
China's Invisible Crisis: Cognitive Delays among Rural Toddlers and the Absence of Modern Parenting

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ABSTRACT

This article explores the problem of cognitive delays among toddlers in rural China and the role of their caregivers in producing low levels of cognition (i.e., low IQ). According to the results of a well-tested international scale of child development, the Bayley Scales of Infant Development (BSID), cognitive delays are alarmingly common, and nearly half the toddlers in our sample score an IQ of less than 84 on the BSID test (more than one standard deviation below the mean). In analyzing the source of this, we find that poor parenting—for example, not reading to, singing with, or engaging in stimulating play with one's children—is closely associated with these delays. Even though mothers (as opposed to grandmother caregivers), and especially more educated mothers, are more likely to follow good parenting practices, quality parenting is rare overall. We seek to find out why so many young children appear to be neglected when it comes to modern parenting practices. We empirically rule out the hypotheses that caregivers discriminate according to their child's gender; that the number of children in a given household is associated with the quality of parenting; or that caregivers living in relative poverty parent differently than their wealthier counterparts. According to the qualitative component of our study, we also find that inadequate parenting does not stem from parental indifference. Parents and grandparents obviously love their children and want them to succeed in life. Instead, the barriers appear to be primarily a lack of time and an absence of knowledge about the importance of good parenting practices. As a result, when they grow up, these children may not possess the levels of cognition needed to thrive in China's increasingly high-skill-based economy. Overall, our findings suggest that China may be facing a national crisis due to inadequate rural early childhood development.

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It has become common knowledge among politicians and economists that China is facing a middle-income trap¹—a term that describes the reduction in growth rates inhibiting many middle-income countries from advancing further. It has also become clear that if China is to circumvent the trap, the productivity of the labor force (i.e., their skill level) needs to rise.² A quick glimpse into the country's current educational attainment levels, however, suggests that there is still a long way to go. In rural areas, home to nearly three-quarters of China's school-age population,³ attending senior high school is uncommon (standing at a low 11 percent among the rural labor force in 2015).⁴ This failure on the educational front, described by some as "China's looming human capital crisis,"⁵ has often been attributed to institutional drawbacks of the educational system.⁶ Nevertheless, an emerging hypothesis, which we examine in this article, suggests that China's educational failure starts well before a student's first day in primary school. In particular, this hypothesis points to the role of inadequate early childhood development (ECD) in precipitating costly and irreversible developmental delays. Could a preponderance of early developmental delays be acting as a barrier for many rural Chinese children to learn, and for the labor force to compete?

Biological and child development studies suggest that this can indeed be the case. Research in neurology shows that most brain development occurs within the first three years.⁷ Whether this brain development occurs optimally or in a compromised fashion heavily influences not just the ability to learn but also health outcomes and noncognitive abilities such as motivation and self-confidence.⁸ Moreover, early experiences often reflect the level of economic advantage (or lack thereof) of the parents.⁹ As a result, without breaking this link between economics and early experiences (i.e., without guaranteeing healthy development to all children regardless of whether they live in a wealthy or poor community), any existing inequalities in society at large are likely to be amplified.

1. Fang Cai, "Is There a 'Middle-Income Trap'? Theories, Experiences and Relevance to China," *China & World Economy* 20, no. 1 (2012): 49–61.

2. Hongbin Li et al., "Human Capital and China's Future Growth," *Journal of Economic Perspectives* 31, no. 1 (Winter 2017): 1–26; Cai, "Is There a 'Middle-Income Trap'?"

3. Niny Khor et al., "China's Looming Human Capital Crisis: Upper Secondary Educational Attainment Rates and the Middle-Income Trap," *China Quarterly*, no. 228 (December 2016): 1–22.

4. Li et al., "Human Capital and China's Future Growth," 30; Khor et al., "China's Looming Human Capital Crisis," 911.

5. Khor et al., "China's Looming Human Capital Crisis."

6. Emily Hannum, "Political Change and the Urban-Rural Gap in Basic Education in China, 1949–1990," *Comparative Education Review* 43, no. 2 (1999): 193–211; Thomas Curran, *Educational Reform in Republican China: The Failure of Educators to Create a Modern Nation* (Lewiston, NY: Mellen, 2005).

