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Number of Children and Parental Subjective Well-Being in Contemporary China: Nonlinear Associations, Competing Pathways, and Heterogeneity

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Abstract

Using five waves of the China Household Finance Survey (2015–2023), this study examines nonlinear associations between the number of children and parental subjective well-being among parents with at least one child (59,883 household-year observations; 18,805 households). The linear term for number of children is positive and the squared term is negative, with an estimated turning point of 3.04 children (95% CI [2.64, 3.44]). Marginal slopes are significantly positive at one child and significantly negative at four children. Results remain directionally consistent across alternative specifications, outcome measures, and samples. Mechanism analyses identify a stable negative pathway through economic burden and a positive pathway through emotional comfort, with diminishing first-stage returns. Old-age security also forms a positive pathway, although evidence of first-stage nonlinearity is only marginal. All three mediators remain significant when entered jointly. Formal tests find no conventional differences in the curve by age, income, urban–rural residence, or gender. Household fixed-effects and instrumental-variable estimates indicate that family selection cannot be ignored. The estimated turning point should therefore be interpreted as a robust conditional association in contemporary China rather than a universal causal optimum.

Keywords: number of children; subjective well-being; family size; competing pathways; nonlinear association; CHFS

1 Introduction

Parenthood is one of the most consequential family transitions in adulthood, yet whether it necessarily enhances subjective well-being remains unsettled. On the one hand, children can generate nonmaterial benefits through emotional bonds, meaning in life, and intergenerational continuity. On the other hand, childrearing entails persistent financial outlays, time pressure, and work–family conflict. Recent happiness research has therefore moved away from treating the question of whether parents are happier than nonparents as one with a single answer. Instead, it increasingly emphasizes that the well-being consequences of parenthood are jointly shaped by family structure, the life course, gender, and institutional context (Nomaguchi & Milkie, 2020, 2023; Grundström et al., 2024; Hudde, 2025; Elsas et al., 2026). Cross-national European evidence further suggests that parenthood may not raise life satisfaction but may consistently strengthen meaning in life (Hudde, 2025). This shift implies that understanding parenthood and well-being requires attention to variation within parenthood, rather than only comparisons between parents and nonparents.

The number of children is among the most consequential, yet still insufficiently explained, dimensions of this within-parent variation. Global and cross-national evidence has long shown that the association between fertility and happiness varies with parity, age, and social context (Margolis & Myrskylä, 2011). More recent studies indicate that first and subsequent children may yield different well-being returns and that the marginal effect of an additional child need not be constant (Mikucka & Rizzi, 2020; Milovanska-Farrington & Farrington, 2021). For parents, a second or third child may broaden the family's emotional network and sources of future support, but may also spread finite income, time, and care resources more thinly. The association between family size and subjective well-being may therefore be nonlinear, reflecting simultaneous changes in marginal benefits and marginal costs. A binary parenthood indicator or a single linear term may conceal this welfare boundary.

More importantly, identifying the shape of a nonlinear association does not by itself explain where that shape comes from. Prior research has documented several channels that may influence parental well-being. Public childcare and school services can ease care burdens and improve parents' life satisfaction, pointing to financial and caregiving pressures as important sources of parenthood-related well-being losses (Tobler et al., 2025). Parent–child interactions can directly generate positive affect and happiness, highlighting the emotional value of children (Izzo et al., 2024). In societies with strong intergenerational ties, such as China, financial transfers, caregiving, and the quality of relationships with adult children are also closely associated with parents'—especially older parents'—subjective well-being (Huang & Fu, 2021; Ma et al., 2026). These mechanisms are not mutually exclusive; they may operate simultaneously and offset one another. A particularly important distinction is whether nonlinearity arises because the marginal gains in emotional comfort or old-age security diminish as the number of children increases, or because the mediator itself has a nonlinear association with happiness. Few studies distinguish these two stages within a unified framework.

China offers a theoretically informative setting for examining this issue, rather than merely a special policy case. Families continue to play a major role in intergenerational care and old-age security, and children's education, marriage, resources, and support can affect parental well-being upward across generations (Huang & Fu, 2021; Tao et al., 2021; Ma et al., 2026). At the same time, migration may reduce face-to-face companionship and care, altering how traditional intergenerational support is delivered (Lu et al., 2023). Existing research also suggests that childbearing can impose persistent mental well-being costs on parents, particularly women (Shi & Shen, 2023). Chinese families thus combine strong emotional and security values attached to children with substantial childrearing resource constraints, providing an informative transitional context in which to ask when additional children are associated with greater happiness and when they begin to be associated with less.

Against this background, this study addresses three related questions. First, among people who are already parents, is the association between the number of children and subjective well-being consistently nonlinear, and where is its empirical turning point? Second, how are three competing pathways—economic burden, emotional comfort, and old-age security—related to the family-size–happiness association, and does the curvature arise primarily in the first stage from number of children to the mediator or in the second stage from the mediator to happiness? Third, does this association vary by life-course stage, income, and urban–rural residence, and how should its causal meaning be delimited after accounting for family selection and endogeneity?

To answer these questions, we use an unbalanced panel comprising five waves of the CHFS: 2015, 2017, 2019, 2021, and 2023. The pooled five-wave sample is the default analytical sample: the baseline regressions, mechanism analyses, heterogeneity analyses, household fixed-effects models, and principal instrumental-variable tests all use all five waves. The 2015 wave is excluded only in a dedicated robustness test. Because our focus is parental well-being and because emotional comfort and old-age security lack a clear child-related meaning for childless respondents, the main analysis is restricted to parents with at least one child, yielding 59,883 observations from 18,805 distinct households. The full sample, including childless households, contains 65,184 observations and is used as an additional robustness check. Models with year fixed effects include both the number of children and its square. We test the inverted U shape using marginal slopes at the endpoints and a confidence interval for the turning point. Robustness checks include ordered logit, alternative measures and samples, an age-squared term, and household fixed effects, followed by tests of the three competing transmission pathways. Finally, formal joint tests assess between-group heterogeneity, and the sex composition of the first two children is used as an instrument to discuss family selection and the limits of identification.

