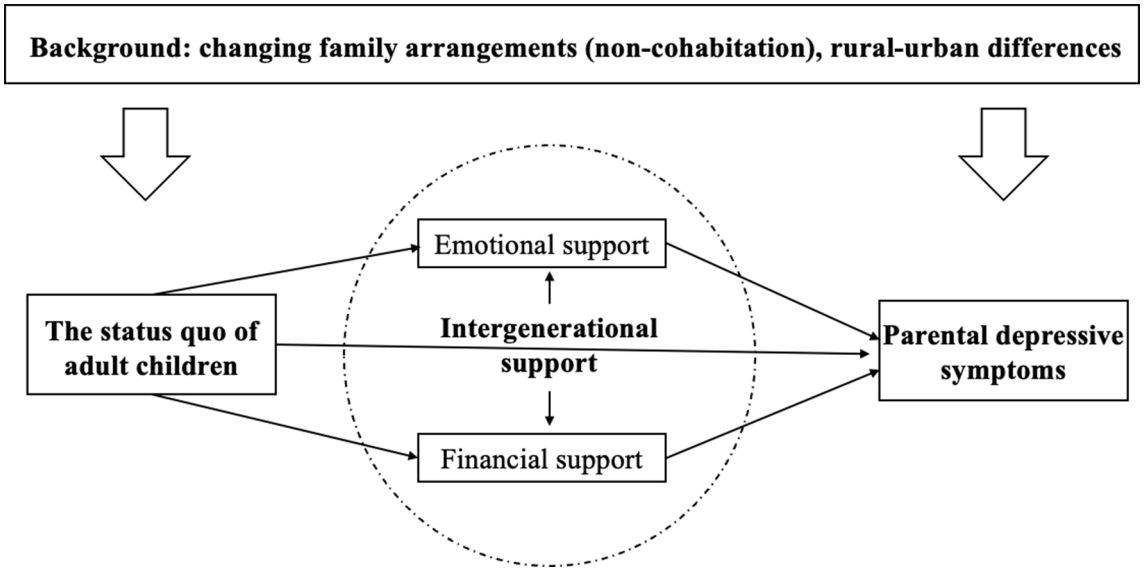

Fig. 1 The proposed model of adult children's status quo and geriatric depression

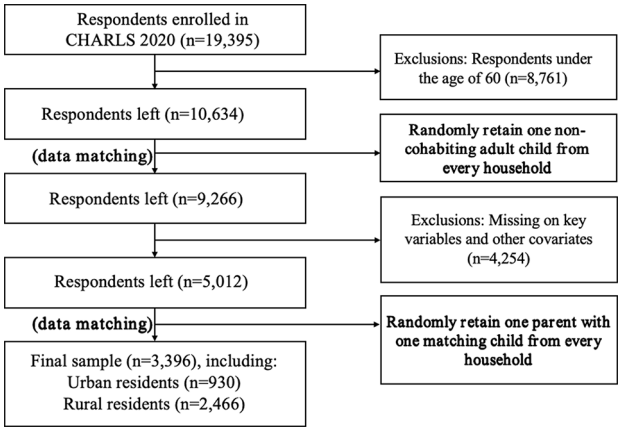

Fig. 2 Flowchart of sample selection

not having lived with the selected children at all in the last survey year (excluding short visits). Those who lived with their children and had no other non-cohabiting children available for matching were not applicable to this study and were therefore excluded. Next, among the remaining eligible respondents, those with missing values were excluded. Finally, following a previous study [25], one parent's information was randomly retained for the second round of matching. This left a total of 3,396 samples. Of these, 930 were from urban areas and 2,466 from rural areas. The study was approved by the Faculty Human Research Ethics Committee of Renmin University of China (EA-NSFC72204256).

Measures

Dependent variable

The main dependent variable of interest was depressive symptoms, measured by the 10-item version of the Center for Epidemiological Studies Depression (CES-D) scale [26]. This Likert scale contains eight items assessing negative symptoms and two items assessing positive symptoms. Respondents were asked to report the frequency of their experiences in the past week. For negative symptom items, the scoring system ranges from 0 to 3 points, corresponding to the frequency categories of 'rarely or not at all' (less than 1 day)', 'occasionally' (1–2 days), 'sometimes' (3–4 days), and 'often' (5–7 days). Scoring for positive symptom items is reversed. The total score of the scale is 30 points, with higher total scores indicating greater severity of depressive symptoms.