7. Center on the Developing Child, Harvard University, "InBrief: The Science of Early Childhood Development," <http://developingchild.harvard.edu/resources/inbrief-science-of-eed/>.

8. James J. Heckman, "Schools, Skills, and Synapses," *Economic Inquiry* 46, no. 3 (2008): 289–324.

9. David M. Blau, "The Effect of Income on Child Development," *Review of Economics and Statistics* 81, no. 2 (1999): 261–76; Lawrence M. Berger, Christina Paxson, and Jane Waldfogel, "Income and Child Development," *Children and Youth Services Review* 31, no. 9 (2009): 978–89.

Despite the substantial implications of ECD for national development and equality, it was not until the 1970s and 1980s that academic research internationally started rigorously examining infants and toddlers. Studies aimed to identify the specific factors that could lead to developmental delays in children. Initially, most attention was dedicated to studying poor nutrition and iron deficiencies.¹⁰ More recently, however, studies started pointing to the home environment (i.e., the presence of modern parenting/stimulation practices in providing stimulation for children) as a strong predictor of the cognitive performance of young children.¹¹ Early stimulation—for example, reading, singing songs, and playing with the child, and so on—have been linked to early language acquisition and improved cognitive development.¹² In developing countries, however, cognitively stimulating home environments are less common. For example, in one international study, only one-third of all parents in these countries involve their children in stimulating interactions.¹³ Perhaps unsurprisingly, estimates of cognitive delays are also quite high, reaching around 200 million children under age five who are not living to their potential.¹⁴

In China, there is little rigorous research on developmental delays. Only one study by Wei and colleagues examines the role of the home environment, and its findings point to insufficient learning activities or toys and caregiver depression as significant correlates of delayed child development.¹⁵ To our knowledge,

10. Jere R. Behrman, "The Impact of Health and Nutrition on Education," *World Bank Research Observer* 11, no. 1 (1996): 23–37; Reynaldo Martorell, "The Nature of Child Malnutrition and Its Long-Term Implications," *Food and Nutrition Bulletin* 20, no. 3 (1999): 288–92; Sally M. Grantham-McGregor, Lia C. Fernald, and Kavita Sethuraman, "Effects of Health and Nutrition on Cognitive and Behavioural Development in Children in the First Three Years of Life; Part 1—Low Birthweight, Breastfeeding, and Protein-Energy Malnutrition," *Food and Nutrition Bulletin* 20, no. 1 (1999): 53–75; H. E. Freeman et al., "Nutrition and Cognitive Development among Rural Guatemalan Children," *American Journal of Public Health* 70, no. 12 (1980): 1277–85; D. P. Waber et al., "Nutritional Supplementation, Maternal Education, and Cognitive Development of Infants at Risk of Malnutrition," *American Journal of Clinical Nutrition* 34, no. 4 (1981): 807–13.

11. Mido Chang et al., "Parental Involvement, Parenting Behaviors, and Children's Cognitive Development in Low-Income and Minority Families," *Journal of Research in Childhood Education* 23, no. 3 (2009): 309–24; Susan P. Walker et al., "Child Development: Risk Factors for Adverse Outcomes in Developing Countries," *The Lancet* 369, no. 9556 (2007): 145–57; Young-Hee Park, "Parenting Behaviors and Cognitive Development in Early Childhood" (PhD diss., Florida State University, 2012); Faith Lamb Parker et al., "Parent-Child Relationship, Home Learning Environment, and School Readiness," *School Psychology Review* 28, no. 3 (1999): 413.

12. Adriana G. Bus, "Joint Caregiver-Child Storybook Reading: A Route to Literacy Development," *Handbook of Early Literacy Research* 1 (2001): 179–91; Mary Ann Evans, Deborah Shaw, and Michelle Bell, "Home Literacy Activities and Their Influence on Early Literacy Skills," *Canadian Journal of Experimental Psychology* 54, no. 2 (2000): 65; Stuart J. Ritchie, Timothy C. Bates, and Robert Plomin, "Does Learning to Read Improve Intelligence? A Longitudinal Multivariate Analysis in Identical Twins from Age 7 to 16," *Child Development* 86, no. 1 (2015): 23–36.