The results show a statistically significant inverted U-shaped association between the number of children and subjective well-being in the parental sample. The baseline turning point is approximately 3.04 children, with a 95% confidence interval of 2.64–3.44. Reintroducing childless households yields a turning point of 3.02, indicating that the curve's location is insensitive to the sample definition. Economic burden constitutes a stable negative pathway. Emotional comfort forms a significant positive pathway, with diminishing first-stage gains as family size increases. Old-age security is also positively associated with happiness through a statistically significant transmission pathway, but its first-stage squared term reaches only marginal significance in the parental sample; accordingly, we do not treat nonlinearity in this pathway as being as robust as that for emotional comfort. Formal tests find no statistically significant differences in the curves across age, income, urban–rural residence, or gender. Household fixed-effects and two-stage least-squares (2SLS) estimates both suggest that family selection cannot be ignored. We therefore interpret the inverted U as a robust conditional association rather than a strictly identified nonlinear causal effect.

This study extends research on parenthood and well-being in three respects. First, it shifts attention from the average parent–nonparent difference to marginal variation in family size within the parental population and applies stricter tests of the inverted U through endpoint slopes and a confidence interval for the turning point. Second, it places economic burden, emotional comfort, and old-age security in a common competing-pathways framework and distinguishes curvature in the first and second stages. Supplementary estimates restricted to parents and models entering all mediators simultaneously reduce the mechanism interpretation's dependence on sample coding. Third, by combining household fixed effects, instrumental variables, and formal between-group tests, the analysis explicitly separates robustness of association, evidence on mechanisms, and causal identification, allowing evidence from China to enter comparative discussions of low-fertility societies more cautiously.

2 Theoretical Framework and Hypotheses

2.1 Benefit–Cost Trade-Offs of Family Size and Nonlinear Well-Being Effects

Parenthood has an inherently dual relationship with subjective well-being. Children may enhance well-being through intimacy, family meaning, and intergenerational continuity, but they also generate sustained financial expenditures, time commitments, and caregiving responsibilities (Nomaguchi & Milkie, 2020). Changes in family size therefore do not simply add a form of “happiness capital”; they reconfigure marginal benefits and marginal costs between positive family returns and resource constraints. Compared with a parenthood indicator, the number of children provides a more direct view of this marginal trade-off.

On the benefit side, an additional child can expand parents' emotional ties and potential sources of intergenerational support, but these gains need not rise proportionally with family size. Parents' time, attention, and capacity to maintain relationships are finite. As families grow, the additional companionship, meaning, or future support generated by each new child may diminish. Prior research likewise shows that the well-being consequences of parenthood vary with the number of children, life-course stage, and family structure (Mikucka & Rizzi, 2020; Bauer et al., 2023). Positive child-related family benefits can therefore be understood as a flow of well-being with diminishing marginal returns.

On the cost side, Becker and Lewis's (1973) quantity–quality trade-off emphasizes that an increase in the number of children intensifies resource constraints when families seek to maintain a given level of investment in each child's education, health, and development. An additional child raises not only direct consumption and education expenditures but also caregiving time, work–family conflict, and anticipated future resource needs. Easterlin's (2001) aspiration-adaptation perspective further suggests that subjective well-being depends on comparisons between actual attainment and reference standards. When expectations for children's development and living standards rise in a competitive environment, the resource pressure associated with larger families may be amplified.

The logic can be represented by a simplified net-welfare framework. Let n denote the number of children, B_E(n) emotional and family-meaning benefits, B_S(n) intergenerational support and old-age-security benefits, and C(n) the economic, time, and resource-constraint costs. Net welfare associated with family size can then be written as:

$$W(n) = B_E(n) + B_S(n) - C(n)$$

If B_E(n) and B_S(n) are positive at lower family sizes but their marginal gains decline as n increases, while the marginal cost of C(n) remains positive or rises, then W(n) may first increase and then decrease, producing an inverted U. The ratio expression 'happiness = utility/desire,' sometimes used in Chinese-language discussions, may serve as an intuitive metaphor for this trade-off. Because no verifiable original academic source in Samuelson's work can be established, however, we do not treat it as a formal theory or testable equation, nor do we rely on it for the core theoretical identification. The testable logic instead rests on diminishing marginal family benefits and continuously accumulating resource costs.

H1: After individual and household characteristics are controlled, the number of children has an inverted U-shaped association with subjective well-being.

2.2 Three Competing Mediating Pathways

The overall well-being association can be decomposed into one negative cost pathway and two positive benefit pathways. Because all three may operate simultaneously and offset one another, the total association cannot reveal whether any single mechanism dominates. We therefore examine economic burden, emotional comfort, and old-age security as three mediating channels.

More children directly increase expenditures on education, health care, housing, caregiving, and daily consumption. They may also reduce parents' life evaluations by compressing savings and leisure and intensifying work–family conflict. Parenthood further reshapes the distribution of resources and well-being within the household, so the welfare costs of an additional child may not be symmetric between partners (Austen et al., 2023). Cross-national evidence indicates that work–family reconciliation policies, public childcare, and school services can ease parental strain and improve parental well-being (Glass et al., 2016; Nordenmark, 2021; Tobler et al., 2025), indirectly demonstrating that resource and care burdens are important sources of parenthood-related well-being losses. Other things equal, more children are therefore expected to be associated with lower subjective well-being through greater economic burden.

H2: A greater number of children is associated with greater economic burden, which in turn is associated with lower subjective well-being, forming a negative statistical transmission pathway.

Parent–child relationships provide belonging, meaning, and positive affect and are therefore an important component of the well-being benefits of parenthood (Izzo et al., 2024). Within a certain range, more children may enlarge parents' emotional networks and sources of interaction, thereby increasing emotional comfort. Yet emotional benefits depend on the quality of actual interactions, not on a mechanical addition of family members. As the number of children rises, limited time and attention must be allocated across more parent–child relationships, and the additional emotional benefit of each child may decline. Emotional comfort may therefore act as a positive mediator while exhibiting diminishing returns in the number-of-children-to-emotional-comfort stage.

H3: The number of children forms a positive statistical transmission pathway to subjective well-being through emotional comfort.

In societies where family-based intergenerational support remains important, adult children can strengthen parents' sense of security in later life through financial transfers, practical care, and emotional support (Huang & Fu, 2021; Li & He, 2023; Zheng et al., 2023). However, more children do not necessarily translate into a proportional increase in available support. Migration, relationship quality, employment, and children's own family responsibilities all affect whether such support materializes (Lu et al., 2023; Sukontamarn et al., 2023). Additional children may therefore strengthen perceived old-age security at lower levels of family size, while the marginal security value may diminish as family size grows.

H4: The number of children forms a positive statistical transmission pathway to subjective well-being through old-age security.