Key independent variables

In this study, the status quo of adult children was measured by three indicators, including their educational attainment, income level, and health status. Educational attainment was measured by years of schooling converted from the highest level of education. Income level was measured by the annual income of the child's nuclear household in the past year, ranging from 1 (has no income) to 12 (more than 300,000 CNY/42,057 USD). Health status was measured on a 5-point scale ranging from 1 (very poor) to 5 (very good).

Mediating variables

Considering both the spiritual and material needs of the elderly, we measured intergenerational support in terms of both emotional and financial support. Emotional support was measured by the frequency of parent-child meetings, as measured by how often the respondents saw their non-cohabiting adult child on an ordinal scale ranging from 1 (almost never) to 9 (almost every day). Meeting frequency was chosen as a proxy for emotional support because face-to-face interactions play an important role in maintaining emotional bonds. Regular face-to-face meetings provide opportunities for emotional exchange, reassurance and psychological comfort, which are essential aspects of emotional support for elderly parents [8]. Financial support was measured by the total amount of cash and other forms of cash-equivalent transfers that the respondents received from their non-cohabiting adult child in the past year.

Covariates

The covariates included the socio-demographic and health status of the elderly respondent, as well as relevant information about his/her children. Sociodemographic and health measures included the elderly parents' residence status (urban/rural), age (years), gender (male/female), educational attainment (years of schooling), marital status (with/without spouse), health insurance coverage, public pension received, functional disability and chronic disease status. Functional disability was measured using both the ADL and IADL scales. The 6-item Katz ADL scale [27] assessed participants' difficulty with self-care activities. Respondents reported difficulty with dressing, bathing, eating, getting in and out of bed, using the toilet, and controlling urination and defecation. The Lawton-Brody IADL scale [28] measured whether participants needed help with instrumental activities such as housekeeping, preparing meals, shopping, using the telephone, taking medications, and managing money. The response for each item on these two scales ranged from 0 (no difficulty) to 3 (unable to do). A higher total score represents more severe functional disability on each measure. Chronic disease status was measured by self-reported somatic chronic conditions and recoded as 0 (had no somatic chronic condition), 1 (had one somatic chronic condition), and 2 (had multimorbidity). Covariates related to child status included age, gender (male/female), and marital status (with/without spouse) of the selected non-cohabiting child [29]. Total number of children, number of male children, and cohabitation status

with other children (yes/no) for older respondents were also selected as covariates, given their potential contribution to Chinese older parents' mental health [30].

Statistical analysis

Stata version 18.0 and SPSS 29.0 were used to analyze the data. First, descriptive statistics were used to characterize the variables within the total sample. Differential analyses between urban and rural subgroups were performed. Chi-squared analysis was used for categorical variables, while t-test was used for continuous and sequential variables. Then, adjusted for covariates, three linear models were performed to examine the relationship between child status quo and respondents' depressive symptoms in the total sample as well as in the urban and rural subgroups. Finally, adding two key variables on intergenerational support, the three-step method and bootstrap resampling test were conducted to examine the mediating effects of meeting frequency and financial support on child status quo and the severity of depressive symptoms. Results are reported for the total sample, the urban subgroup, and the rural subgroup, respectively.

Results

Sample descriptive statistics

Table 1 presents the descriptive statistics of the total sample and subgroups categorized by urban and rural. Of the total 3,396 respondents, 27.39% were urban residents, 51.80% were male, 74.44% had a spouse and 95.82% had health insurance. Their mean age was 68.26 years (SD = 6.20), mean years of schooling was 5.03 years (SD = 4.15), and mean pension received in logarithmic form was 6.66 (SD = 3.46). The mean scores for the ADL disability, IADL disability, and depressive symptoms measures were 0.67 (SD = 1.71), 1.12 (SD = 2.60), and 9.38 (SD = 6.58), respectively. The mean of chronic condition status was 1.60 (SD = 0.68), indicating that elderly were more likely to have multimorbidity. Compared to urban older adults, rural older adults had significantly lower educational attainment and public pension, fewer chronic somatic conditions, more children, more severe depressive symptoms (all $p < 0.001$) and less health insurance enrollment ($p < 0.05$).

