

The Impact of Childbearing Behavior on the Quality of Life among Middle-aged and Older Adults

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Abstract: Against the dual backdrop of population aging and adjustments in fertility policies, the impact of children's reproductive behaviors on the quality of life of middle-aged and elderly individuals has increasingly become a focal point of social concern. Based on data from the 2022 China Family Panel Survey (CFPS), this study systematically examines the effects of children's reproductive behaviors on the quality of life of middle-aged and elderly individuals and their underlying mechanisms, focusing on the perspectives of grandchild quantity and gender structure. The study reveals four key findings: First, childbearing behaviors significantly reduce quality of life among middle-aged and elderly individuals. Second, both increased numbers of grandchildren negatively impact their quality of life, though gender differences remain relatively minor as traditional patriarchal values have diminished in modern society. Third, childbearing behaviors exacerbate quality of life through heightened intergenerational caregiving burdens, while financial support from children effectively mitigates this adverse effect. Fourth, heterogeneous analysis indicates that the 45-59 age group often referred to as the "sandwich generation" and grandparents in single-child families experience more pronounced negative impacts. To address these challenges, it is imperative to establish a multi-tiered intergenerational care support system, refine intergenerational economic assistance policies, and implement differentiated family support strategies. This approach will facilitate coordinated development between fertility incentives and elderly welfare protection, thereby preventing families from being caught in the dual pressures of childbearing and elderly care.

Keywords: Reproductive Behavior; Middle-aged and Elderly Individuals; Quality of Life; Grandchild Structure.

1. Introduction

According to the results of the Seventh National Population Census, the number of elderly people aged 60 and above in China has reached nearly 300 million, accounting for 18.70% of the total population – an increase of 5.44 percentage points compared to 2010. By the end of 2024, the proportion of the population aged 60 and above had reached 22%, while the proportion of those aged 65 and above stood at 15.6%; thus, Chinese society has officially entered the stage of moderate aging[1]. Against this backdrop of population aging[2], the reversal of demographic structure not only signifies a rapid escalation of fiscal pressures on elderly care, healthcare, and social security systems but also indicates profound transformations in intergenerational support, lifestyles, and the living conditions of elderly households. The dramatic growth in the elderly population has made elderly care issues increasingly prominent: constrained by traditional impression, economic conditions, healthcare resources, and social support, the quality of life among the elderly is declining, and many of their needs remain unmet. Meanwhile, fertility policies have been continuously adjusted and optimized – from the one-child policy to the universal two-child policy, and now to the current universal three-child policy – all of which have profoundly influenced family fertility decisions and demographic structures. In this context, the relationship between children's fertility behaviors and the quality of life of the elderly has gradually become a focal point of societal concern.

In China, the well-being of elderly individuals has always been deeply embedded within family networks[3]. The "feedback model" inherent in Chinese Confucian thought imposes a duty of support on children[4]; thus, Chinese families operate under a "raising-supporting" model—where

young adults raise their own children, who in turn support their elderly parents. However, the role of the family in providing elderly care is gradually diminishing. Firstly, this is due to increased social mobility and societal transformation, as many young and middle-aged adults leave their hometowns to seek livelihoods; this phenomenon reduces the opportunities for intergenerational support—such as financial assistance, daily care, and emotional comfort—between elderly parents and their children. Over time, this has led to a deepening generational rift between parents and children, challenging traditional notions of filial piety and elderly care. Secondly, alongside changes in contemporary family structures and fertility patterns, family sizes have become smaller, birth rates have declined, and "empty-nest" families have become more prevalent. Data from the Seventh National Population Census show that the average household size in China decreased from 3.10 people in 2010 to 2.62 people in 2020; as the number of family members continues to shrink, the family-based elderly care system faces a widespread supply shortage, making it difficult to ensure the quality of life for the elderly.

Against the backdrop of declining numbers of children and increasing geographic dispersion among families, grandchildren—as new nodes in the intergenerational family chain—are gradually influencing the quality of life of older adults. The structure of grandchildren encompasses factors such as the number of grandchildren and their gender. Different grandchildren structures imply that older adults will assume distinct roles and responsibilities within the family, which in turn can bring about varied emotional experiences and life-related pressures. For example, a larger number of grandchildren may increase the burden of caregiving and education for older adults, but it can also bring them greater joy and emotional fulfillment; gender differences among

grandchildren may affect the status and expectations older adults hold within the family. Under the new demographic policy environment—characterized by the successive implementation of China's two-child and three-child birth policies—there may emerge new divergences in the number and timing of childbearing; as a result, different families will exhibit distinct grandchild structures, giving rise to heterogeneous care needs and emotional impacts on older adults, thereby affecting their quality of life. To simultaneously encourage childbirth and safeguard the well-being of older adults, it is essential to clarify the direction and mechanisms of the spillover effects of childbearing behavior; otherwise, families may easily find themselves trapped in a dilemma where both childbirth and elderly care are simultaneously demanding.

Building upon the aforementioned research context, this paper utilizes data from the 2022 China Family Panel Survey (CFPS) to explore the impact of children's fertility behavior on the quality of life among older adults, and offers relevant recommendations based on the findings.

2. Theoretical Analysis and Literature Review

2.1. Factors Influencing the Quality of Life in Older Adults

Quality of life is a complex and multidimensional concept; it refers to the elderly's comprehensive assessment of their living conditions[5], encompassing multiple dimensions—including physiological, psychological, social, and environmental aspects—as well as an individual's positive state of being in their real-life experiences. Based on existing research, scholars have predominantly measured quality of life from three perspectives: subjective, objective, or a combination of both. However, many scholars define quality of life solely in terms of life satisfaction—a approach that may be overly narrow and fail to provide a comprehensive or in-depth understanding of the elderly's quality of life[6][7]. Some researchers measure the quality of life among the elderly across four dimensions: health status, economic situation, social network, and psychological characteristics[8]; other scholars categorize the elderly's quality of life into five dimensions—sleep disorders, depression, anxiety, stress, and cognitive ability—for analysis[9]. Additionally, some studies combine subjective and objective indicators by aggregating life satisfaction scores with nine social participation indicators to comprehensively assess the elderly's quality of life[10]; others employ the concept of "healthy aging = intrinsic capacity + environmental support" to divide the elderly's quality of life into two dimensions—intrinsic and extrinsic—and use the entropy weight method to validate the relevant indicators[11].