2.3 The Stage at Which Nonlinearity Arises

Even if emotional comfort and old-age security are positive mediators, curvature in the total association may arise at different stages. One possibility is first-stage nonlinearity: the association between the number of children and the mediator itself has diminishing returns. More children may initially increase emotional comfort or perceived old-age security substantially, but the gains may then level off or turn negative. In this case, the association between the mediator and happiness can remain approximately linear. A second possibility is second-stage nonlinearity: the number of children changes the mediator approximately linearly, but the mediator itself has diminishing marginal utility or a threshold relationship with happiness. The two mechanisms can produce similar total-effect curves while implying different behavioral interpretations.

The existing literature provides theoretical grounds for both possibilities. We therefore do not assume that nonlinearity necessarily occurs at either stage, but treat the source of curvature as a competing mechanism question. Empirically, we test whether Children² enters the first-stage equation from number of children to the mediator and whether M² enters the second-stage equation from the mediator to happiness. Only when the first-stage squared term is statistically significant and there is no independent second-stage evidence for M² do we attribute the positive mediator's curvature primarily to the first stage. This strategy avoids inferring that a mediator must share the same shape as the inverted U observed in the total association.

3 Data and Methods

3.1 Data and Analytical Sample

We use harmonized data from five waves—2015, 2017, 2019, 2021, and 2023—of the China Household Finance Survey (CHFS), conducted by the Survey and Research Center for China Household Finance at Southwestern University of Finance and Economics. The pooled five-wave data constitute the default sample for all main analyses. The survey contains information on household demographic structure, income, health, marital status, education, and subjective well-being, with households tracked over time by household identifier. Because the theoretical focus is parental well-being and both emotional comfort and old-age security refer to relationships with children, the principal analysis is restricted to households with at least one living child. Except for a specific robustness test excluding 2015, the baseline, mechanism, heterogeneity, and principal identification analyses retain all survey waves. The full harmonized sample contains 65,184 household-year observations from 20,473 distinct households, including 5,301 childless observations. Excluding these yields a principal parental sample of 59,883 observations from 18,805 distinct households. The full sample including childless households is not used for child-related mechanism analyses; it is used only as an additional sensitivity test of whether the baseline curve depends on restricting the sample to parents.

Family size is highly stable over the observation period. Household-level checks show that the number of children does not change during the observed waves for approximately 99.3% of households in the parental sample; only about 0.7% exhibit within-household variation. The main models are therefore identified primarily from between-household differences. Household fixed effects can serve only as a test of the identification boundary and cannot be expected to deliver precise estimates of within-household fertility effects.

3.2 Measures

Subjective well-being. The dependent variable is based on the CHFS question, “Overall, how happy are you with your current life?” Responses range from 1 to 5, with higher values indicating greater subjective well-being. Although the measure is ordinal, the main analysis uses ordinary least squares (OLS), which facilitates interpretation of nonlinear terms and indirect effects. Ordered logit models are estimated as a robustness check.

Number of children. The principal explanatory variable is the total number of living children in the household, ranging from 1 to 7 in the main sample. The baseline model includes both the linear and squared terms. The full sample, ranging from 0 to 7 children, is used in a robustness check. The categorical specification uses two-child families as the reference category and compares families with one, three, and four or more children.

Mediators. The harmonized data provide three composite indices measured on 1–5 scales: economic burden (Burden), emotional comfort (Comfort), and old-age security (Pension). Higher values indicate, respectively, a heavier economic burden, greater emotional comfort, and stronger perceived old-age security. The available files retain only these composite indices, not their constituent items. We therefore neither recalculate nor report Cronbach's alpha and do not describe the indices as standardized z scores. Accordingly, the mechanism analysis is defined as an assessment of statistical transmission pathways based on the available composite measures.

Control variables. The baseline model controls for self-rated health, marital status, age, gender, years of education, the logarithm of annual household income per capita, and urban residence, together with survey-year fixed effects. Standard errors in continuous-outcome regressions are clustered at the household level. Because happiness may be nonlinearly related to age, a robustness specification additionally includes Age^2.

Instrumental variable. To address endogeneity arising when family preferences, baseline happiness, or other unobserved factors jointly influence continued childbearing and happiness, we follow the established family-size literature and use whether the first two children are of the same sex (SameSex) as an instrument for the number of children (Angrist & Evans, 1998). Because this variable has a clear meaning only for families with at least two living children, the 2SLS analysis is strictly limited to families with two or more children (N = 42,110). The estimate therefore identifies a local average treatment effect (LATE) among families whose continued childbearing is affected by the sex composition of their first two children, not an average treatment effect for the full sample.

3.3 Empirical Strategy

We first estimate a quadratic relationship between the number of children and subjective well-being:

$$Happiness_{it} = \beta_0 + \beta_1 Children_{it} + \beta_2 Children_{it}^2 + \gamma' Z_{it} + \lambda_t + \varepsilon_{it}$$

where $Happiness_{it}$ is subjective well-being for household i in wave t, $Children_{it}$ is the number of children, Z_{it} is a vector of control variables, and λ_t denotes year fixed effects. An inverted U requires not only $\beta_1 > 0$ and $\beta_2 < 0$ with the turning point inside the sample support, but also a significantly positive marginal slope at a lower family size and a significantly negative marginal slope at a higher family size. We report a delta-method 95% confidence interval for the turning point. Ordered logit models assess whether the findings depend on treating the 1–5 happiness scale as approximately cardinal.

Because the number of children, mediator measures, and happiness are observed mainly in the same wave, we explicitly interpret the mechanism analysis as statistical mediation or transmission rather than as identification of causal mediation. The first-stage model allows the number of children to have a quadratic association with mediator M and calculates the instantaneous indirect effect at Children = x. The second-stage model adds M and M^2 to the happiness equation. For emotional comfort and old-age security, curvature is attributed primarily to the number-of-children-to-mediator stage only when the first-stage $Children^2$ term is consistently significant and the second-stage M^2 term lacks independent significance.

To avoid overstating a single pathway when the mediators are correlated, we conduct a supplementary parallel multiple-mediator test. Economic burden, emotional comfort, and old-age security are entered simultaneously in the same happiness equation, and we assess whether the direction and statistical significance of each association are preserved. Confidence intervals for indirect effects are also checked using household-clustered bootstrap resampling in the parental sample.