Regarding the status quo of the adult child, the mean scores for their educational attainment, income level, and health assessment were 8.94 (SD = 4.23), 6.86 (SD = 2.02), and 3.78 (SD = 0.98), respectively, for the total sample.

Table 1 Demographic characteristics and descriptive statistics ($N = 3,396$)

	Total sample ($n = 3,396$)	Urban residents ($n = 930$)	Rural residents ($n = 2,466$)	χ2 or t
Adult child Status				
Child educational attainment (years), mean (SD), range [0,22]	8.94(4.23)	11.46(3.77)	7.99(4.01)	-22.84***
Child income level, mean (SD), range [1,12]	6.86 (2.02)	7.40(2.04)	6.65(1.98)	-9.65***
Child health status, mean (SD), range [1,5]	3.78 (0.98)	3.77(0.93)	3.78(1.00)	0.21
Intergenerational Support				
Frequency of meeting, mean (SD), range [1,9]	5.22(2.49)	5.82(2.47)	4.99(2.46)	-8.69***
Financial support in logarithmic form, mean (SD), range [0,12.22]	6.26(2.75)	6.48(2.80)	6.18(2.72)	-2.89**
Older parents' covariates				
Age (years), mean (SD), range [60,108]	68.26(6.20)	69.36(6.51)	67.84(6.03)	-6.42***
Male (ref. female), n (%)	1,759(51.80)	508(54.62)	1,251(50.73)	-4.10*
Educational attainment (years), mean (SD), range [0,19]	5.03(4.15)	7.33(4.24)	4.16(3.69)	-21.38***
Have a spouse (ref. no), n (%)	2,528(74.44)	679(73.01)	1,849(74.98)	1.38
Pension (in logarithmic form), mean (SD)	6.66(3.46)	8.99(3.04)	5.79(3.20)	-26.40***
Have health insurance, n (%)	3,254(95.82)	904(97.20)	2350(95.30)	6.14*
ADL disability, mean (SD), range [0,18]	0.67(1.71)	0.59(1.76)	0.71(1.69)	1.80
IADL disability, mean (SD), range [0,18]	1.12(2.60)	0.99(2.61)	1.17(2.59)	1.84
Chronic condition status, mean (SD), range [0,2]	1.60(0.68)	1.67(0.64)	1.57(0.70)	-3.83***
Child covariates				
Child age (years), mean (SD), range [18,90]	43.09(7.30)	43.83(7.39)	42.81(7.25)	-3.51***
Male child (ref. female), n (%)	1,522(44.82)	444(47.74)	1078(43.71)	4.43*
Number of male children, mean (SD), range [0,7]	1.52(0.97)	1.29(0.92)	1.61(0.97)	8.52***
Number of children, mean (SD), range [1,10]	2.97(1.30)	2.51(1.18)	3.14(1.30)	13.04***
Child has a spouse (ref.no), n (%)	3,145(92.61)	856(92.04)	2,289(92.82)	0.60
Have other fully co-resident children, n (%)	910(26.80)	234(25.16)	676(27.41)	1.75
Depressive symptoms				
CES-D, mean (SD), range [0,30]	9.38(6.58)	7.38(6.01)	10.13(6.62)	11.09***

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (two-tailed)

These scores indicate that, on average, the children had a junior high school education or higher, an annual income of about 30,000 CNY (about 4,200 USD), and were generally in good health. In terms of intergenerational support, the mean score for frequency of meeting was 5.22 (SD = 2.49), indicating face-to-face contact of about once a month. The mean logarithmic financial support received from adult children was 6.26 (SD = 2.75). The mean age of the matched children was 43.09 (SD = 7.30), 92.61% had a spouse and 44.82% were male. The average number of male children and the total number of children the respondents had was 1.52 (SD = 0.97) and 2.97 (SD = 1.30) respectively. 26.80% of respondents had other children living with them. Compared to the adult children of urban residents, those of rural residents had relatively lower levels of education and income (both $p < 0.001$), met their parents less often ($p < 0.001$), and provided less financial support ($p < 0.01$).