The quality of life among older adults serves as a comprehensive indicator for measuring their well-being and is influenced by multiple factors at various levels—individual, familial, societal, and policy-related. At the individual level, research has shown that older adults living with their children generally experience a higher quality of life[12]; likewise, those with better financial circumstances or higher housing satisfaction also report a higher quality of life[13]. One study conducted among elderly residents in nursing homes in Hebei Province found that older adults who engaged in regular physical exercise had a higher quality of life than those who did not[14]. The study further categorized older adults'

physical activity into three groups—aerobic exercise group, traditional physical exercises group, and resistance training group—and found that all three types of physical activity exerted a significant positive influence on the quality of life among older adults[15]. At the societal level, the neighborhood environment affects the health and social relationships of older adults through both the built environment and the broader social context, thereby influencing their quality of life[16]. Additionally, different types of community-based elderly care services also have a significant positive impact on the quality of life among older adults; social adaptation plays a mediating role between these care service types and the quality of life[17]. Through qualitative research methods, it was further discovered that esports—a novel form of gaming—can reduce the sense of social isolation among older adults, expand their social networks, and have a positive impact on their quality of life[18]. At the policy level, the New Rural Pension Insurance Scheme can significantly increase the utilization rate of medical services among older adults, improve the lifestyle of insured seniors, and raise the likelihood of their participation in social activities and physical exercise, thereby enhancing their overall quality of life[19].

2.2. The Impact of Childbearing Behavior on The Quality of Life Among Older Adults

Children's childbearing behavior encompasses factors such as the timing of childbirth and their own willingness to have children; consequently, the impact of different childbearing behaviors on older adults varies. To clarify how children's childbearing behavior affects the quality of life among older adults, this paper shifts its focus to the outcomes of children's childbearing—namely, the number and composition of grandchildren—rather than merely examining children's willingness to have children or whether they actually do so.

The Intergenerational Support Theory is a set of propositions jointly developed over the past four decades by economists, sociologists, demographers, and family researchers to explain why and how household resources flow between generations. This theory proposes a motivational hypothesis regarding intergenerational support and describes patterns of intergenerational interaction. The Intergenerational Support Theory posits that family intergenerational relationships constitute a dynamic system sustained by the flow of resources. Within the Chinese feedback-mode family intergenerational relationships, children's reproductive behavior reconfigures the direction of intergenerational support flow; the emergence of grandchildren transforms middle-aged and elderly individuals from recipients into caregivers, giving rise to a reverse support pattern of intergenerational care. This role reversal may disrupt the original equilibrium of intergenerational support and, consequently, affect individuals' quality of life.

The Role Stress Theory posits that when individuals assume multiple social roles, these roles entail a range of burdens and obligations. The excessive burden of these responsibilities can lead individuals to neglect their own health care and maintenance[20]; moreover, family conflicts arising from role-related demands can generate chronic stress, thereby adversely affecting both their physical and mental well-being[21]. The emergence of childbearing among grandparents triggers shifts in family roles, compelling them to lower their standard of living in order to meet the consumption needs of their grandchildren; in some cases, they

may even sacrifice their own family and social lives[22].

The Resource Dilution Theory posits that a family's resources are finite; as the number of family members increases, the resources allocated to the other members are diluted—these resources include economic assets, time spent together, and other forms of support[23]. Since a family's total resources are limited, when the number of children rises, the share of resources allocated to each child decreases accordingly[24]. However, this resource dilution is less pronounced when the family is financially well-off; in contrast, within a family structure comprising an elderly parent and several young children, there are rigid constraints on the allocation of resources to the elderly—yet the level of support provided to them is relatively low; there are also soft constraints on providing support to the younger generations, and the level of support offered to adult children is not particularly significant[25].

Social Exchange Theory posits that reciprocity and equilibrium are the core elements that underlie the sustained stability of social exchange relationships between individuals. Reciprocity refers to the situation in which both parties derive benefit from an exchange relationship, regardless of the duration or magnitude of that benefit. Equilibrium denotes the return that both parties recognize and accept after engaging in an exchange following mutual contribution through interpersonal interaction[26]. Childbearing behavior affects the quality of life of middle-aged and older adults in terms of economic, physical/mental, and time-related dimensions. According to Social Exchange Theory, children are more likely to compensate for the negative impacts of childbearing on the lives of middle-aged and older adults by providing intergenerational economic, emotional, and care support, thereby mitigating these adverse effects.

Existing research on the fertility behaviors of children and their impact on the quality of life among older adults is limited; however, some studies have found that the subjective well-being of older adults increases as the number of grandchildren living with them rises. A subsequent questionnaire survey conducted among older adults in rural areas of Hubei and Shaanxi provinces revealed that rural older adults with grandchildren reported higher levels of well-being than those without grandchildren; nonetheless, no significant difference in subjective well-being was observed among rural older adults who had only grandsons, only granddaughters, or both grandsons and granddaughters. An increase in the number of younger grandchildren can elevate the depression levels of grandparents by diluting or competing with the emotional support they receive from their children, as well as by increasing the time grandparents devote to caring for their grandchildren; conversely, it can also enhance the life satisfaction of grandparents by increasing the financial support they receive from their children.

An examination of existing domestic and international literature reveals that there is relatively limited research on the impact of children's fertility behavior on the quality of life of older adults; furthermore, the existing literature lacks a unified indicator for defining the variable "quality of life among older adults," and different definitional approaches yield divergent results. Building upon previous research, this study re-examines the two core variables—children's fertility behavior and the quality of life of older adults—and investigates their comprehensive impact on the quality of life across four dimensions—living environment, physical health, mental health, and economic well-being—by considering the

structure of grandchildren. Using data from the 2022 China Family Panel Survey (CFPS), this study explores how children's fertility behavior affects the quality of life of middle-aged and older adults through the lens of the grandchildren's structural composition. After addressing endogeneity issues using the instrumental variable method, the study further examines the underlying mechanisms through which children's fertility behavior influences the quality of life of middle-aged and older adults. This approach aims to clarify the potential tension between encouraging childbirth and safeguarding the well-being of older adults, while providing micro-level evidence to inform the refinement of fertility support and family care policies.