The core inverted U is examined across changes in sample definition, functional form, and variable specification. Except for test (5), which excludes the 2015 wave specifically to assess survey-period sensitivity, the baseline and robustness analyses retain all five waves (2015, 2017, 2019, 2021, and 2023) wherever possible. The checks are: (1) adding Age^2; (2) estimating ordered logit and binary logit models; (3) excluding the approximate 1980–1992 birth cohorts, identified as survey year minus age; (4) restricting the sample to parents aged 40 or older; (5) excluding the 2015 wave; (6) using categorical family-size indicators; (7) reincorporating childless observations; and (8) estimating household fixed effects. For income heterogeneity, we classify respondents by tertiles of lnIncome within each survey wave rather than applying common nominal-income cutoffs across waves, reducing mechanical reclassification caused by nominal income growth over time.

For the endogeneity analysis, SameSex is used only in the subsample with at least two children. Linear 2SLS assesses the local well-being effect associated with exogenous variation in fertility. A generated-instrument 2SLS specification treating both Children and Children² as endogenous is used only as an additional sensitivity analysis because it requires stronger exclusion restrictions and is sensitive to the instrument set.

4 Results

4.1 Descriptive Statistics

Table 1 presents descriptive statistics for the principal parental sample. Mean subjective well-being is 3.778 (SD = 1.001), and the mean number of children is 2.096 (SD = 0.994). Most parents have between one and three children: families with one, two, and three children account for 29.7%, 42.3%, and 20.1% of the sample, respectively, or 92.1% combined. Fewer than 2.5% have five or more children. The empirical support for the quadratic curve therefore comes primarily from the range of one to four children, and extrapolation to very large families should be treated cautiously.

Table 1 Descriptive Statistics for the Main Variables

Variable	N	Mean	SD	Minimum	Maximum
Subjective well-being (Happiness)	59,883	3.778	1.001	1	5
Number of children (Children)	59,883	2.096	0.994	1	7
Economic burden (Burden)	59,883	2.860	0.738	1.20	5.00
Emotional comfort (Comfort)	59,883	3.279	0.705	1.13	5.00
Old-age security (Pension)	59,883	3.153	0.742	1.34	5.00
Female (Gender)	59,883	0.478	0.500	0	1
Age	59,883	51.737	13.242	18	90
Years of education (Edu)	59,883	8.658	4.231	0	19
Married (Marry)	59,883	0.796	0.403	0	1
Self-rated health (Health)	59,883	3.431	1.077	1	5
ln(household income per capita) (lnIncome)	59,883	10.233	1.272	4.39	15.48
Urban residence (Urban)	59,883	0.543	0.498	0	1

Note. The main analysis is restricted to Children ≥ 1. Gender, Marry, and Urban are binary indicators. The observed support for the number of children in the parental sample is 1–7.

4.2 Number of Children and Subjective Well-Being

Table 2 reports, in sequence, linear OLS models, OLS models with controls and year fixed effects, a quadratic model for the parental sample, and an ordered logit model. Model 4 is the principal specification. Model 5 uses ordered logit with household-clustered sandwich standard errors.

Table 2 Number of Children and Subjective Well-Being: OLS and Ordered Logit Estimates

Variable / regressor	Model 1 OLS	Model 2 OLS + controls	Model 3 OLS + controls + year FE	Model 4 Quadratic OLS	Model 5 Ordered logit
Number of children	0.008* (0.005)	0.011** (0.005)	0.011** (0.005)	0.083*** (0.017)	0.155*** (0.031)
Number of children squared	—	—	—	-0.0136*** (0.0031)	-0.0257*** (0.0057)
Self-rated health	—	0.112*** (0.004)	0.113*** (0.004)	0.113*** (0.004)	0.203*** (0.007)
Married	—	0.271*** (0.010)	0.271*** (0.010)	0.271*** (0.010)	0.491*** (0.019)

Variable / regressor	Model 1 OLS	Model 2 OLS + controls	Model 3 OLS + controls + year FE	Model 4 Quadratic OLS	Model 5 Ordered logit
ln(income per capita)	—	0.104*** (0.004)	0.103*** (0.004)	0.103*** (0.004)	0.186*** (0.007)
Age	—	0.0007* (0.0004)	0.0005 (0.0004)	0.0005 (0.0004)	0.0008 (0.0007)
Years of education	—	0.005*** (0.001)	0.005*** (0.001)	0.005*** (0.001)	0.010*** (0.002)
Household fixed effects	No	No	No	No	No
Year fixed effects	No	No	Yes	Yes	Yes
Observations	59,883	59,883	59,883	59,883	59,883
R^2 / pseudo R^2	0.0001	0.0511	0.0514	0.0519	0.0185

Note. Household-clustered robust standard errors are in parentheses. ***, **, and * denote $p < .01$, $p < .05$, and $p < .10$, respectively. McFadden's pseudo R^2 is reported for the ordered logit model.

In the parental sample, the linear coefficient on Children is only marginally significant in the unadjusted model and becomes a small positive association after controls are added. In the quadratic specification, Children = 0.0826 (SE = 0.0170, $p < .001$) and Children^2 = −0.0136 (SE = 0.0031, $p < .001$), implying a turning point at 3.04 children. The delta-method 95% confidence interval is [2.64, 3.44]. Endpoint tests further show that the marginal slope is 0.055 at one child (one-sided $p < .001$) and −0.026 at four children (one-sided $p = .004$). Thus, within the empirically dominant range of one to four children, the curve changes from a significantly positive to a significantly negative slope. Ordered logit produces the same pattern of a positive linear and negative squared term. Adjusted predictions rise from approximately 3.747 at one child to 3.803 at three children and then decline. The statistical shape is clear, although its absolute magnitude is modest.