Association between adult child status quo and depressive symptoms

Table 2 presents the linear regression estimates of older parents' depressive symptoms, both for the total sample and for subgroups of urban and rural residents. In the total sample, lower depressive symptoms were significantly associated with better child education (Coef. = -0.161, $p < 0.001$), child income level (Coef. = -0.192, $p < 0.001$), and child health status (Coef. =- 0.785, $p < 0.001$). In addition, the following covariates were also associated with lower depression, including: urban residence (Coef. = -1.468, $p < 0.001$), older age (Coef. = -0.068, $p < 0.01$), male gender (Coef. = -1.341, $p < 0.001$), higher educational level (Coef. = -0.076, $p < 0.05$), having a spouse (Coef. = -1.282, $p < 0.001$), less ADL disability (Coef. = 0.589, $p < 0.001$), less IADL disability (Coef. = 0.391, $p < 0.001$), fewer somatic chronic conditions (Coef. = 1.312, $p < 0.001$) and having children living with them (Coef. = -0.453, $p < 0.05$).

In the urban sample, lower depressive symptoms were significantly associated with better child education (Coef. = -0.147, $p < 0.01$) and health status (Coef. = -0.881, $p < 0.001$), whereas child income level did not play a significant role in shaping parents' mental health. Gender, presence of a spouse, ADL disability, IADL disability, and chronic illness still played a significant role as in the total sample (all $p < 0.05$). However, age and education were not significantly associated with depressive symptoms among urban residents.

For rural residents, better child education (Coef. = -0.167, $p < 0.001$), income (Coef. = -0.227, $p < 0.01$) and health status (Coef. = -0.769, $p < 0.001$) were significantly associated with lower depressive symptoms, which

Table 2 Linear regression estimates of older parents' depressive symptoms

	Total sample			Urban Residents			Rural Residents		
	Coef.	95% CI	p	Coef.	95% CI	p	Coef.	95% CI	p
Adult child Status									
Child educational attainment	-0.161	[-0.218, -0.104]	0.000	-0.147	[-0.258, -0.037]	0.009	-0.167	[-0.235, -0.100]	0.000
Child income level	-0.192	[-0.299, -0.084]	0.000	-0.097	[-0.292, 0.098]	0.331	-0.227	[-0.356, -0.097]	0.001
Child health status	-0.785	[-0.992, -0.578]	0.000	-0.881	[-1.267, -0.495]	0.000	-0.769	[-1.015, -0.523]	0.000
Older parents' covariates									
Urban resident (ref. rural)	-1.468	[-1.992, -0.945]	0.000						
Age (years)	-0.068	[-0.119, -0.017]	0.008	-0.058	[-0.151, 0.034]	0.216	-0.075	[-0.136, -0.014]	0.017
Male	-1.341	[-1.780, -0.902]	0.000	-1.118	[-1.884, -0.353]	0.004	-1.390	[-1.931, -0.850]	0.000
Educational attainment	-0.076	[-0.134, -0.018]	0.010	-0.062	[-0.156, 0.032]	0.194	-0.079	[-0.152, -0.005]	0.036
Have a spouse (ref. no)	-1.282	[-1.765, -0.800]	0.000	-1.634	[-2.492, -0.776]	0.000	-1.162	[-1.747, -0.578]	0.000
Pension (in logarithmic form)	-0.059	[-0.121, 0.003]	0.064	-0.083	[-0.208, 0.041]	0.187	-0.054	[-0.128, 0.019]	0.149
Have health insurance	-0.478	[-1.453, 0.497]	0.337	-1.157	[-3.223, 0.909]	0.272	-0.337	[-1.456, 0.782]	0.555
ADL disability	0.589	[0.439, 0.740]	0.000	0.346	[0.074, 0.618]	0.013	0.666	[0.485, 0.847]	0.000
IADL disability	0.391	[0.290, 0.491]	0.000	0.576	[0.392, 0.760]	0.000	0.334	[0.214, 0.453]	0.000
Chronic condition status	1.312	[1.022, 1.602]	0.000	1.162	[0.623, 1.701]	0.000	1.364	[1.018, 1.709]	0.000
Child covariates									
Child age	-0.019	[-0.060, 0.023]	0.385	-0.030	[-0.112, 0.051]	0.467	-0.014	[-0.064, 0.035]	0.568
Male child (ref. female)	0.028	[-0.454, 0.511]	0.908	-0.182	[-1.052, 0.687]	0.681	0.149	[-0.433, 0.730]	0.616
Number of male children	-0.037	[-0.329, 0.255]	0.804	-0.086	[-0.651, 0.480]	0.767	-0.040	[-0.383, 0.303]	0.819
Number of Children	0.037	[-0.176, 0.250]	0.737	0.244	[-0.181, 0.670]	0.260	-0.014	[-0.262, 0.235]	0.914
Child has a spouse (ref.no)	-0.312	[-1.079, 0.454]	0.424	-0.110	[-1.413, 1.194]	0.869	-0.393	[-1.334, 0.548]	0.413
Have other fully co-resident children	-0.453	[-0.904, -0.002]	0.049	-0.353	[-1.162, 0.456]	0.392	-0.490	[-1.033, 0.053]	0.077
Cons.	21.246	[18.241, 24.250]	0.000	19.678	[14.520, 24.835]	0.000	21.658	[17.884, 25.433]	0.000
Number of obs.	3,396			930			2,466		
R-squared	0.251			0.271			0.213		