3. Data and Methods

3.1. Sources of Data

The data for this study are drawn from the 2022 China Family Panel Studies (CFPS) database, which is a nationwide, comprehensive social tracking survey project organized and implemented by the Institute of Social Science Survey (ISSS) at Peking University. The project aims to collect dynamic data on Chinese households and society through regular follow-up surveys, thereby reflecting the evolving trends in China's social, economic, demographic, educational, and health landscapes, and providing data support for academic research and social policy formulation. The sample design is nationally representative and captures the circumstances of households and individuals across different regions and socioeconomic backgrounds in China. Since this study examines the impact of children's fertility outcomes on the quality of life among middle-aged and elderly individuals from the perspective of generational structure—specifically, the relationship between grandparents and their grandchildren—it excludes middle-aged and elderly individuals without children. The study matches these middle-aged and elderly individuals with their children using the Family Relationship Database, and then matches these children with their grandchildren to obtain characteristics such as the number and gender of the grandchildren among the middle-aged and elderly cohort. After retaining the relevant variables, the final research sample consists of 8,592 individuals.

3.2. Model Specification

3.2.1. Ordinary Least Squares Regression Model

Since this study examines the impact of the internet on the quality of life among older adults—where the quality of life is measured across multiple dimensions—and building upon existing research, this paper employs an OLS model:

$$\text{Quality}_i = \alpha_0 + \alpha_1 \text{Decision}_i + \alpha_2 \text{Control}_i + \varepsilon_i \quad (1)$$

In the above formula, Quality_i is the dependent variable representing the quality of life among older adults, calculated using the entropy value method; Decision_i is the explanatory variable representing the fertility behavior of children of middle-aged and elderly parents; in this study, this behavior is measured using the number of grandchildren and their gender composition. Control_i denotes the set of control variables, encompassing individual-level, household-level, and regional-level characteristics among middle-aged and elderly individuals. α_0 , α_1 and α_2 are the parameters to be estimated; ε_i is the random perturbation term.

3.2.2. Mediation Model

In addition to examining how children's reproductive

behavior affects the quality of life among middle-aged and older adults, this study, drawing upon existing literature and relevant research, identifies a relevant mediating effect in the pathway through which children's reproductive behavior influences the quality of life among older adults. This paper selects intergenerational caregiving and the digital divide as mediating variables in the relationship between children's reproductive behavior and the quality of life among older adults, aiming to investigate whether intergenerational caregiving and the digital divide serve as mediating factors in this influence pathway. A mediating effect is a statistical method used to identify an underlying mechanism operating between the independent variable and the dependent variable; the corresponding model is presented below.

$$\text{Care}_i = \alpha_0 + \alpha_1 \text{Decision}_i + \alpha_2 \text{Control}_i + \varepsilon_i \quad (2)$$

3.2.3. Regulatory Effect Model

In Chinese family studies, children's financial support

$$\text{Quality}_i = \alpha_0 + \alpha_1 \text{Decision}_i + \alpha_2 \text{Support}_i * \text{Decision}_i + \alpha_3 \text{Support}_i + \alpha_4 \text{Control}_i + \varepsilon_i \quad (3)$$

Inside, Support_i denotes financial support for children, $\text{Support}_i * \text{Decision}_i$ is an interaction term used to test the moderating role of parental economic support in the relationship between children's fertility behavior and the quality of life among middle-aged and older adults. If α_2 is significantly positive, it indicates that economic support for children can effectively mitigate the negative impacts of childbearing; If α_2 is not statistically significant, it indicates that the moderating effect of economic support is limited.

3.3. Variable Selection

3.3.1. Explanatory Variable

The core explanatory variable is children's fertility behavior. This study measures the fertility behavior of middle-aged and elderly parents using their children's fertility outcomes; these outcomes represent the characteristics of their grandchildren, specifically the number of grandchildren and their gender, with the number of grandsons and the number of granddaughters serving as indicators of the gender composition of the grandchildren.

3.3.2. Explained Variable

The dependent variable is the quality of life among middle-aged and elderly individuals. Since the quality of life among the elderly is a comprehensive concept, this study, building upon existing research, measures this quality of life across two dimensions: environmental support and intrinsic capacity. Environmental support is further broken down into two components: the living environment and economic status. The living environment is assessed based on two questions: whether the living space includes a toilet and whether the elderly individual or their family members hold full ownership of the residence; economic status is assessed based on two questions: the elderly individual's income situation and whether they are covered by social insurance.

Internal well-being is divided into physical health and mental health. Physical health is assessed using self-rated health, self-care ability, and the presence of chronic diseases; self-rated health is measured via the questionnaire item "How would you rate your own health status?" – with scores ranging from 1 to 5, where a higher score indicates poorer health. Self-care ability is measured using the Self-Care Ability Scale

serves as a crucial bond for maintaining intergenerational reciprocal equilibrium. According to social exchange theory, the sustained stability of intergenerational relationships depends on mutual reciprocity and equilibrium between the parties—when children's childbearing behavior has a negative impact on their parents' quality of life, children tend to compensate for this through financial support to preserve the harmony of intergenerational relationships. In real-life contexts, children's financial support is not only an embodiment of the filial piety culture but also an important resource for middle-aged and elderly individuals to cope with medical expenses, enhance their purchasing power, alleviate caregiving pressures, and improve their quality of life. Therefore, this paper introduces children's financial support as a moderating variable to examine whether it can mitigate the negative impact of children's childbearing behavior on the quality of life among middle-aged and elderly individuals.

from the CFPS questionnaire, which comprises seven indicators measuring an individual's capacity for independent living: "Independent outdoor activities," "Independent eating," "Independent kitchen activities," "Independent use of public transportation," "Independent shopping," "Independent cleaning and hygiene," and "Independent laundry"; scores range from 0 to 7, with higher scores indicating poorer self-care ability. The presence of chronic diseases is assessed by asking whether the individual has any chronic diseases within the past six months. Mental health is categorized into depressive status and life satisfaction. Depressive status is measured using a Depression Level Scale (consisting of six negative statements and two positive statements); for the six negative statements, values are assigned using a Likert scale: 0 = almost never, 1 = sometimes, 2 = often, 3 = most of the time; for the two positive statements, reverse-coded values are used and then summed. Higher scores indicate greater depression and poorer mental health status. Life satisfaction is measured by the questionnaire item "How satisfied are you with your life?" – with scores ranging from 1 to 5, where higher scores indicate greater satisfaction. The definitions and scoring methods for quality of life indicators among middle-aged and older adults are presented in Table 1.