13. Walker et al., "Child Development."

14. *Ibid.*

15. Q. W. Wei et al., "High Prevalence of Developmental Delay among Children under Three Years of Age in Poverty-Stricken Areas of China," *Public Health* 129, no. 12 (2015): 1610–17.

however, no further empirical work has examined the home learning environment or the parenting practices associated with cognitive delays in rural China. Further, no study has ever used interactive international scales of infant development to measure the cognition of rural toddlers.

Nevertheless, there are many reasons to believe that rural Chinese children—or at least certain subsets of them—are at risk of inadequate development. First, despite the country's impressive economic growth, many families in many parts of rural China are still poor.¹⁶ Second, girls in rural China have historically been discriminated against.¹⁷ Third, despite the implementation of the so-called One Child Policy over the past three to four decades, it is well known that rural families have continued to have significantly higher levels of fertility than their urban counterparts.¹⁸ One potential consequence of lower fertility is that parents can invest more time and effort in each child than parents who have more children.¹⁹ Is it possible that rural children growing up with siblings have not enjoyed sufficient levels of parental involvement and that rural children are cognitively delayed due to being on the negative side of a quantity/quality trade-off?²⁰

Finally, China's *hukou* household registration system is also known to be producing a huge number, to an extent never before experienced in human history, of left-behind children (i.e., children whose parents migrate to cities while leaving them in the custody of relatives). Is it possible that when parents leave their young children behind to work at urban factory, construction, or service sector jobs, this absence could lead to poor cognitive outcomes?

All four of the groups we have mentioned—the poor; girls; children growing up in families with many siblings; and the left behind—make up large fractions of rural Chinese society. If they are disadvantaged with regards to their parenting, it may be the case that it is these particular home environments that are responsible for delayed cognition. Unfortunately, no prior research has tried to identify the sources of poor home environment.

The present study has three main aims: (a) to better understand the levels of cognition of rural toddlers; (b) to describe the nature of the home environment in which rural children are growing up; and (c) to test a number of hypotheses about what factors are associated with the quality of parenting and, ultimately,

16. Thomas Glauben et al., "Persistent Poverty in Rural China: Where, Why, and How to Escape?," *World Development* 40, no. 4 (2012): 784–95.

17. Monica Das Gupta et al., "Why Is Son Preference So Persistent in East and South Asia? A Cross-Country Study of China, India and the Republic of Korea," *Journal of Development Studies* 40, no. 2 (2003): 153–87.

18. Zhen Guo et al., "The Effect of Urbanization on China's Fertility," *Population Research and Policy Review* 31, no. 3 (2012).

19. Gary S. Becker, "An Economic Analysis of Fertility," in *Demographic and Economic Change in Developed Countries* (New York: Columbia University Press, 1960), 209–40.

20. Hongbin Li, Junsen Zhang, and Yi Zhu, "The Quantity-Quality Trade-Off of Children in a Developing Country: Identification Using Chinese Twins," *Demography* 45, no. 1 (2008): 223–43.

the level of cognitive development. To do so, we undertook a study in a set of poor rural counties in Shaanxi province that are representative of areas that are home to around half of all of China's children.²¹ We examined a random sample of 1,442 toddlers, aged 18–30 months (1.5–2.5 years), and their primary caregivers (who are typically either mothers or grandmothers). We relied on a mixed-methods approach that both analyzes quantitative data from the rigorously selected sample as well as a rich set of qualitative data that we obtained through in-depth interviews with a subset of the caregivers.

In the quantitative section of this study, we first provide estimates of cognitive delays among our sample toddlers. The results provide insight into the magnitude of China's ECD challenge. We then turn to a multifaceted empirical investigation of parenting. First, we consider the role of parenting in the development of child cognition by testing whether the cognitive delays that we observe in our sample are associated with parenting practices. In particular, we examine whether caregivers who follow good parenting practices are less likely to have cognitively delayed toddlers (we define "good parenting practices" as singing, reading, and playing with the toddler).