Table 3 Results of children's status quo on geriatric depression through intergenerational support

	Key variables	Frequency of meeting	Financial support	Depression
Total sample	Child educational attainment	-0.013	0.067***	-0.163***
(*n* = 3,396)	Child income level	-0.126***	0.345***	-0.218***
	Child health status	0.195***	0.253***	-0.735***
	Frequency of meeting			-0.244***
	Financial support			-0.013
	R-square	0.074	0.134	0.259
Urban residents	Child educational attainment	-0.004	0.103***	-0.151**
(*n* = 930)	Child income level	-0.131**	0.337***	-0.130
	Child health status	0.204*	0.156	-0.849***
	Frequency of meeting			-0.181*
	Financial support			-0.028
	R-square	0.052	0.150	0.276
Rural residents	Child educational attainment	-0.020	0.060***	-0.171***
(*n* = 2,466)	Child income level	-0.125***	0.351***	-0.250***
	Child health status	0.200***	0.284***	-0.707***
	Frequency of meeting			-0.268***
	Financial support			-0.029
	R-square	0.061	0.132	0.223

Notes: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (two-tailed); All covariates were controlled

Table 4 Bootstrap testing of the mediating effect of intergenerational support between children's status quo and geriatric depression

	Significant Pathways	Indirect Effect	BootSE	BootLLCI	BootULCI	Proportion of total effect that is mediated
Total sample	Child income level-Frequency of meeting-Depression	0.031	0.008	0.017	0.047	16.15%
(*n* = 3,396)	Child health status-Frequency of meeting-Depression	-0.048	0.014	-0.078	-0.022	6.11%
Urban residents	Child income level-Frequency of meeting-Depression	0.024	0.014	0.003	0.055	100.00%
(*n* = 930)	Child health status-Frequency of meeting-Depression	-0.037	0.024	-0.091	-0.001	4.20%
Rural residents	Child income level-Frequency of meeting-Depression	0.034	0.010	0.018	0.055	14.98%
(*n* = 2,466)	Child health status-Frequency of meeting-Depression	-0.054	0.017	-0.091	-0.023	7.02%

was consistent with the results for the total sample. In terms of covariates, age, gender, education, presence of a spouse, ADL disability, IADL disability and chronic somatic conditions were significant (all $p < 0.05$) as in the total sample.

The mediating role of the intergenerational support

Table 3 first summarizes the results of the mediation of children's status quo on geriatric depression by intergenerational support, for both the total sample and the urban-rural subsamples. Among the total, adult children with higher income (Coef. = -0.126, $p < 0.001$) and poorer health (Coef. = 0.195, $p < 0.001$) met their parents less often, while their level of education was not associated with meeting frequency. When included in the fully tested model, meeting frequency was significantly associated with lower depressive symptoms (Coef. = -0.244, $p < 0.001$). Regarding financial support, although adult children's education, income level, and health were all significantly associated with financial support for their elderly parents (all $p < 0.001$), no significant association was found between financial support and parents' depressive symptoms. Similar results were found for the rural samples. In Table 3, child health was not significantly associated with financial support in the urban samples. Meanwhile, child income was not associated with parental depressive symptoms in the fully tested model for urban residents, showing differences from the rural samples.

