

Title: How Public Pension and Living Area Shape the Effects of Intergenerational Support Patterns on Older Adults' Health Level: Evidence from China

Research background

China's population is ageing at an unprecedented rate, with nearly one-fifth of citizens aged 60 or above. This demographic transformation intensifies pressure on families, health systems, and welfare institutions. In this context, understanding how intergenerational support affects older adults' health—and how these effects are conditioned by institutional and spatial contexts—has become a crucial research agenda. Previous studies demonstrate that financial, emotional, and instrumental support from adult children contribute differently to well-being (Teerawichitchainan, Pothisiri, & Long, 2015; Zhou, Mao, Lee, & Chi, 2017). However, the interplay between such family-based support, public pensions, and the urban–rural divide remains insufficiently explored. This study aims to fill this gap by investigating how public pension status and residential context jointly moderate the relationship between intergenerational support patterns and health outcomes among Chinese older adults.

Theoretical focus

The study integrates insights from the convoy model of social relations (Antonucci, 2001; Antonucci, Ajrouch, & Birditt, 2014) and reciprocity/exchange theory (Molm, 2010). The convoy model posits that individuals traverse later life embedded in dynamic social networks that provide emotional, instrumental, and financial resources. Exchange theory emphasizes bidirectional intergenerational transfers shaped by need and resource complementarity. Together, these perspectives highlight that intergenerational support is multidimensional and context-dependent.

At the same time, China's institutional stratification—particularly the dual urban–rural welfare structure under the hukou system—creates structural conditions that shape how family support translates into health (Jiang et al., 2021; Yang et al., 2023; Zhu & Österle, 2017). Public pension programs, such as the New Rural Pension Scheme, may substitute for or complement family transfers. Thus, the same support pattern can yield distinct health effects depending on whether older adults are covered by pensions and whether they live in urban or rural areas. The study tests three hypotheses:

H1: Intergenerational support patterns are associated with older adults' health.

H2: Public pension status moderates this association.

H3: Urban–rural residence moderates this association.

Data

The analysis draws on four waves (2011, 2013, 2015, and 2018) of the China Health and Retirement Longitudinal Study (CHARLS), a nationally representative panel of Chinese adults aged 45 and above. To ensure comparability and data completeness, respondents aged 50 or older in 2011 with at least one child and grandchild were included, yielding a final analytical sample of 16,813 individuals. The CHARLS data provide detailed information on financial, emotional, and physical intergenerational support, public pension receipt, hukou status, social activities, and multidimensional health indicators.

Methods

The study employed a Gaussian Mixture Model (GMM) to identify latent intergenerational support patterns based on the intensity of financial, emotional, and physical exchanges between older adults and their children. This probabilistic clustering method allows for the detection of unobserved heterogeneity and provides a nuanced typology of family support structures.

Health was operationalized as a latent index derived from self-rated health, memory ability, and cognitive function, extracted via factor analysis.

To assess how support patterns predict subsequent health, lagged regression models were estimated for 2015 and 2018 outcomes, controlling for baseline health, socioeconomic factors, and family characteristics. Interaction terms between support patterns, pension status, and residence were introduced to test moderation effects. Missing data were handled using multiple imputation with MICEForest in Python 3.12.4; all regressions were conducted in Stata 14.0.

Research findings

Five distinct support patterns were identified: financially–physically reliant (6.3%), financially balanced (66%), physically–emotionally reliant (3.5%), emotionally–physically reliant (12%), physically balanced (12%).