Second, having established the importance of these parenting practices, we examine how frequently the caregivers follow these behaviors. We also examine whether good parenting practices and the rate of cognitive delays are associated with the gender of the child, the number of children in a household, whether the mother is the primary caregiver, maternal education, and relative poverty.

In the qualitative section of the article, we go beyond the quantitative data and explore why rural children are often neglected when it comes to modern parenting practices. We focus on four potential barriers: caregiver indifference toward their children, ignorance of the link between parenting and children's cognitive development, ignorance of what good parenting looks like, and time constraints. The qualitative section presents and summarizes what a subset of our sample caregivers perceive of these barriers, as they told our enumerators during in-depth interviews.

QUANTITATIVE DATA AND RESULTS

Our quantitative data were collected from a survey of 1,442 randomly selected toddlers and their caregivers in 351 villages across 174 townships in 11 nationally designated poverty counties in Shaanxi Province. At the time of the four-week data collection period in October 2014, the sample children were 18–30 months (1.5–2.5 years) old. Teams of trained enumerators identified each child's primary caregiver (the individual who takes the most responsibility for the child's care)

21. Khor et al., "China's Looming Human Capital Crisis."

and administered a detailed survey on child, caregiver, and household characteristics. The survey also included a series of questions about the parenting environment, including whether they engage in reading, singing, and using toys to play with their children.

In addition to the survey, each toddler was administered the Bayley Scales of Infant Development (BSID) test, an internationally recognized²² test of ECD.²³ All of the BSID enumerators attended a week-long training course on how to administer the test, including a two-and-a-half-day experiential learning component in the field. Enumerators administered the test inside each household using a set of standardized toys and a detailed scoring sheet. The BSID takes into consideration each child's age in days, as well as whether he or she was born prematurely. These two factors, combined with the child's performance on a series of tasks using the standardized toy kit, contribute to the establishment of a standardized score: the Mental Development Index (MDI). The MDI evaluates memory, problem solving, early number concepts, generalization, classification, vocalizations, and language to produce a measure of cognitive development.²⁴ The index is scaled to have an expected mean of 100 and a standard deviation of 16, where scores can range between 50 and 150.²⁵ Impairment is defined as any score below 84 (one standard deviation below the mean). To facilitate an understanding of what "one standard deviation below the mean" means, it is often convenient to consider the BSID as an infant/toddler IQ test and note that < -1 standard deviation in an IQ test means an individual has an IQ of less than 90. Our study is the largest administrations of the BSID ever conducted in China and the only one ever conducted in rural China.

Are Rural Chinese Children Suffering from Developmental Delays?

The study finds alarmingly high rates of developmental delay among the sample toddlers (table 1). Overall, 48 percent of the sample toddlers have an MDI score below 84, indicating that nearly one in two is cognitively delayed. If the thousand-day hypothesis is true (the idea that a child's lifetime IQ is mostly set by age 2.5), which most specialists believe, this means that nearly half of China's children

22. The BSID test was formally adapted to the Chinese language and environment in 1992; and as part of this process, the standards for impairment were recalibrated to China based on a sample of 2,409 normally functioning infants and toddlers from 12 cities in China who were 2–30 months old. For more information on the adapted version, consult Shourong Yi, *Manual of Bayley Scales of Infant Development, Chinese Revision*. Xiangya School of Medicine [in Chinese] (Changsha: Central South University Press, 1995).

23. Shourong Yi, "The Revising of the Bayley Scales of Infant Development (BSID) in China" [in Chinese], *Chinese Journal of Clinical Psychology* 2 (1993); T. S. Watson and C. H. Skinner, *Bayley Scales of Infant Development* (New York: Springer, 2004).

24. Nancy Bayley, *Manual for the Bayley Scales of Infant Development* (New York: Psychological Corporation, 1969).

25. Yi, *Manual of Bayley Scales of Infant Development*.

Table 1. Fraction of Sampled Toddlers with Cognitive Delays

Age	Mean (1)	Observations (2)
18–24 months	.41	731
25–30 months	.55	711
Total	.48	1,442

Note: Cognitive delay describes a BSID score below 84 on the Mental Development Index (MDI).

from poor rural areas (who make up three-quarters of all of China's three-year-olds) will be developmentally delayed for their entire lives.