Table 4 shows the bootstrap test of the mediating effect between children's status quo and parental depression through the mediator of intergenerational support, with only statistically significant results reported. In Table 4, meeting frequency significantly mediated the relationship between children's income level and health status on older parents' depressive symptoms for all groups. In the pathway from children's income to geriatric depression, the proportion of the total effect mediated by meeting frequency was 16.15%, 100.00% and 14.98% in the total, urban and rural samples respectively. In the pathway from children's health to parental depression, meeting

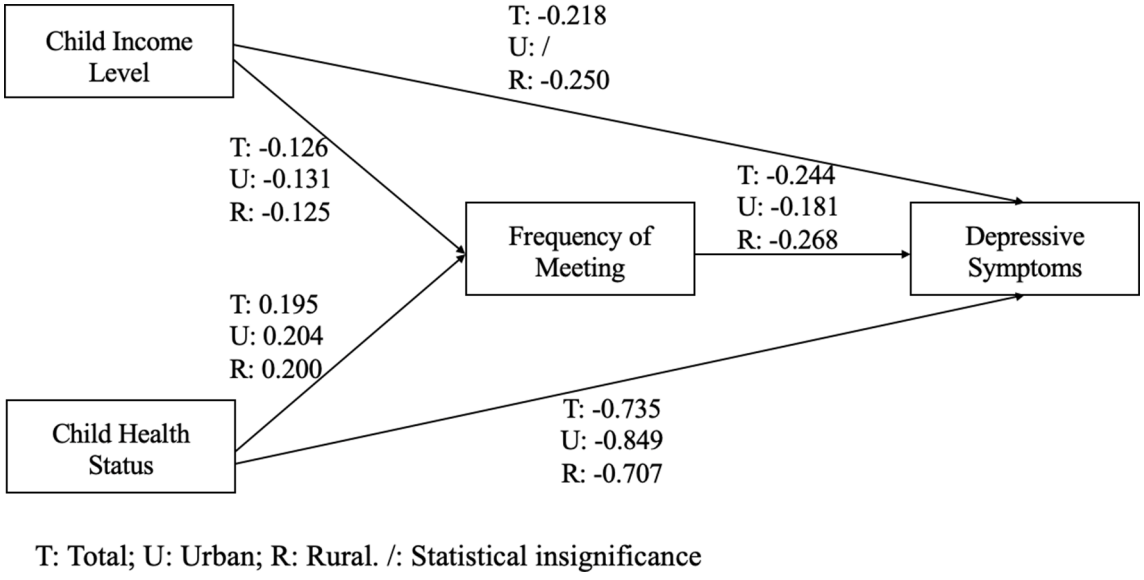

Fig. 3 Pathways that passed the bootstrap test for mediation effects

frequency mediated 6.11%, 4.20% and 7.02% of the total effect in the total, urban and rural samples respectively.

Figure 3 presents the mediation pathways, illustrating both the direct and indirect effects of children's status quo on parental depression. Specifically, the direct effect of child income on parental depression was – 0.218 and – 0.250 for the total and rural samples, respectively, while it was not significant in the urban sample. The indirect effects, mediated through meeting frequency, were 0.031, 0.024, and 0.034 for the total, urban, and rural samples, respectively. Similarly, for child health, its direct effect on parental depression was – 0.735, -0.849, and – 0.707 for the total, urban, and rural samples, respectively, while the indirect effects mediated through meeting frequency were – 0.048, -0.037, and – 0.054.

Discussion

In response to the increasing attention paid to the psychological well-being of older adults in the context of population aging and family transformation, this study examined the association between adult children's status quo and their non-cohabiting parents' geriatric depression in the Chinese context. It was hypothesized that geriatric depression would be associated not only directly with children's status quo, but also through its impact on intergenerational support. This study operationalized children's status quo into three dimensions: education, income and health status, and tested the hypothesis using nationally representative data from CHARLS in China.

First, this study found that better child education was significantly associated with lower depressive symptoms in older parents, consistent with other studies [4, 9]. However, this study differs from others in its findings on underlying mechanisms. While previous studies suggest that well-educated children can better support their parents financially and improve their health, we found that while child education was correlated with financial support, financial support itself was not associated with geriatric depression, suggesting that it may not be an important pathway. Instead, well-educated children may reduce parental depression through their psychological benefits. In China, where education is highly valued, parents often derive fulfilment from children's academic success as a symbol of family honor and achievement. A well-educated child therefore raises the social status of the family and brings pride and social recognition to the parents, making education a crucial factor in their psychological well-being [31, 32].