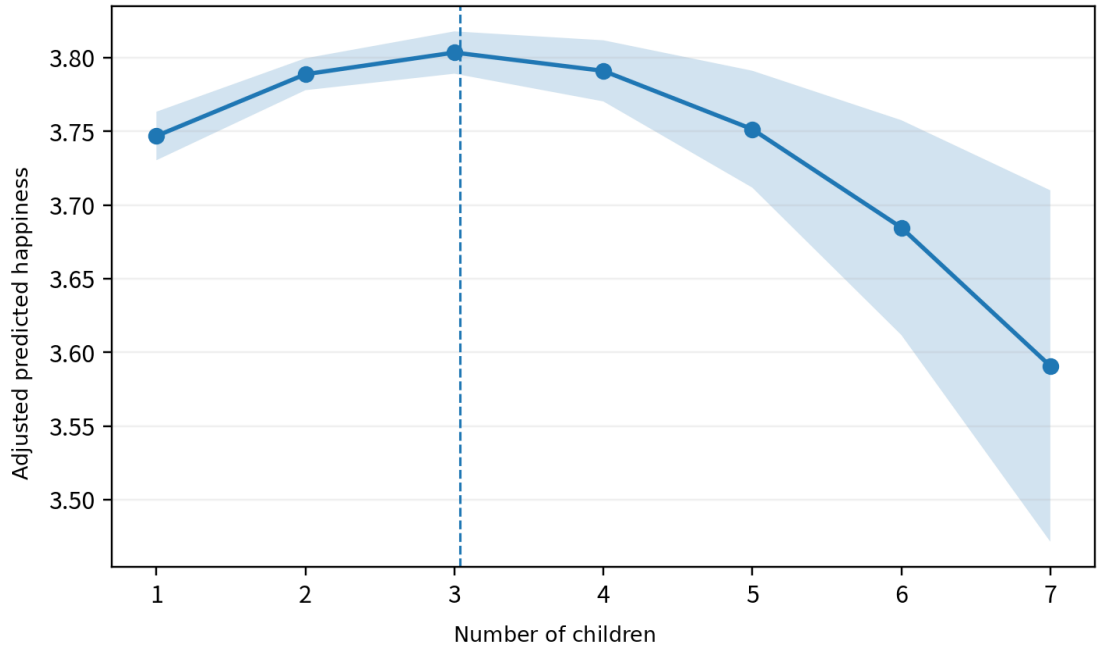


Fig. 1 Adjusted Predicted Relationship Between Number of Children and Subjective Well-Being (Parental Sample)

Note. Predictions are based on Model 4 in Table 2, with other covariates fixed at their means in the parental sample and year indicators set to their sample proportions. The shaded band is the 95% confidence interval, and the dashed line marks the estimated turning point of 3.04 children. Because families with five or more children are uncommon, the tail of the curve should be interpreted cautiously.

4.3 Robustness and Endogeneity Tests

4.3.1 Alternative Models, Measures, and Samples

Table 3 reassesses the core quadratic association in the parental sample. With the sole exception of the row excluding the 2015 wave, all tests in the table—and the baseline, mechanism, and heterogeneity analyses throughout the article—prioritize the pooled 2015, 2017, 2019, 2021, and 2023 data. Both Children and Children² are reported for each major change in sample or measurement so that robustness of the inverted U itself can be evaluated directly.

Table 3 Multidimensional Robustness Checks

Robustness specification	Core estimates	Cluster-robust SE	Significance	Comparison with main result
Baseline quadratic OLS, parental sample	Children = 0.0826; Children² = -0.0136	0.0170; 0.0031	Both $p < .01$	Turning point: 3.04
Add Age²	Children = 0.0826; Children² = -0.0136	0.0170; 0.0031	Both $p < .01$	Turning point: 3.04; Age² nonsignificant
Ordered logit	Children = 0.1547; Children² = -0.0257	0.0313; 0.0057	Both $p < .01$	Same inverted U
Reintroduce childless households (full sample)	Children = 0.0597; Children² = -0.00987	0.0112; 0.00232	Both $p < .01$	Turning point: 3.02
Exclude approximate 1980–1992 birth cohorts	Children = 0.0857; Children² = -0.0143	0.0186; 0.00341	Both $p < .01$	Turning point: 3.00
Restrict to parents aged ≥ 40	Children = 0.0883; Children² = -0.0152	0.0187; 0.00345	Both $p < .01$	Turning point: 2.91
Binary logit for happiness	Children = 0.1431; Children² = -0.0229	0.0346; 0.00636	Both $p < .01$	Turning point: 3.12
Household FE (nonlinear within)	Children = 0.0740; Children² = -0.0229	0.220; 0.0404	Both nonsignificant	Very weak within-household identification
Categorical family size (2 children reference)	1 child = -0.0305; 3 children = 0.0382; ≥4 children = -0.0213	0.0115; 0.0130; 0.0184	1 child / 3 children $p < .01$; ≥4 nonsignificant	Discrete pattern rises then falls
Exclude 2015 wave (2017–2023)	Children = 0.0855; Children² = -0.0146	0.0180; 0.00328	Both $p < .01$	Turning point: 2.93

Note. The binary happiness indicator equals 1 for scores of 4–5 and 0 for scores of 1–3. The categorical family-size model uses two-child families as the reference group. Exclusion of the approximate 1980–1992 cohorts uses survey year minus age as a proxy for birth year and is therefore only a rough cohort robustness check. Because the harmonized data do not contain children's birth years, excluding the 2015 wave can be interpreted only as a test of survey-period sensitivity, not as an individual-level causal estimate of China's universal two-child policy.

The inverted U in the parental sample is stable across the principal specifications. Adding Age² leaves the Children and Children² coefficients, and the turning point of approximately 3.04 children, virtually unchanged; Age² itself is not significant. After excluding the approximate 1980–1992 birth cohorts, restricting the sample to parents aged 40 or older, excluding 2015, or dichotomizing happiness, Children remains positive and Children² remains negative and statistically significant. The implied turning points range from 2.91 to 3.12 children. Reintroducing childless households yields coefficients of 0.0597 and −0.00987 and a turning point of 3.02, indicating that the restriction to parents did not generate the location of the curve near three children.

The categorical model also supports an initial rise followed by a decline. Relative to two-child families, one-child families report happiness that is 0.0305 points lower ($p = .008$), three-child families report happiness that is 0.0382 points higher ($p = .003$), and families with four or more children return to a nonsignificant difference of −0.0213. Neither Children nor Children² is significant in the household fixed-effects model. Given that the number of children remains unchanged during the observation period for 99.3% of parental households, this result primarily reflects minimal within-household fertility variation and further cautions against interpreting the pooled OLS curve as a strict causal effect of fertility.

4.3.2 Instrumental-Variable and Nonlinear Sensitivity Analyses

To address endogeneity arising when baseline happiness, income, and family preferences jointly affect continued childbearing, we use SameSex—the sex composition of the first two children—as an instrument and estimate pooled 2SLS models in the subsample with at least two children.