To further understand cognitive delays in our sample, we divide the sample into two age cohorts: the younger cohort including toddlers 18–24 months old inclusive and the older cohort including toddlers 25–30 months old inclusive. According to this division, 41 percent of the younger cohort of toddlers are cognitively delayed, compared with 55 percent of the older cohort, suggesting an increase in cognitive delays as children age.

Can Poor Parenting Predict Developmental Delays?

We next tested whether these high rates of cognitive delay are associated with the home parenting environment. Table 2 shows that an absence of good parenting practices is significantly associated with delays in cognitive development, even when we control for other characteristics, such as the child's gender, age, and premature birth status; maternal educational level and age; whether the child is an only child; whether the child's mother was identified as the primary caregiver; and whether the family receives a welfare benefit (i.e., is particularly poor). In households where an adult reads, sings, or plays with the toddler, the likelihood of a cognitive delay is substantially lower, and the difference is statistically significant. (A threshold for significance is set at $p < .05$ for all of our analyses.) This association is consistent in both magnitude and direction when examining each of the two age cohorts separately (table 2, cols. 2 and 3). Overall, these results provide evidence that when a caregiver engages with a child in a stimulating way (i.e., when a caregiver regularly reads to, sings to, and plays with a child), the child is more likely to develop cognitive skills similar to their counterparts in urban China and the rest of the developed world.

Despite this strong correlation between parental involvement and development, we find that the fraction of caregivers who engage their children using cognitively stimulating practices is low. Only 39.2 percent of the caregivers in our sample reported playing with their toddler the day before. Even smaller fractions of caregiv-

Table 2. Association between Parenting Behavior and Cognitive Delay

	All Children (1)	Aged 18–24 Months (2)	Aged 25–30 Months (3)
Read to child yesterday	–.15* (.04)	–.14* (.06)	–.16* (.06)
Sing to child yesterday	–.15* (.03)	–.14* (.04)	–.16* (.04)
Used toys to play with child yesterday	–.11* (.03)	–.07 (.04)	–.14* (.04)
Observations	1,442	731	711

Note: The above estimates represent marginal effects calculated in a logistic model. A cognitive delay describes a Bayley Scales of Infant Development (BSID) score below 84 on the Mental Development Index (MDI). Controls (not shown) include child's age, gender, premature birth, maternal age and education, whether the mother is the primary caregiver, whether the household receives a welfare benefit, and whether the child is an only child. Robust standard errors in parentheses.

* $p < .05$.

ers reported either reading (12.6 percent) or singing (37.5 percent) to their child. Overall, in our sample of families, a large majority of infants and toddlers growing up in villages received low mental stimulation in these respects.

Gender, the One Child Policy, Left-Behind Children, and Other Correlates of Low IQ

Evidence from the child development literature shows that early experiences are often influenced by the socioeconomic and/or demographic characteristics of the household.²⁶ To verify whether this applies to our sample, we examined whether parenting is influenced by any of the following five characteristics relevant to the rural Chinese context: the toddler's gender (which informs us about potential gender discrimination), whether the toddler has siblings (which informs us about a potential quantity/quality trade-off), whether the mother is the primary

26. David M. Blau, "The Effect of Income on Child Development," *Review of Economics and Statistics* 81, no. 2 (1999): 261–76; Lawrence M. Berger, Christina Paxson, and Jane Waldfogel, "Income and Child Development," *Children and Youth Services Review* 31, no. 9 (2009): 978–89; Safaa El Tayeb El-Kogali et al., "Inequality of Opportunity in Early Childhood Development in Morocco over Time" (World Bank Policy Research Working Paper, Social Science Research Network, Rochester, NY, May 2016); Caroline Krafft and Safaa El-Kogali, "Inequalities in Early Childhood Development in the Middle East and North Africa" (working paper, Economic Research Forum, Giza, 2014).

caregiver (a proxy for whether the toddler is “left behind”), the mother’s education level, and whether the caregiver receives a government welfare benefit (a proxy for poverty).