Regarding emotional support, previous studies have reached opposing conclusions. Some suggest that well-educated children can provide more emotional support due to stronger social skills and a greater sense of family responsibility [23, 32]. Others argue that higher education leads to busier lives that reduce parent-child interactions, leading to negative parental mental health outcomes [33]. This study found that although meeting frequency was negatively associated with depressive symptoms, it was not directly related to children's education, making this mediation pathway inconclusive. This aligns with Indonesian studies showing no relationship between children's education and time transfer [34, 35].

Second, lower parental depressive symptoms were significantly associated with higher child income, especially in rural areas. Previous studies have suggested that rural parents have a less developed pension system than urban residents, making higher-income children more likely to provide financial support, which in turn benefits their parents' mental health [10, 18]. However, similar to

findings on children's education, although higher-income children may provide substantial financial support to their elderly parents, this was not strongly associated with geriatric depression. Meeting frequency, a proxy for emotional support, plays a significant role in parental mental health in the non-cohabiting context. However, high income was found to be negatively associated with meeting frequency, as children are more likely to have migrated to developed areas, making frequent contact with parents more difficult and thus worsening parental well-being [36]. Therefore, in the rural context, the association between high child income and low parental depression may represent a trade-off between the positive psychological effects of children's achievements and the negative effects of being distant from children and lacking emotional support.

Third, the good health of adult children is associated with lower depressive symptoms in their parents, regardless of whether they live in rural or urban areas. The bootstrap test showed that the direct effect of children's health on parental depression reached −0.735, -0.849 and −0.707 for the total, urban and rural samples respectively - much higher than the effect of children's income. Meanwhile, the indirect effect of health status on geriatric depression is mainly mediated by meeting frequency. When adult children are healthy, elderly parents experience less psychological and caregiving strain, resulting in lower levels of depression. In addition, good health allows children to visit more often and provide additional support, further improving their parents' mental well-being [37].

In this study, except for the relationship between child income and parental outcomes, the links between children's status quo (e.g., education and health) and parental depression were largely consistent across urban and rural non-cohabiting families. This contrasts with previous research emphasizing urban-rural differences [18, 19]. Despite differences in social security and cultural norms, non-financial pathways - such as emotional attachment - play a universal role in shaping parental mental health in non-cohabiting families. However, this does not negate the importance of considering urban-rural differences. This study found that urban older adults had significantly lower depressive symptoms than their rural counterparts, which is consistent with previous findings [10, 18]. Notably, the effect of intergenerational support did not differ significantly between urban and rural groups, suggesting that other factors may contribute to the observed differences. Further research is needed to identify these additional influences and mechanisms.

Some limitations of the present study should be mentioned. First, because key variables such as depressive symptoms, income, and health status were measured by self-report, the current findings may be subject to self-report bias due to recall delay and social desirability effects. Second, this study discussed the mediating role of intergenerational support. Due to the limitations of secondary data, the study used the frequency of meetings to indicate the emotional support provided by adult children to elderly parents. As frequent meetings may not always translate into meaningful emotional support, this measure was limited to capture the depth and quality of emotional interactions. Future studies should include measures of the quality of meetings, older parents' subjective perceptions of children's emotional support, as well as the quality of the parent-child relationship. Third, this study used cross-sectional data and therefore cannot establish a causal pathway from adult children's status quo to intergenerational support and ultimately to parents' mental health. The proposed pathway and data interpretation were based on the theoretical framework. Parental mental health may also influence the quality of intergenerational support or even affect children's status quo. Future research could address this limitation by using longitudinal data to examine unidirectional relationships or by using alternative theoretical frameworks to explore reverse pathways. The use of longitudinal data to explore how changes in children's status quo may affect parents' mental health over time may further contribute to this issue. Fourth, the use of secondary data also limits the ability of this study to account for other confounding variables. It cannot capture how care responsibilities between multiple siblings affect intergenerational support. For example, one child may provide financial support while others stay with the elderly parent to care. Randomly pairing a parent with a child may therefore oversimplify family dynamics and introduce bias. Future research should include more comprehensive variables to better account for family interactions. Finally, this study also has some limitations in terms of context. For example, it focused only on non-cohabiting families. While many previous studies have examined cohabiting contexts, changing family norms call for a re-evaluation of whether similar patterns exist in cohabiting families, which could deepen understanding of intergenerational dynamics. Meanwhile, the generalizability of our findings, which are rooted in the Chinese cultural emphasis on family ties, also requires careful consideration beyond China. The associations observed in this study may be different in other social contexts. Future cross-cultural research may provide more valuable insights.