Table 4 Instrumental-Variable (2SLS) Estimates: Subsample with at Least Two Children

Regression step and variable	First stage: number of children	Second stage: subjective well-being

Regression step and variable	First stage: number of children	Second stage: subjective well-being
First two children same sex (SameSex)	0.169*** (0.015)	—
Number of children (fitted)	—	-0.006 (0.067)
Individual controls	Yes	Yes
Year fixed effects	Yes	Yes
Kleibergen–Paap rk Wald F	—	127.59
Observations	42,110	42,110
R^2	0.014	0.052

Note. SameSex is used as an instrument only in the sample with at least two children. Household-clustered robust standard errors are in parentheses. With a single excluded instrument, the square of the cluster-robust first-stage t statistic is 127.59.

SameSex significantly predicts the number of children in the first stage (0.169, SE = 0.015), and the first-stage F statistic of 127.59 gives no indication of a weak instrument. The second-stage linear 2SLS coefficient is −0.006 (SE = 0.067, p = .933). This result does not support a strong interpretation in which an additional child has a universally positive causal return to happiness. At the same time, the exclusion restriction for SameSex warrants caution in China because children's sex composition may be directly related to parental well-being through gender preferences and intergenerational expectations. We therefore treat the IV analysis as a diagnostic of identification risk rather than decisive causal evidence.

Table 5 Supplementary 2SLS Validation and Sensitivity Tests for the Nonlinear Specification

Specification	Children coefficient	Children² coefficient	Implied turning point
Main: SameSex, SameSex × urban, SameSex × age First-stage excluded-instrument joint F ≈ 44.01 / 34.56	2.922 (2.795)	-0.494 (0.471)	≈ 2.96 children
Sensitivity: SameSex, SameSex × education, SameSex × ln(income) First-stage excluded-instrument joint F ≈ 44.29 / 34.75	-1.503 (2.782)	0.253 (0.468)	≈ 2.98 children (sign reversal)
Reference: pooled quadratic OLS, parental sample	0.083*** (0.017)	-0.0136*** (0.0031)	≈ 3.04 children

Note. The sample is restricted to families with at least two children (N = 42,110). Household-clustered robust standard errors are in parentheses. The first-stage F statistics are cluster-robust joint Wald statistics for the excluded instruments in the respective endogenous-variable equations.

When Children and Children² are both treated as endogenous, the generated-instrument 2SLS estimates are sensitive to the instrument set and even reverse signs across specifications. Thus, although the implied turning point remains close to three children in some models, these results cannot confirm a nonlinear causal relationship.

4.4 Mechanisms

4.4.1 First-Stage Nonlinearity: Number of Children → Mediator

Table 6 First-Stage Nonlinear Indirect Effects and Path Estimates

Mediating pathway	Economic burden	Emotional comfort	Old-age security
First stage: X → M			
Linear X term	0.1253*** (0.0029)	0.0942*** (0.0097)	0.0859*** (0.0106)
X^2	—	-0.00562*** (0.00174)	-0.00338* (0.00194)
Second stage: M → Y			
M coefficient	-0.0759*** (0.0056)	0.1151*** (0.0057)	0.1031*** (0.0055)
Indirect effect at X = 2	-0.0095	0.00825	0.00746
Cluster-bootstrap 95% CI	[-0.0110, -0.0081]	[0.00707, 0.00942]	[0.00639, 0.00859]

Mediating pathway	Economic burden	Emotional comfort	Old-age security
Direct effect	0.0207*** (0.0049)	0.0038 (0.0049)	0.0042 (0.0049)
Total effect (linear Children)	0.0112** (0.0049)	0.0112** (0.0049)	0.0112** (0.0049)

Note. Mechanism analyses are restricted to the parental sample. All continuous-outcome regressions include the baseline controls and year fixed effects; household-clustered robust standard errors are in parentheses. The 95% confidence intervals for indirect effects are checked using 1,000 household-clustered bootstrap replications. The first-stage economic-burden model is linear; the emotional-comfort and old-age-security models include X^2.

In the parental sample, economic burden forms a stable negative statistical transmission pathway: Children significantly increases Burden (0.1253), and Burden significantly reduces Happiness (−0.0759). At X = 2, the indirect effect is −0.0095, with a 95% household-clustered bootstrap interval of [−0.0110, −0.0081]. In the emotional-comfort pathway, the first-stage coefficients are 0.0942 for Children and −0.00562 for Children² (p = .001); the second-stage coefficient on Comfort is 0.1151 (p < .001). The indirect effect at X = 2 is 0.00825, with a 95% interval of [0.00707, 0.00942], providing relatively robust evidence of diminishing marginal emotional returns. In the old-age-security pathway, Children = 0.0859, Children² = −0.00338 (p = .082), and Pension = 0.1031 (p < .001). The indirect effect at X = 2 is 0.00746, with a 95% interval of [0.00639, 0.00859]. The positive old-age-security pathway is therefore robust, but its first-stage nonlinearity is supported only marginally.

In the supplementary parallel multiple-mediator model, the coefficients on Burden, Comfort, and Pension are −0.0768, 0.1158, and 0.1033, respectively, and all are significant at the 1% level. The direct Children coefficient falls to a nonsignificant 0.0063. The directions of the three pathways therefore cannot be attributed solely to omission of the other mediators. Because these variables are measured primarily in the same wave, however, we continue to describe them as statistical transmission pathways rather than causal mediation effects satisfying strict temporal ordering and sequential ignorability.

4.4.2 Second-Stage Nonlinearity: Mediator → Happiness

To distinguish the source of curvature further, Table 7 adds Comfort² and Pension², respectively, to the second-stage happiness equations in the parental sample. Because marginal curvature may occur in either stage, we do not assume that the two positive mechanisms must share the same source of nonlinearity.

Table 7 Tests of Second-Stage Nonlinearity in the Mediating Pathways

Second-stage term	Emotional-comfort pathway	Old-age-security pathway
Linear M term	0.0485 (0.0394)	0.0776** (0.0355)
M^2	0.0102* (0.0059)	0.0040 (0.0055)
p value for M^2	$p(M^2) = .085$	$p(M^2) = .463$
Second-stage turning point (if applicable)	-2.38 (outside observed range)	-9.61 (outside observed range)
Controls and year FE	Yes	Yes
Conclusion	Only marginal evidence at 10%; no robust second-stage inverted U	M^2 nonsignificant; no evidence of a second-stage inverted U

Note. The second-stage specification is Happiness = Children + M + M^2 + controls + year fixed effects. Household-clustered robust standard errors are in parentheses. Evidence for second-stage curvature is evaluated from M^2 itself and whether its turning point lies within the observed support.