Columns 1, 2, and 3 in table 3 present the fraction of sampled toddlers at the receiving end of the three parenting practices conditional on these characteristics. Column 4 shows the rate of cognitive delay also conditional on these characteristics. To examine whether any observed difference is statistically significant and not due to chance, we use these characteristics as covariates in a linear regression reported in table A2. The following subsections provide a detailed discussion of the results for each characteristic and its role.

Parenting Practices, Cognition and Gender

Do female toddlers receive less frequent stimulating interaction from their caregivers? Gender-based discrimination in parental care has been well documented in the developing world.²⁷ Studies have found evidence that in many developing countries, parents allocate more nutrition, education, and healthcare resources toward their sons than to their daughters,²⁸ especially in times of financial hardship.²⁹

This gender preference has also been documented in China,³⁰ albeit with more dramatic manifestations. Judith Banister, for example, attributes the sex imbalance in China to sex-selective abortion and excessive female mortality during childhood.³¹ Similarly, Jianghong Li and William Lavelly find that female infant mortality in China is higher in areas where the male preference is more pronounced,³² suggesting that caregivers play a critical role. Moreover, the available literature on gender in China also has identified that the reasons behind son preference are primarily economic. A son is a more productive asset—especially in

27. United Nations Department of Economic and Social Affairs, Population Division, *Sex Differentials in Childhood Mortality* (United Nations Publication ST/ESA/SER.A/314, United Nations, New York, 2011).

28. Aparna Pandey et al., “Gender Differences in Healthcare-Seeking during Common Illnesses in a Rural Community of West Bengal, India,” *Journal of Health, Population and Nutrition* 20, no. 4 (2002): 306–11; G. Hazarika, “Gender Differences in Children’s Nutrition and Access to Health Care in Pakistan,” *Journal of Development Studies* 37, no. 1 (2000): 73–92.

29. Martina Björkman-Nyqvist, “Income Shocks and Gender Gaps in Education: Evidence from Uganda,” *Journal of Development Economics* 105 (November 2013): 237–53; Abay Asfaw, Francesca Lamanna, and Stephan Klasen, “Gender Gap in Parents’ Financing Strategy for Hospitalization of Their Children: Evidence from India,” *Health Economics* 19, no. 3 (2010): 265–79.

30. Monica Das Gupta et al., “Why Is Son Preference So Persistent in East and South Asia? A Cross-Country Study of China, India and the Republic of Korea,” *Journal of Development Studies* 40, no. 2 (2003): 153–87.

31. Judith Banister, “Shortage of Girls in China Today,” *Journal of Population Research* 21, no. 1 (2004): 19–45.

32. Jianghong Li and William Lavelly, “Village Context, Women’s Status, and Son Preference among Rural Chinese Women,” *Rural Sociology* 68, no. 1 (2003): 87–106.

Table 3. Rates of Parenting Practices and Cognitive Delays Conditional on Toddler and Caregiver Characteristics

Characteristic	Rate of Engaging in Parenting Practice (%)			Rate of Cognitive Delays (%) (4)
	Reading (1)	Singing (2)	Playing (3)	
Toddler gender:				
Male	12	36	41	50
Female	13	40	37	46
Only child:				
Yes	14	40	41	46
No	11	34	37	51
Mother is primary caregiver:				
Yes	14	41	42	48
No	11	32	34	47
Maternal educational level:				
Middle school or lower	11	34	37	51
Senior high school or higher	19	53	48	33
Receives welfare subsidy:				
Yes	12	34	41	53
No	13	39	39	46

Note: Columns 1, 2, and 3 show the rates of engaging in our focal parenting practices (columns) by child and caregiver characteristics (rows). Column 4 shows the rate of cognitive delays by child and caregiver characteristic.

future farming activities in rural societies—whereas a girl usually departs the family and relocates when she marries.³³ Therefore it is possible that caregivers might choose to invest less time and effort engaging with their female children.