3.3.3. Control Variable

Taking into account additional factors that influence the quality of life among middle-aged and elderly individuals, this study draws upon existing literature and, from the perspectives of the individual, family, and regional levels, selects the following control variables: gender, age, household registration status, marital status, number of children, education level, region, and retirement status. Specifically: individuals aged 60 or older are coded as 1; those aged 45–59 are coded as 0; males are coded as 1; females are coded as 0; urban household registration status is coded as 1; rural household registration status is coded as 0; marital status is coded as 1 for married individuals and 0 for unmarried, divorced, or widowed individuals, as determined by the questionnaire questions; for education level, individuals who are illiterate or semi-illiterate or have never attended school are recoded as "illiterate" (coded as 1);

Table 1. Definition and weighting of Quality of Life Indicators for Middle-Aged and Older Adults

Dimension	Primary Indicator	Secondary Indicator	Indicator Description and Definition	evaluation
Environmental Support	living condition	Indoor toilet	Is there an indoor toilet	No indoor toilet: 0; Indoor toilet available: 1
		Is it owner-occupied housing	Whether the elderly person or their family members hold full ownership of the dwelling.	No housing ownership: 0; Housing ownership: 1
	Economic level	Income status	Individual income situation	Personal income situation
		social security	Does one have social insurance	No social insurance: 0; Has social insurance: 1
Internal capability	in good condition	Self-assessment of health	Current health status	The higher the score (1–5), the less healthy it is.
		self-care ability	Self-Care Ability Scale Score	The higher the self-care ability, the poorer the outcome.
		Chronic illness	Does the patient have a chronic disease	No chronic disease: 0; Presence of chronic disease: 1
	mental health	Depressive state	Depressive Symptom Scale score	A score of 0–24 indicates higher levels of depression.
		Life satisfaction	Current life satisfaction	The higher, the greater the satisfaction.

those with primary school education are coded as 2; those with junior high school education are coded as 3; all other options are recoded as "high school or above" (coded as 4); individuals residing in eastern China are coded as 1; those residing in central China are coded as 2; and those residing in western China are coded as 3; individuals who are retired are coded as 1; those who are not retired are coded as 0; and the number of children refers to the number of living children among middle-aged and elderly individuals.

3.3.4. Metavariable

Based on existing literature and relevant issues in the CFPS survey, intergenerational caregiving was selected as a mediating variable. This variable was measured using the questionnaire question "Over the past 6 months, have you helped your children with household chores or looked after their children?"; a response of "Yes" was assigned a value of 1, while a response of "No" was assigned a value of 0.

3.3.5. Regulated Variable

This study uses children's financial support as a moderating variable; this variable is measured based on the questionnaire question "Over the past 6 months, have your children provided you with financial assistance?" – a "Yes" response is assigned a value of 1, while a "No" response is assigned a value of 0.

4. Finding

4.1. Descriptive Statistics

Table 2 presents the descriptive statistics for the entire sample as well as for the separate male and female subsamples. The results indicate that the quality of life among middle-aged and elderly individuals is at a moderate level; on average, each middle-aged or elderly person has one grandchild (61.5% of whom are grandsons) and 1–2 living children. Regarding the individual-level control variables, 51.3% of the respondents in the sample are individuals aged 60 or older, indicating a relatively even age distribution across the sample. The proportion of middle-aged and elderly

individuals with rural household registration is significantly higher than that of those with urban household registration; furthermore, the majority of these individuals are married, and the vast majority have not yet retired. Across the entire sample, 39.6% of the middle-aged and elderly respondents reside in the eastern region, 32% in the central region, and 28.4% in the western region, reflecting a relatively even regional distribution. More than half of the middle-aged and elderly respondents (55.1%) have only an elementary school education, whereas those with a junior high school education or above account for only 19.2% of the sample. When the entire sample is divided into separate male and female subsamples, it is observed that there are also differences in the variables across genders. Men report a higher quality of life than women, and they also have a higher level of education; specifically, 83.5% of men have an education level of elementary school or above, compared to just 64.8% among women.

4.2. Benchmark Regression

To investigate the impact of children's fertility behavior on the quality of life among middle-aged and elderly individuals, this study examines fertility in two dimensions: the number of children and the gender composition of the children. The number of children is measured by the total number of grandchildren, while the gender composition is distinguished by the number of grandsons and granddaughters. These three variables are incorporated into a regression equation for empirical analysis; the results are presented in Table 3.

As shown in Model 1, an increase in the number of grandchildren is associated with a decline in the quality of life among middle-aged and elderly individuals at the 1% significance level: for every additional child, the quality of life decreases by 0.009 units. This may be because an increase in the number of grandchildren implies that middle-aged and elderly individuals may bear greater economic support responsibilities—such as purchasing food, clothing, or toys for their grandchildren, or even covering their educational

expenses. Such responsibilities directly reduce the elderly individuals' disposable economic resources;