Comfort² = 0.0102 (p = .085), reaching only marginal significance at the 10% level, whereas Pension² = 0.0040 (p = .463) is not significant. Both point estimates imply negative turning points outside the observed range. Together with the first-stage results, this pattern is most consistent with diminishing marginal returns in the first stage for emotional comfort. Old-age security forms a stable positive pathway, but its first-stage Children² term is itself only marginally significant.

4.5 Heterogeneity Analysis

Table 8 reports subgroup results by life-course stage, income, urban–rural residence, and gender in the parental sample. To reduce mechanical effects of nominal income growth between 2015 and 2023, low-, middle-, and high-income groups are defined by tertiles of lnIncome within each survey wave. All heterogeneity conclusions are based on formal joint tests of the interactions involving Children and Children², not on comparisons of significance within separate subgroup regressions.

Table 8 Nonlinear Regression Results by Subgroup

Dimension / group	Children	Children²	Turning point	N	Joint p value for between-group difference
Life course: younger (<45)	0.0586** (0.0292)	-0.00745 (0.00519)	3.93 (squared term nonsignificant)	17,663	0.306
Life course: middle-aged (45–60)	0.1006*** (0.0252)	-0.01656*** (0.00471)	3.04	27,036	
Life course: older (>60)	0.0727** (0.0323)	-0.01438** (0.00583)	2.53	15,184	
Income: low (within-wave tertile)	0.0848*** (0.0275)	-0.01443*** (0.00498)	2.94	20,037	0.772
Income: middle (within-wave tertile)	0.0936*** (0.0257)	-0.01442*** (0.00464)	3.24	19,968	
Income: high (within-wave tertile)	0.0689*** (0.0254)	-0.01172** (0.00469)	2.94	19,878	
Residence: urban	0.0717*** (0.0231)	-0.01017** (0.00426)	3.52	32,534	0.251
Residence: rural	0.0905*** (0.0250)	-0.01624*** (0.00451)	2.79	27,349	
Gender: male	0.0954*** (0.0242)	-0.01509*** (0.00448)	3.16	31,245	0.498
Gender: female	0.0677*** (0.0239)	-0.01175*** (0.00431)	2.88	28,638	

Life course. The squared term is not significant among younger parents. The turning point is approximately 3.04 children for middle-aged parents and 2.53 for older parents. However, the joint test of curve differences across age groups yields p = .306, so the three curves cannot be considered structurally different.

After income groups are redefined by within-wave tertiles, the linear term is positive and the squared term negative in all three groups, with turning points of approximately 2.94, 3.24, and 2.94 children in the low-, middle-, and high-income groups, respectively. The omnibus between-group test yields p = .772, so income heterogeneity should be treated as exploratory description. The turning point is approximately 3.52 children among urban parents and 2.79 among rural parents, with a significant inverted U within both groups; however, the joint test of urban–rural curve differences yields p = .251, making the contrast descriptive only. The corresponding turning points are approximately 3.16 for fathers and 2.88 for mothers, again with inverted U shapes within both groups. The joint gender-interaction test yields p = .498, providing no evidence of a structural difference.

5 Discussion

5.1 From the Parenthood–Happiness Paradox to Nonlinear Well-Being Effects of Family Size

International happiness research increasingly emphasizes that the well-being consequences of parenthood are context dependent. Longitudinal studies also caution that happiness itself can affect the probability and timing of entry into parenthood, implying both selection into parenthood and consequences of parenthood (Grundström et al., 2024). By restricting the main analysis to parents, this study aligns its empirical object with the intensive margin of family size. Support for the inverted U comes not only from the quadratic coefficients but also from a significantly positive slope at one child, a significantly negative slope at four children, and a turning-point confidence interval of 2.64–3.44. The value near three children is thus best understood as an empirical boundary in the current sample of Chinese parents rather than an artifact of comparing childless respondents with parents.

This finding moves the literature from the extensive margin of parenthood to the intensive margin of family size. Early global comparisons showed that the relationship between fertility and happiness varies across fertility stages and social environments (Margolis & Myrskylä, 2011). Mikucka and Rizzi (2020) further demonstrated variation in the well-being consequences of parenthood by number and gender of children. Using an instrumental-variable approach, Milovanska-Farrington and Farrington (2021) also found a pronounced nonlinear family-size effect, although its specific form differs from ours. Recent European evidence additionally suggests that parenthood may have different associations with life satisfaction and meaning in life (Hudde, 2025). Variation in nonlinear patterns across countries is substantively informative: the functional relationship between family size and happiness is unlikely to be a universal biological or cultural law, but rather a contextual outcome of family benefits, childrearing costs, and institutional support. The turning point near three children in this study should therefore be understood as an empirical boundary in contemporary China, not as an optimal number of children generalizable across countries.

5.2 Competing Mechanisms: Emotional Benefits, Old-Age Security, and Childrearing Costs

The mechanism analysis further shows that the nonlinear association with family size does not arise from a single channel. Economic burden increases with the number of children and is consistently associated with lower happiness. Emotional comfort is positively associated with happiness, but the emotional gain from each additional child clearly diminishes. Old-age security also forms a positive statistical transmission pathway, but its first-stage nonlinearity is only marginally significant in the parental sample. The claim that old-age security yields positive benefits should therefore be distinguished from the stronger claim that the old-age-security pathway is itself necessarily inverted U-shaped.

This pattern is consistent with international accounts of parenthood as a high-reward but high-demand social role (Nomaguchi & Milkie, 2020). Crucially, cross-national research shows that the cost side is not fixed but is substantially reshaped by public institutions. In 22 OECD countries, Glass et al. (2016) found that work–family reconciliation policies, including paid leave and childcare subsidies, were associated with smaller parental happiness disadvantages. Using the European Social Survey, Nordenmark (2021) similarly showed that the well-being gap between parents and nonparents was markedly smaller in Nordic institutional settings with more extensive family policies. Evidence from Asia points in the same direction. Across ten Asian countries, Chao and Glass (2020) found no stable parental happiness premium after socioeconomic characteristics were controlled, while leave and flexible-work policies helped narrow parenthood-related happiness gaps. A recent study in the Journal of Happiness Studies used the quasi-experimental reopening of schools and daycare centers in Germany to show that restored public care substantially improved mothers' life satisfaction (Tobler et al., 2025). Together, these findings suggest that the location and curvature of the family-size–happiness relationship are institutionally malleable rather than determined by traditional family culture alone.