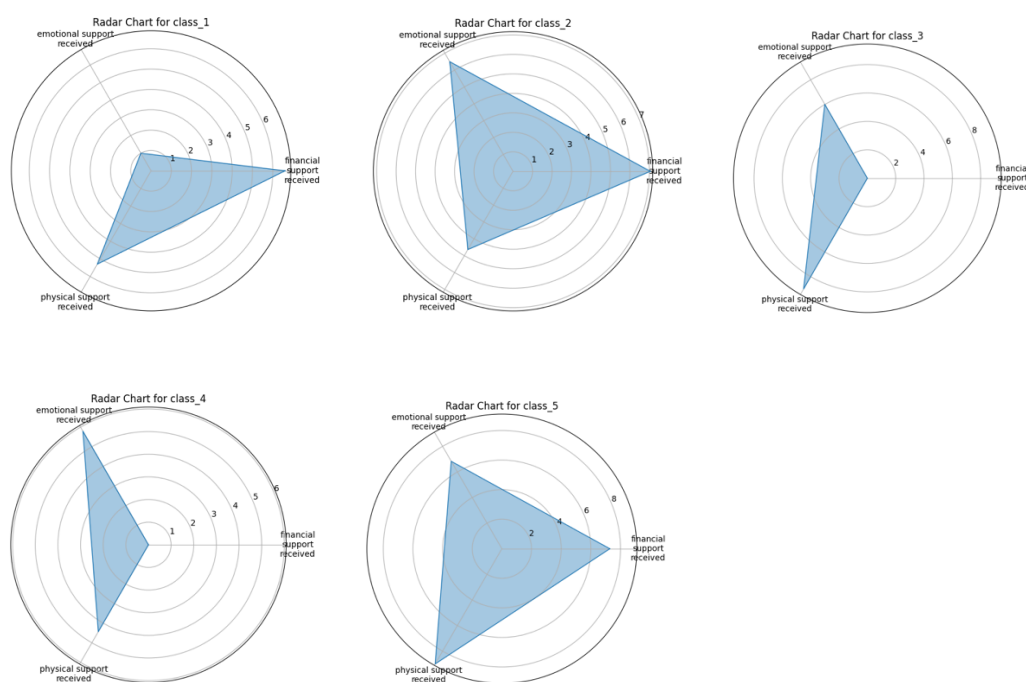


Fig.1 Patterns of Intergenerational Support at the Baseline *Note* The proportions for the latent profiles based on the estimated model and conditional probabilities. Values of financial support (from 0 to 14) are log-transformed. Value of emotional and instrumental support received range from 1 to 9.

Older adults in emotionally or physically oriented patterns (C3, C4) demonstrated significantly higher health levels than those in the financially balanced group (C2), suggesting that emotional

connection and caregiving are more beneficial to health than financial assistance alone. However, the moderating effects of pension and residence revealed striking asymmetries. Urban pensioners—despite their socioeconomic advantages—exhibited poorer health when engaged in emotionally or physically reliant patterns, with health scores 4–5 points lower than rural pensioners in comparable arrangements ($p < 0.05$). Conversely, urban residence itself was a strong positive predictor of health, but rural non-pensioners remained the most vulnerable group. These results confirm that the health benefits of intergenerational support are not universal, but depend systematically on institutional and spatial conditions.

Discussion

This study contributes to the literature by demonstrating that the relationship between intergenerational support and health among older adults is contextually contingent, shaped by both welfare regimes and spatial inequality. The paradoxical finding—that urban pensioners fare worse in emotionally dependent arrangements—highlights the limits of the traditional resource-deficit model, suggesting instead a dual mechanism of resource substitution and contextual stress (Nikolov & Adelman, 2019; Zhang, Wang, & Jiao, 2022). Public pensions may replace the need for certain forms of support, reducing their health utility, or even transforming them into stressors when they conflict with older adults' autonomy and role expectations.

The results have significant policy implications. First, ageing policies should recognize the interactive nature of family and institutional support, ensuring that pension expansion complements rather than undermines informal care networks. Second, interventions should be context-sensitive: strengthening formal welfare for rural non-pensioners, while fostering autonomy and emotional balance among urban pensioners.

In conclusion, the study shows that neither family support nor public pensions alone guarantee healthy ageing. Their interplay—mediated by spatial and institutional inequalities—determines how older adults experience the benefits or burdens of intergenerational ties in a transforming Chinese society.