Table 2. Descriptive Statistics

Variable	Full sample(N=8592)		Male sample(N=4342)		Female sample(N=4250)	
	Mean Percentage	Standard Deviation	Mean Percentage	Standard Deviation	Mean Percentage	Standard Deviation
Explained Variable						
Quality of life	0.308	0.140	0.329	0.146	0.287	0.131
Explaining Variable						
Number of grandchildren	1.166	1.372	1.131	1.352	1.202	1.391
Number of troops	0.615	0.854	0.600	0.848	0.632	0.859
Controlled Variable						
Agespecific	0.513	0.703	0.535	0.714	0.491	0.692
Registered permanent residence	0.283	0.451	0.28	0.450	0.284	0.451
Marriage	0.902	0.297	0.927	0.260	0.877	0.328
Retirement Status	0.262	0.440	0.237	0.426	0.288	0.453
Quantity of children	1.601	0.760	1.608	0.756	1.595	0.764
Endemic distribution						
East	0.396	0.489	0.392	0.488	0.400	0.490
Central Section	0.320	0.467	0.315	0.465	0.326	0.469
West	0.284	0.451	0.293	0.455	0.274	0.446
Educational attainment						
Illiteracy	0.257	0.437	0.164	0.371	0.352	0.478
Primary school	0.551	0.497	0.606	0.489	0.494	0.500
Junior high school or above	0.192	0.394	0.229	0.420	0.154	0.362

thereby limiting their ability to allocate funds to improving their living conditions, healthcare, leisure activities, and other areas, which ultimately leads to a decline in their quality of life; moreover, this negative impact outweighs the psychological comfort that having more grandchildren can provide. According to the Resource Dilution Theory, an increase in the number of grandchildren further dilutes the household resources available to middle-aged and elderly individuals, reducing their external resources and adversely affecting their quality of life. Based on Model 2 and Model 3, it can be concluded that the number of sons and the number of granddaughters also significantly influence the quality of life among older adults; however, the differential negative impact of gender on the quality of life among middle-aged and older adults is relatively small. Model 2 reveals that having a son as a child reduces the quality of life among middle-aged and older adults by 0.01 units at the 1% significance level—that is, for every additional grandson, the quality of life decreases by 0.01 units; Model 3 shows that having a girl as a child also reduces the quality of life among middle-aged and older adults at the same 1% significance level—namely, for every additional granddaughter, the quality of life decreases by 0.011 units. In terms of gender, it is found that the gender of the child does not exert a substantially different impact on the quality of life among

middle-aged and older adults. This finding suggests that, within modern family structures, the economic investment, time commitment, and emotional toll associated with raising a boy or a girl tend to be similarly burdensome for the elderly. Combining the results from the three models, it can be concluded that childbearing behavior significantly reduces the quality of life among middle-aged and older adults, although the gender-specific effects are relatively small.

The analysis of control variables reveals that middle-aged and elderly men generally enjoy a higher quality of life than women; this may be due to the fact that women are more likely to bear the burden of caregiving for their grandchildren. Among different age groups, elderly individuals aged 60 or older report a lower quality of life compared to those aged 45–59; this could be attributed to the decline in physical functioning associated with aging, which makes it more challenging to maintain a high quality of life. Furthermore, middle-aged and elderly individuals with higher levels of education tend to have a better quality of life than those with lower educational attainment; this may be because more educated older adults are more likely to optimize their health-related behaviors, thereby enhancing their overall quality of life. Middle-aged and elderly individuals in eastern China generally experience a better quality of life than those in central and western China; this disparity is likely due to the

more robust economic and healthcare infrastructure in the eastern region, which helps ensure a higher standard of living

for this demographic.

Table 3. The impact of childbearing behavior on the quality of life among middle-aged and older adults

Variable Name	Model1		Model2		Model3	
	Regression Coefficient	Standard Error	Regression Coefficient	Standard Error	Regression Coefficient	Standard Error
Number of grandchildren	-0.009***	0.001				
Number of troops			-0.010***	0.002		
Number of granddaughters					-0.011***	0.002
Control Variable						
Gender (Female)	0.038***	0.003	0.038***	0.003	0.038***	0.003
Age group (45-59years)	-0.064***	0.002	-0.067***	0.002	-0.067***	0.002
Rural household registration	0.041***	0.003	0.042***	0.003	0.042***	0.003
Marriage (Single/Divorced/Orphaned)	-0.009**	0.003	-0.010**	0.005	-0.009**	0.005
Retirement status (Not yet retired)	-0.065***	0.004	-0.065***	0.004	-0.065***	0.004
Number of offspring	-0.002	0.002	-0.004**	0.002	-0.005**	0.002
Regional distribution(Eastern region)						
Central Section	-0.012***	0.003	-0.013***	0.003	-0.012***	0.003
West	-0.015***	0.003	-0.016***	0.003	-0.015***	0.003
Educational attainment (illiteracy)						
Primary School	0.010***	0.003	0.011***	0.003	0.011***	0.003
Junior high school or above	0.023***	0.005	0.025***	0.005	0.024***	0.005
Constant Term	0.348***	0.006	0.348***	0.006	0.348***	0.006
N	8592		8592		8592	
R ²	0.268		0.265		0.266	

Note: ***express p<0.001, **express p<0.01, *express p<0.1; the same below

Table 4. Further Analysis of Children's Reproductive Behavior Refinement

Variable Name	Quality of life	
	Regression Coefficient	Standard Error
One son and one daughter	-0.025***	0.004
Zeroer – a daughter	-0.026***	0.005
Two or more children	-0.034***	0.006
Only two or more women	-0.038***	0.006
Has both a son and a daughter	-0.033***	0.004
Controlled Variable	YES	
Constant Term	0.358***	0.007
N	8592	
R ²	0.271	

A further breakdown of childbearing structures is presented in Table 4. According to Table 4, within a family, regardless

of whether the child born is a boy or a girl, the negative impact of having one child on the quality of life of elderly individuals

is smaller than the negative impact of having two or more children on the quality of life of elderly individuals. This finding aligns with the earlier conclusion and is consistent with the Resource Dilution Theory. However, in families with more than one child, families with two or more daughters experience a greater negative impact on the quality of life of elderly individuals compared to families with other childbearing structures. This may be because, in families with at least one daughter, parents may pursue additional children in the hope of achieving a "good" family outcome; when such efforts fail, this can cause psychological distress among middle-aged and elderly individuals. Additionally, the high cost associated with raising two or more children places significant pressure on these individuals. In families where the elderly have grandchildren, the negative impact on their quality of life is the smallest among all family structures; this suggests that gender balance can bring certain psychological benefits to middle-aged and elderly individuals. For families with only one child, the regression model reveals that whether the child is a boy or a girl does not significantly affect the quality of life of the elderly, nor does having a sole grandson or granddaughter make a significant difference; this indicates that gender preferences have diminished within single-child families.