5.3 Life Course and Intergenerational Support: Another Lens on Institutional Differences

The meaning of children for parental well-being also changes over the life course. When children are young, financial and time costs are usually most concentrated. As parents enter middle and later life, direct childrearing costs decline, while children may become sources of emotional connection, health monitoring, and care. Children's departure from the parental home may itself alter parents' life satisfaction, underscoring the family-life-course dynamics of parental well-being (Collischon et al., 2024). International evidence, however, does not support a simple narrative of sacrifice in youth followed by an inevitable happiness return in old age. Using SHARE data, Bauer et al. (2023) found no substantial overall difference in life-satisfaction trajectories after age 50 between parents and childless adults, although children may serve as resources for health and coping in some groups. Research on older adults in Germany suggests that parents may fare better on life satisfaction, positive affect, and negative affect, but these advantages still depend on age and family circumstances (Tolkamp & Pollmann-Schult, 2024). Across 32 European countries, Pollmann-Schult (2025) further showed that the life-satisfaction advantage of parenthood in later life is highly contingent on social norms and economic vulnerability and varies substantially across countries.

Within the parental sample, perceived old-age security remains positively associated with happiness, but evidence that its marginal gain clearly declines as the number of children rises is weak. This is consistent with the comparative literature: the value of children as a resource in later life depends on pension systems, long-term care, nonfamily support networks, and intergenerational norms. The present analysis supports the proposition that old-age security is a positive family-resource pathway, but a single-country, contemporaneous design cannot establish that its curvature is universal.

5.4 Limited Heterogeneity and the Need for More Direct Tests of Resource Constraints

After income groups are reconstructed using within-wave tertiles, formal curve differences across income groups are no longer significant; the joint tests for differences by age, urban–rural residence, and gender are also nonsignificant. The analysis should therefore not present an optimal number of children for any demographic group as a principal finding. Different subgroup-specific turning points are observable, but the data do not establish that the underlying curves differ statistically. This result reinforces the study's central pattern: the average nonlinear association with family size is more stable than the subgroup differences.

Resource constraints remain an important topic for comparative research, but they require more direct designs. Future studies could interact family size with actual education expenditures, housing costs, childcare availability, working hours, and public transfers, or incorporate these measures into mechanism models. Multicountry data could then test whether welfare regimes systematically shift the curve. By contrast, income-tertile regressions alone provide insufficient evidence for a mechanism specific to middle-income families.

5.5 International Relevance of the Chinese Case: From Cultural Exception to Institutional Comparison

The significance of the Chinese case is not that it confirms a uniquely Chinese tradition in which more children necessarily bring greater happiness. Rather, it provides a representative institutional setting in which to examine the well-being trade-offs of parenthood in low-fertility societies worldwide. East Asian societies commonly combine rapidly declining fertility, strong norms of family responsibility, intense educational competition, and substantial family responsibility for care. Chao and Glass's (2020) cross-national Asian study shows that parents are not automatically happier even in societies that place a high value on family and childbearing; institutional support still determines how effectively parenthood costs are buffered. The Chinese results can therefore be situated alongside a shared problem in Japan, South Korea, and low-fertility European countries: when childrearing responsibilities are highly familialized and childcare, flexible work, and social protection do not absorb additional family obligations, the emotional benefits of children may be offset by rising opportunity costs.

The most generalizable conclusion is therefore not that three children maximize happiness, but three broader propositions. First, family size may have a nonlinear association with happiness, and an average linear coefficient may conceal consequential marginal changes. Second, nonlinearity arises from asymmetry in the growth of parenthood benefits and costs, not from cultural preferences alone. Third, family policy, labor-market institutions, and social protection alter these benefits and costs and may therefore change both the shape and turning point of the curve. This framework offers directly testable comparative propositions for future cross-national research.

5.6 Limitations and Future Research

This study has several limitations in identification and data. First, the number of children does not change over the observation period for approximately 99.3% of households in the parental sample. Fixed-effects identification is therefore weak, and the core results derive mainly from between-household comparisons. Second, SameSex applies only to families with at least two children, and its exclusion restriction is debatable in a Chinese context of gender preferences and intergenerational expectations; nonlinear 2SLS using generated instruments is also sensitive to the instrument set. Third, the available harmonized data lack each child's year of birth, survey weights, and province identifiers. We therefore cannot identify policy exposure precisely or implement uniform weighted estimates and province fixed effects. Rather than substitute speculative measures, we consequently limit causal and nationally representative claims. Fourth, the mechanism variables and happiness are measured primarily in the same wave, so the pathway analyses should not be interpreted as strict causal mediation. Fifth, and especially important for an international journal, evidence from one country cannot identify how institutional differences shift the family-size–happiness curve. Future research could apply the nonlinear mechanism framework developed here to the European Social Survey, SHARE, the World Values Survey, or other cross-national panel data. Linking these data to paid parental leave, public childcare coverage, housing and education costs, pension generosity, and long-term-care institutions would allow researchers to test whether the same family size yields different marginal happiness returns across welfare regimes.

6 Conclusion

Using five waves of the CHFS (2015, 2017, 2019, 2021, and 2023), and treating the pooled five-wave sample as the primary basis for the baseline, mechanism, and heterogeneity analyses, this study reassesses family size and subjective well-being among parents with at least one child. The number of children has a robust inverted U-shaped conditional association with happiness, with a turning point near 3.04 children and a 95% confidence interval of 2.64–3.44. Reintroducing childless households leaves the turning point near 3.02. Economic burden forms a stable negative pathway; emotional comfort forms a positive pathway with clear first-stage diminishing returns; and old-age security forms a positive pathway, although evidence of its nonlinearity is weaker than for emotional comfort. Formal tests provide little evidence of between-group heterogeneity. Household fixed-effects and IV results further show that family selection cannot be ignored, so the curve should be understood as a robust association rather than as a strictly identified causal effect of fertility.

In the broader context of international happiness research, the most transferable contribution is not a universal happiness-maximizing number of children. It is the evidence that family size may relate to happiness nonlinearly and that curvature can arise jointly from accumulating childrearing costs and diminishing marginal family benefits. Public childcare, paid leave, flexible work, pensions, and long-term care can all alter the marginal cost or marginal family benefit of an additional child and thereby shift the family-size–happiness relationship.

Whether children bring happiness should therefore not be treated as a private family question detached from social institutions. A more accurate comparative perspective is that parental happiness is jointly produced by family relationships, resource constraints, the life course, and public institutions. China provides an important case of these mechanisms in a context of rapid modernization, low fertility, and strong family responsibility. Truly general tests will require comparisons across countries, institutions, and life-course stages.

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