Table1 Baseline descriptive statistics and bivariate analyses across intergenerational support patterns for baseline variables

Variables	Total sample (N= 16813)	Patterns of Intergenerational Support					χ^2	T test
		C1 (N= 1055)	C2 (N= 11096)	C3 (N= 596)	C4 (N= 2010)	C5 (N= 2056)		
Personal characteristic in 2015								
Male	47.72%	42.84%	48.02%	52.01%	48.51%	46.64%	16.31**	
Age	60.37 (9.60)	65.81 (11.70)	60.65 (9.39)	57.64 (8.69)	58.64 (9.62)	58.55 (8.49)		C2>C3***; C1>C2***; C2>C4***; C2>C5***; C1>C3***; C4>C3*; C5>C3*; C1>C4***; C1>C5***
Years of education	6.02 (3.33)	5.04 (2.96)	5.92 (3.26)	7.03 (3.80)	6.23 (3.43)	6.54 (3.52)		C3>C2***; C2>C1***; C2>C4***; C5>C2***; C3>C1***; C3>C4***; C3>C5**; C4>C1***; C5>C1**
Urban hukou	19.98%	15.17%	15.99%	25.67%	18.96%	22.96%	110***	
Marital status							312.48***	
Married	87.04%	70.71%	87.69%	88.93%	87.76%	89.64%		
Divorced	12.13%	28.91%	11.35%	9.40%	11.29%	9.19%		
Not married	0.83%	0.28%	0.82%	1.51%	0.85%	0.92%		
Working	66.96%	57.54%	67.43%	66.95%	68.91%	67.36%	47.05***	
Health score in 2015	37.86 (17.80)	35.08 (18.00)	37.57 (17.71)	41.09 (17.61)	39.42 (18.27)	39.91 (17.54)		C3>C2***; C2>C1***; C4>C2***; C5>C2***; C3>C1***; C4>C1***; C5>C1***
Health score in 2018	37.46 (16.15)	37.33 (17.19)	37.16 (16.05)	38.29 (15.93)	37.68 (16.37)	38.65 (15.99)		C5>C2***; C5>C1*
Situational characteristics in 2015								

Participate in social activities	54.50%	56.64%	60.57%	56.12%	60.12%	54.50%	15.15**
The number of children	2.03 (2.04)	1.55 (1.71)	1.02 (1.20)	1.31 (1.52)	1.07 (1.29)	2.03 (2.04)	C3>C2***; C1>C2***; C4>C2***; C5>C2***; C1>C3***; C3>C4***; C1>C4***; C5>C1***; C5>C4***
Percentage of children who are financially independent	0.90 (0.23)	0.87 (0.27)	0.80 (0.36)	0.77 (0.35)	0.87 (0.29)	0.90 (0.23)	C2>C3***; C1>C2**; C4>C2***; C1>C3***; C5>C3**; C5>C1**; C5>C4***
Average health level of children	3.74 (0.81)	3.93 (0.82)	4.03 (0.86)	3.94 (0.85)	4.03 (0.85)	3.74 (0.81)	C2>C3*; C2>C1***; C2>C5***; C3>C1***; C4>C1***; C1>C5***; C4>C5**

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table2 Baseline descriptive statistics and bivariate analyses across public pension and living areas for baseline variables

Variables	In receipt of a public pension				χ^2	T test	Living areas		
	Rural pensioners (RN) (N= 2603)	non-Rural pensioners (RP) (N= 10690)	Urban pensioners (UN) (N= 1419)	non-Urban pensioners (UP) (N= 2101)			Rural areas (N= 12046)	Urban areas (N= 4767)	t/χ^2
Personal characteristic in 2015									
Male	43.45%	47.28%	49.54%	54.07%	36.22***		47.73%	47.70%	0
Age	59.43 (9.22)	60.44 (9.57)	58.94 (9.99)	62.04 (9.70)		***	60.51 (9.56)	60.00 (9.70)	-3.06**
Years of education	5.15 (2.76)	5.55 (3.05)	7.32 (3.61)	8.55 (3.73)		***	5.38 (2.92)	7.63 (3.74)	41.40***
Marital status					10.17**				8.81*