4.3. Endophytism

The relationship between children's fertility behavior and the quality of life among middle-aged and elderly individuals may involve an endogeneity issue stemming from reverse causality; if the quality of life among middle-aged and elderly members of a household is poor, their children may reduce their own fertility intentions and fertility behaviors in order to

alleviate the family burden; conversely, middle-aged and elderly individuals with a higher quality of life are more likely to support their children's fertility decisions. Existing literature indicates that, within a given population, an individual's behavior is influenced by the behavior of other individuals in that population; furthermore, the economic level, fertility policies, and infrastructure across different regions tend to be relatively similar. Therefore, this study uses the average number of grandchildren, sons-in-law, and daughters-in-law among other households in the same region as instrumental variables for children's fertility behavior to address the endogeneity issue. The average number of grandchildren, sons-in-law, and daughters-in-law among other households in the same region shows no correlation with the quality of life among middle-aged and elderly individuals, thereby satisfying the exogeneity requirement and meeting the instrumental variable condition.

Table 5 presents the test results for weak instrumental variable assumptions: the first-stage F-statistics for the number of grandchildren, the number of grandsons, and the number of granddaughters are 87.88, 59.41, and 304.41, respectively—all exceeding 10, thereby rejecting the weak instrumental variable assumption; the KP rk LM statistics are 76.04, 49.04, and 148.85, respectively, which reject the null hypothesis of insufficient instrumental variable identification. Based on this table, it can be concluded that after addressing the endogeneity issue, children's fertility behavior—both in terms of the number of children and the gender composition—still exhibits a significantly negative effect on the quality of life among middle-aged and elderly individuals, consistent with the results from the baseline regression.

Table 5. Endogeneity Test

Variable Name	IV-first stage	Quality of life	IV-first stage	Quality of life	IV-first stage	Quality of life
iv_child_other	0.304*** (0.032)					
Number of grandchildren		-0.029*** (0.009)				
iv_sons_other			0.299*** (0.039)			
Number of troops				-0.053*** (0.017)		
iv_daus_other					0.578*** (0.033)	
Number of granddaughters						-0.046*** (0.008)
Controlled variable	Yes	Yes	Yes	Yes	Yes	Yes
Constant term	-0.063 (0.066)	0.348*** (0.006)	-0.024 (0.043)	0.349*** (0.007)	-0.236*** (0.047)	0.347*** (0.008)
Phase I F-value	87.88		59.41		304.41	
KP rk LM	76.04***		49.04***		148.85***	
N	8450	8450	8450	8450	8450	8450

4.4. Robustness Test

To ensure the robustness of the baseline regression analysis, this study conducts robustness checks across the following four dimensions: (1) Altering the measurement method for the

dependent variable—life quality among middle-aged and elderly individuals. The entropy weight method used in the baseline regression is replaced with the equal-weighting method; the weight assigned to each dimension is set to be equal and incorporated into the regression model for

robustness testing. (2) Modifying the independent variable sample. Families with three or more children account for only 13.36% of the total sample; moreover, such families may be influenced by various factors—such as family economic status—on the outcomes. Therefore, families with three or more children are excluded from the analysis, and the remaining families are used for robustness testing. (3) Replacing the independent variables. The number of grandchildren is replaced by the presence or absence of grandchildren: a value of 1 is assigned to families with grandchildren, and a value of 0 is assigned to those without; the number of grandsons is replaced by the presence or absence of grandsons: a value of 1 is assigned to families with grandsons, and a value of 0 is assigned to those without; the same procedure is applied to the number of granddaughters. (4) Controlling for the age of grandchildren. Given that

grandchildren, upon reaching adulthood, may engage in reciprocal care behaviors toward middle-aged and elderly individuals, thereby influencing their quality of life, this study restricts the age of grandchildren to those under 18 years old when conducting the robustness checks.

The regression results presented in Table 6 indicate that the number of grandchildren (whether sons or daughters) still significantly diminishes the quality of life among middle-aged and elderly individuals. Therefore, both variations in the number of children and differences in gender composition exert a significant negative impact on the quality of life among middle-aged and elderly individuals; this finding is consistent with the results from the baseline regression analysis, demonstrating the robustness of the regression findings.

Table 6. Robustness Test 1

Variable Name	(1)Change the dependent variable measurement method			(2)Change the independent variable sample		
Number of grandchildren	-0.006*** (0.001)			-0.017*** (0.002)		
Number of troops		-0.005*** (0.002)			-0.015*** (0.002)	
Number of granddaughters			-0.009*** (0.002)			-0.014*** (0.003)
Controlled variable	Yes	Yes	Yes	Yes	Yes	Yes
Constant term	0.554*** (0.008)	0.554*** (0.007)	0.554*** (0.007)	0.353*** (0.008)	0.348*** (0.008)	0.347*** (0.008)
N	8592	8592	8592	7444	7444	7444
R ²	0.201	0.199	0.201	0.280	0.277	0.276

Table 7. Robustness Test 2

Variable Name	(3)Replace independent variable			(4)Control grandchildren's age		
Do you have grandchildren	-0.030*** (0.003)					
Does he have a grandson		-0.020*** (0.003)				
Do you have a granddaughter			-0.021*** (0.003)			
Number of minor grandchildren				-0.005*** (0.002)		
Number of minor grandchildren					-0.005* (0.003)	
Number of minor grandchildren						-0.008*** (0.003)
Controlled Variable	Yes	Yes	Yes	Yes	Yes	Yes
Constant Term	0.359*** (0.007)	0.352*** (0.006)	0.351*** (0.006)	0.317*** (0.009)	0.313*** (0.010)	0.328*** (0.011)
N	8592	8592	8592	4487	3256	2847
R ²	0.271	0.266	0.266	0.205	0.201	0.187

4.5. Mechanism Analysis

4.5.1. Mediation Effect Test

The number of children and their gender composition represent milestone events in a family's developmental journey, exerting an irreplaceable and enduring influence on the quality of life among middle-aged and older adults. From the perspective of family structure, having children transforms middle-aged and older adults into grandparents—

a shift in identity that goes beyond a mere change in title and signifies a deeper elevation of responsibility and purpose. Therefore, this study uses intergenerational caregiving as a mediating variable and adopts the mediation analysis method proposed by Jiang Ting et al. to investigate the mechanism through which childbearing behavior affects the quality of life among middle-aged and older adults.