Our findings have several policy implications. First, in the context of the urban-rural divide, higher child income is associated with lower parental depression in rural areas but not in urban areas, with meeting frequency - rather than financial support - being the key mediating factor. In the context of large-scale migration in China, the mental health of the rural elderly left behind deserves special

attention. Rural revitalization policies [38] offers a promising solution. By improving infrastructure, health services, education, and employment opportunities, these policies can reduce migration pressures and strengthen child-parent support networks within rural communities. Future policies should continue to prioritize rural revitalization, creating opportunities for rural youth and ensuring long-term benefits for all. Second, meeting frequency is positively associated with reducing depressive symptoms in elderly parents, which means that future policies should take into account the changing family patterns in China and formulate more policies to facilitate frequent family reunions. Third, this study found that the norms of intergenerational support have changed. Compared with emotional support, elderly parents may be less dependent on financial support from children, even for rural residents. The public pension system should be further improved to support them financially, while their children can provide additional emotional support.

This study aligns with the social exchange framework by demonstrating how children's education, income and health status contribute to parental mental health. In examining the underlying mechanisms, we included intergenerational support as a mediator and found that meeting frequency, rather than financial support, played a significant role. Our findings on the relationship between adult children's education and health are broadly consistent with studies rooted in other contexts [4, 39] and reflect a universal pattern of parental concern and emotional investment, where a child's struggles or lack of success can lead to feelings of anxiety, disappointment or distress for older parents, regardless of cultural or institutional differences and whether they live together or apart.

The main difference between our findings and those from other social contexts lies in the relationship between adult children's income and parental depression. In countries with weaker welfare systems, such as Mexico, children's financial stability directly improves parental well-being by providing economic support [40]. In contrast, in Western countries with strong social safety nets, such as Sweden and Germany, parental well-being is less linked to children's income because pensions and elderly care services provide stability [41]. Some studies even suggest that financial support from children may reduce life satisfaction among older people by signaling dependency [5]. This study differs from both in that we found that adult children's income affected parental mental health in rural areas, but not through financial support. The absence of financial transfers as a mediator suggests that, in contrast to other less developed settings, financial support may no longer be a dominant channel affecting parental well-being. Rooted in traditional family values that view a child's success not only as a personal achievement but also as a reflection of family honor, higher child income may serve as a marker of filial piety, thereby boosting parental self-esteem and reducing anxiety about the family's future [42]. This highlights the specificity of the Chinese context, where cultural values and expectations regarding children's achievements remain influential, even in the midst of rapid social change.

Conclusion

Rooted in the context of massive migration and changing family living arrangements, this study adds to existing knowledge on the relationship between adult children's status quo and geriatric depression, particularly in non-cohabiting living arrangements. It found that the better status quo of adult children in terms of education, income and health status was significantly associated with lower depressive symptoms in non-cohabiting elderly parents, particularly for rural residents. Further mediation analyses revealed that, although good status quo and financial support were strongly associated, children's financial support was not associated with parental depression. Instead, meeting frequency was a significant mediator. The results of this study provide solid evidence for further depression interventions in China, as well as implications for other societies experiencing rapid social and family change.

Acknowledgements

We are grateful to the China Center for Economic Research at Beijing University for providing us with the data, and we thank the CHARLS research and field team for collecting the data.

Author contributions

YYH designed the study, wrote the first draft and revised the manuscript; YYY performed the data analysis and revised the manuscript. All authors were fully familiar with the primary data. All authors have read the full manuscript and approved it for submission.

Funding

The Project Supported by National Natural Science Foundation of China No. 72204256. The funding supported data analysis and manuscript preparation.

Data availability

The datasets used and analyzed in this study are available on request from https://charls.pku.edu.cn/en/.

Declarations

Ethical approval and consent to participate

The study was conducted in accordance with the ethical guidelines of the Helsinki Declaration and was approved by the Human Ethics Committee of the School of Public Administration and Policy, Renmin University of China (reference number: EA-NSFC72204256). Written informed consent was obtained from each participant by the CHARLS team.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Clinical trial number
not applicable.

Received: 10 September 2024 / Accepted: 28 April 2025
Published online: 13 May 2025

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