Married	86.48%	86.74%	86.61%	86.48%		87.04%	86.60%	
Divorced	11.72%	12.47%	11.84%	11.72%		12.00%	12.38%	
Not married	1.54%	0.78%	0.42%	1.54%		0.95%	0.50%	
Working	70.07%	73.30%	49.40%	42.69%	934.39***	74.53%	47.83%	1099.52***
Health score in					***			
2015	35.29 (17.91)	36.88 (17.79)	42.35 (17.79)	44.72 (15.68)		35.95 (17.64)	43.52 (17.10)	24.51***
Health score in					***			
2018	35.91 (16.27)	36.50 (16.07)	40.42 (16.73)	42.35 (14.81)		36.03 (16.02)	41.12 (15.89)	17.82***
Situational characteristics in 2015								
Participate in					181.41***			
social activities	50.75%	55.24%	63.42%	69.44%		52.94%	67.30%	286.67***
The number of					***			
children	1.43 (1.63)	1.55 (1.72)	1.27 (1.46)	1.31 (1.49)		1.55 (1.71)	1.29 (1.51)	-9.10***
Percentage of					***			
children who are								
financially								
independent	0.85 (0.29)	0.86 (0.28)	0.82 (0.33)	0.87 (0.30)		0.87 (0.27)	0.83 (0.33)	-5.28***
Average health					***			
level of children	3.85 (0.82)	3.91 (0.84)	4.05 (0.83)	4.07 (0.80)		3.88 (0.84)	4.07 (0.81)	9.84***

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table3 Moderated effects of public pension and living areas on intergenerational support patterns and health index (N=8594)

Variables	2015	2015	2015	2018	2018	2018
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	<i>b(SE)</i>	<i>b(SE)</i>	<i>b(SE)</i>	<i>b(SE)</i>	<i>b(SE)</i>	<i>b(SE)</i>
Patterns of support (<i>ref</i> : C2)						
C1	-0.652 (0.714)	-1.384 (0.871)	-0.694 (0.813)	0.659 (0.711)	0.145 (0.873)	0.371 (0.815)
C3	2.258* (0.916)	3.567** (1.254)	2.049+ (1.160)	0.256 (0.870)	0.706 (1.195)	1.356 (1.104)
C4	1.085* (0.547)	1.999** (0.694)	0.954 (0.646)	0.072 (0.531)	-0.276 (0.680)	0.119 (0.631)
C5	0.639	0.865	0.432	0.742	0.512	0.667
Public pension (<i>ref</i> : Rural pensioners)						
Rural non-pensioners		-0.662 (0.597)			0.447 (0.579)	
Urban non-pensioners		2.949*** (0.802)			2.662*** (0.778)	
Urban pensioners		5.222*** (0.684)			2.566*** (0.659)	
Patterns of support × public pension (<i>ref</i> : C2 × Rural pensioners)						
C1×Rural non-pensioners		2.191 (1.941)			0.356 (1.922)	
C1×Urban non-pensioners		4.633+ (2.785)			0.315 (2.930)	
C1×Urban pensioners		0.935 (2.303)			3.874+ (2.282)	
C3×Rural non-pensioners		-3.317 (2.623)			-1.110 (2.493)	

C3×Urban non-pensioners	0.731 (3.051)		0.444 (2.934)	
C3×Urban pensioners	-5.338* (2.307)		-2.054 (2.193)	
C4×Rural non-pensioners	-3.216* (1.533)		0.476 (1.498)	
C4×Urban non-pensioners	0.670 (1.884)		0.036 (1.796)	
C4×Urban pensioners	-4.414** (1.603)		1.059 (1.555)	
C5×Rural non-pensioners	-1.144 (1.544)		-0.261 (1.489)	
C5×Urban non-pensioners	-1.745 (1.841)		0.663 (1.762)	
C5×Urban pensioners	-0.605 (1.429)		0.521 (1.367)	
Urban areas		5.105*** (0.498)		3.891*** (0.480)
C1×Urban areas		0.272 (1.637)		1.109 (1.629)
C3×Urban areas		-0.172 (1.846)		-3.307+ (1.758)
C4×Urban areas		-0.035 (1.175)		-0.540 (1.139)
C5×Urban areas		-0.363 (1.094)		-0.546 (1.046)

_cons	3.518 ⁺	4.487 [*]	2.843	-0.980	-0.898	-1.546
	(1.835)	(1.846)	(1.822)	(1.772)	(1.791)	(1.765)
ll	-37321.061	-37265.005	-37246.106	-35472.532	-35449.843	-35427.982
rho						
N	8914	8914	8914	8588	8588	8588

⁺ $p < 0.10$, ^{*} $p < 0.05$, ^{**} $p < 0.01$, ^{***} $p < 0.001$