Table 8 examines the variables related to intergenerational caregiving practices and finds that children's fertility behavior

significantly encourages middle-aged and older adults to engage in intergenerational caregiving; this effect is observed whether considering the number of children or the gender composition of the children. Caregiving intensity is negatively correlated with mental health: as caregiving intensity increases, the risk of middle-aged and older adults developing depressive symptoms gradually rises. Intergenerational caregiving also exerts a significant negative impact on the physical health of grandparents; compared to low-intensity caregiving, high-intensity caregiving is more likely to have a pronounced adverse effect on the physical and mental well-being of grandparents. The Role Stress Theory suggests that middle-aged and older adults, striving to fulfill their role as grandparents effectively, tend to provide more

extensive care to their grandchildren. However, intergenerational caregiving consumes a significant amount of time and energy from these individuals; the time devoted to caregiving activities takes away time that these adults could otherwise allocate to self-recreation, social activities, or health management, thereby reducing the time available for self-care. This, in turn, can have negative physical and psychological impacts on middle-aged and older adults. If they are subjected to high-intensity caregiving over an extended period, they are more likely to experience fatigue and stress, and their physical and mental well-being may be compromised, leading to a decline in their overall quality of life.

Table 8. Mediation Effect Test

Variable Name	Intergenerational care		
Number of grandchildren	0.053*** (0.003)		
Number of troops		0.062*** (0.005)	
Number of granddaughters			0.059*** (0.005)
Controlled Variable	Yes	Yes	Yes
Cconstant Term	-0.034* (0.019)	-0.034* (0.019)	-0.031 (0.019)
N	8592		
R ²	0.312	0.302	0.301

4.5.2. Regulatory Effect Test

Table 9. Regression Effect Test

Variable Name	(1)	(2)	(3)	(4)	(5)	(6)
	Main Effect	Interaction term	Main Effect	Interaction term	Main Effect	Interaction term
Number of grandchildren	-0.009*** (0.001)	-0.011*** (0.001)				
Number of grandchildren * Economic support for children		0.011*** (0.002)				
Number of troops			-0.010*** (0.002)	-0.009*** (0.001)		
Number of grandchildren * Economic support for children				0.008*** (0.003)		
Number of granddaughters					-0.010*** (0.002)	-0.010*** (0.001)
Number of grandchildren * Economic support for children						0.013*** (0.003)
Controlled Variable	Yes	Yes	Yes	Yes	Yes	Yes
Cconstant Term	0.348*** (0.006)	0.353*** (0.006)	0.348*** (0.006)	0.351*** (0.006)	0.348*** (0.006)	0.344*** (0.006)
N	8592	8592	8592	8592	8592	8592
R ²	0.268	0.276	0.265	0.274	0.266	0.275

In the Chinese context, abundant family resources serve as the foundation for nurturing familial bonds; children's financial support is not only an embodiment of the filial piety

culture but also a vital resource for middle-aged and elderly individuals to cope with medical expenses and enhance their purchasing power. Therefore, it is worthwhile to examine

whether the negative impact of children's childbearing behavior on middle-aged and elderly individuals is mitigated or even reversed when children provide financial support. Table 9 indicates that children's financial support plays a positive moderating role in the negative impact of children's childbearing behavior on the quality of life among middle-aged and elderly individuals. According to social exchange theory, children's childbearing exerts varying degrees of influence on middle-aged and elderly individuals in terms of daily life and economic aspects; during this period, children provide appropriate financial support to middle-aged and elderly individuals to maintain the equilibrium and stability of their relationship, thereby achieving mutual benefit. Children's financial support to middle-aged and elderly individuals represents a form of intergenerational support; such support enables the elderly to meet their daily consumption needs when they require assistance with healthcare or daily living, while also enhancing their well-being and alleviating depressive symptoms, thereby buffering the caregiving burden associated with children's childbearing and reducing its negative impact on their quality of life.

4.6. Heterogeneity Analysis

4.6.1. Age-related heterogeneity

Table 10 illustrates the impact of children's reproductive

behavior on the quality of life among middle-aged and elderly individuals across different age groups. It shows that such behavior has a relatively significant negative impact on the quality of life of middle-aged individuals aged 45–59, whereas its effect on the quality of life of individuals aged 60 or older is not statistically significant. Whether viewed from a quantitative or gender perspective, an increase in the number of grandchildren—whether sons or daughters—exerts a significant negative influence on the quality of life of middle-aged individuals aged 45–59; specifically, for every additional child a middle-aged individual has, their quality of life decreases by 0.009 units. This phenomenon may be attributed to two factors: first, a larger number of grandchildren entails more time and financial resources devoted to their care; second, middle-aged individuals at this stage are simultaneously responsible for caring for their elderly parents above them and supporting their children below them—essentially functioning as "sandwiched caregivers"—which intensifies their life pressures. The arrival of grandchildren represents a new challenge for these individuals, adversely affecting both their physical and mental well-being and making it difficult to safeguard their overall quality of life.

Table 10. Age Heterogeneity Analysis

Variable Name	45—59(wrinkly)			Age 60 and above (the aged)		
Number of grandchildren	-0.009*** (0.001)			-0.001 (0.001)		
Number of troops		-0.009*** (0.002)			-0.001 (0.002)	
Number of granddaughters			-0.014*** (0.002)			-0.001 (0.002)
Controlled Variable	Yes	Yes	Yes	Yes	Yes	Yes
Cconstant Term	0.323*** (0.008)	0.318*** (0.008)	0.334*** (0.009)	0.234*** (0.009)	0.234*** (0.009)	0.225*** (0.010)
N	5234			3358		
R ²	0.167	0.163	0.169	0.021	0.021	0.022

4.6.2. Heterogeneity between families with and without only-child members

Table 11 illustrates the impact of children's reproductive behavior on the quality of life among middle-aged and elderly individuals, both in single-child families and non-single-child families. According to the table, from the perspective of the number and gender of grandchildren, children's reproductive behavior has a negative impact on the quality of life among middle-aged and elderly individuals in both single-child and non-single-child families. The results of the between-group coefficient test indicate that this negative impact is more pronounced in single-child families: in such families, having one more child reduces the quality of life among middle-aged and elderly individuals by 0.014 units; in non-single-child families, the reduction is only 0.007 units. This may be because, in single-child families, children are more likely to rely on their parents for intergenerational care, and middle-aged and elderly individuals are more frequently expected to shoulder the obligation of providing financial and daily-life

support to their children and grandchildren. This dynamic exacerbates the depletion of the middle-aged and elderly individuals' own resources and increases the physical and psychological burden on them, thereby hindering the improvement of their quality of life.

5. Conclusion and Suggestion

5.1. Conclusion

This study utilizes data from the 2022 China Family Panel Survey (CFPS) to systematically examine the impact of children's fertility behavior on the quality of life among middle-aged and elderly individuals, from the perspectives of the number of grandchildren and their gender composition, while also conducting an in-depth analysis of the underlying mechanisms and heterogeneous characteristics of this impact.

First, children's reproductive behavior significantly diminishes the quality of life among middle-aged and elderly individuals. The baseline regression results indicate that for

every additional grandchild, the quality of life among middle-aged and elderly individuals declines by 0.009 units; this negative effect remains robust even after controlling for endogeneity. From a gender perspective, an increase in the number of grandsons or granddaughters both significantly reduces the quality of life among middle-aged and elderly individuals, though the gender-specific disparity is relatively

small. This suggests that the traditional societal preference for sons over daughters has diminished in modern society, and the caregiving, economic, and psychological/physical pressures associated with raising grandchildren of different genders have become more similar for middle-aged and elderly individuals.

Table 11. Heterogeneity Analysis of Families with and Without Only Child Members

Variable Name	One-child family			Non-only-child families		
Number of grandchildren	-0.014*** (0.002)			-0.007*** (0.001)		
Number of troops		-0.015*** (0.002)			-0.007*** (0.002)	
Number of granddaughters			-0.014*** (0.003)			-0.007*** (0.002)
Controlled Variable	Yes	Yes	Yes	Yes	Yes	Yes
Cconstant Term	0.354*** (0.007)	0.349*** (0.007)	0.347*** (0.007)	0.344*** (0.011)	0.344*** (0.012)	0.343*** (0.012)
N	4548			4044		
R ²	0.314	0.311	0.310	0.204	0.200	0.204

Second, the childbearing structure exerts differential impacts on the quality of life among middle-aged and older adults. Further analysis reveals that having one child has a smaller negative impact on the quality of life of older adults than having two or more children does; in terms of the number of children, families with two or more daughters experience the most significant negative impact on the quality of life of middle-aged and older adults; compared to families with non-only-grandchild children of other structural configurations, the gender-balanced family structure—where both sons and daughters exist—experiences a relatively milder negative impact.

Third, the negative impact of children's reproductive behavior on the quality of life among middle-aged and older adults exhibits significant intergroup differences. In terms of age, the "sandwich" -aged population (aged 45–59) suffers the most pronounced adverse effects, whereas the impact on individuals aged 60 and above is less pronounced; regarding retirement status, the non-retired population bears stronger negative consequences, while the retired population does not experience any notable impact; in terms of family structure, the decline in the quality of life among grandparents in single-child families is approximately twice as large as that observed in families with more than one child. This suggests that middle-aged individuals and grandparents in single-child families—who face tight time constraints and concentrated caregiving responsibilities—are more likely to find themselves caught in a dual predicament involving both childbearing and elderly care obligations.

Fourth, intergenerational caregiving serves as an important mechanism through which children's reproductive decisions influence the quality of life among middle-aged and older adults. Having children significantly increases the caregiving burden on these individuals, consuming time that would otherwise be devoted to self-care, social activities, and health management—thereby adversely affecting their physical and mental well-being; however, the financial support provided

by their children plays a significant moderating role, effectively mitigating the negative impacts of having children and helping to maintain a reciprocal balance in intergenerational relationships.

5.2. Policy Proposal

Based on the above research findings, in order to mitigate the negative impact of children's reproductive behavior on the quality of life among middle-aged and older adults, and to achieve a balanced development between encouraging childbirth and safeguarding the well-being of the elderly, the following recommendations are proposed:

First, establish a multi-tiered intergenerational caregiving support system to alleviate the caregiving burden on middle-aged and older adults. The government should increase investment in inclusive childcare services and develop diversified models—such as community-based and corporate childcare services—to reduce children's reliance on grandparents for care; simultaneously, it could explore the implementation of a "intergenerational caregiving leave" policy, allowing middle-aged and older adults to take formal caregiving leave when necessary, thereby safeguarding their right to rest—particularly for middle-aged individuals who have not yet retired and fall into the "sandwich generation," who should be entitled to both caregiving leave and more flexible work arrangements. For middle-aged and older adults engaged in high-intensity intergenerational caregiving, communities should provide support services—including psychological counseling and health monitoring—to mitigate the physical and mental health risks associated with prolonged caregiving responsibilities.

Second, refine intergenerational economic support policies and strengthen children's obligation to provide financial support to their parents. Research has demonstrated that financial support from children can effectively mitigate the negative impact of childbearing on the quality of life of middle-aged and older adults. It is recommended to

incentivize children to provide financial support to their parents through measures such as tax incentives and social security subsidies; when designing maternity insurance and childcare subsidies, the caregiving contributions made by middle-aged and older adults should be taken into account, and appropriate financial compensation or preferential access to elderly care services should be granted to grandparents who provide intergenerational care, thereby establishing an institutionalized framework for intergenerational reciprocity.

Third, promote the concept of healthy aging and enhance the self-development capabilities of middle-aged and older adults. Against the backdrop of policies encouraging higher birth rates, it is essential to strengthen public awareness campaigns promoting healthy lifestyles among middle-aged and older adults, guiding them to prioritize their own health while fulfilling their family responsibilities; enrich the supply of community-based elderly care services by offering development-oriented services—such as cultural and recreational activities as well as continuing education—helping these individuals realize their self-worth as new grandparents, rather than simply sacrificing their own well-being.

In conclusion, against the dual backdrop of an aging population and adjustments to fertility policies, coordinating intergenerational family relationships requires the collaborative efforts of policymakers, communities, and families. Only by establishing a social support system that equally prioritizes both fertility-friendly and elderly-friendly approaches can we avoid the dilemma between encouraging childbirth and providing elderly care, and thereby achieve the sustainable development of family well-being.

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