We test this hypothesis in our sample and find somewhat surprisingly that female toddlers are as likely as male toddlers to receive caregiver interaction (table 3). The observed differences are all small (4 percentage points or less), and none are statistically significant (table A2). In terms of reading to a child in particular, the lack of a difference between female and male toddlers suggests that intellectually stimulating activities are not being reserved more frequently for sons. Thus, we rule out the hypothesis that rural Chinese caregivers discriminate in this important way according to their child's gender.

When looking at the recent literature on gender outcomes in rural China, this result may, in fact, be unsurprising. In a number of recent papers, researchers have documented that the gender gap in rural China appears to be narrowing in several respects. For example, Zhou and colleagues³⁴ examined a large rural sample of children born in the late 1990s and early 2000s and found that with the exception of anemia, all physical health outcomes were similar across gender—which is a departure from findings on older cohorts.³⁵ This convergence of health indicators may suggest that male preference is no longer common in rural Chinese communities and may consequently explain why we observe no evidence of gender discrimination in how caregivers practice parenting.

In line with this, we also find no evidence that male and female toddlers are at different risk levels of exhibiting a cognitive delay. The difference in the rate of cognitive delays among male and female toddlers is very small in magnitude (table 3, col. 4) and in fact is statistically indistinguishable from zero (table A2, col. 4). Thus, we conclude that on average, female and male toddlers receive equal levels of parenting and are at equal risk levels of exhibiting cognitive delays. In other words, according to our analysis rural China's cognitive delay crisis is not at all due to gender discrimination.

33. Yuping Zhang, Grace Kao, and Emily Hannum, "Do Mothers in Rural China Practice Gender Equality in Educational Aspirations for Their Children?," *Comparative Education Review* 51, no. 2 (2007): 131–57; Li and Lavelly, "Village Context, Women's Status, and Son Preference."

34. Hua Zhou, Di Mo, Chengchao Zhou, Alexis Medina, Yaojiang Shi, Linxiu Zhang, and Scott Rozelle, "The Gender Gap among School Children in Poor Rural Areas of Western China: Evidence from a Multi-Province Dataset," *International Journal for Equity in Health* (2016) 15:162, doi:10.1186/s12939-016-0442-5.

35. Shuzhuo Li, Chuzhu Zhu, and Marcus W. Feldman, "Gender Differences in Child Survival in Contemporary Rural China: A County Study," *Journal of Biosocial Science* 36, no. 1 (2004): 83–109; Xinhua Steve Ren, "Sex Differences in Infant and Child Mortality in Three Provinces in China," *Social Science & Medicine* 40, no. 9 (1995): 1259–69; Ansley J. Coale and Judith Banister, "Five Decades of Missing Females in China," *Demography* 31, no. 3 (1994): 459–79; Stephen L. Morgan, "Richer and Taller: Stature and Living Standards in China, 1979–1995," *China Journal*, no. 44 (2000): 1–39.

Parenting Practices, Cognition and the Number of Children

Might caregivers be less inclined or less capable of following stimulating parenting practices if the household has more than one child? There are two possible reasons why caregivers may engage less. The first pertains to a potential quantity/quality trade-off where the number of children in any given household decreases the amount of time resources available for any one of them.³⁶ A second potential reason is that caregivers who have more than one child might believe that the children provide their own stimulation for one other by playing together. Thus, the caregivers may allocate more time to other activities.

This question is relevant to our sample in particular and to poor rural areas in general, given that the one-child policy typically was not fully enforced in poor rural areas and many rural families indeed have more than one young child. Simple demographic extrapolation indicates that around 80 percent of the caregivers either had or should be expected to have more than one child, though at the time of our study more than half the caregivers were raising an only child (table A1). Most of the rest of the sample were caring for two children, and only a small fraction were caring for more than two children.

We exploit the variation in our sample to test whether caregivers with multiple children are less likely to engage in the three parenting practices. According to our data, however, we find no evidence in favor of this hypothesis. While table 3 shows that parenting practices are reported slightly more often by caregivers who have one child, none of these differences are statistically significant (table A2). In other words, the amounts of reading, singing, and playing that children with siblings receive are statistically indistinguishable from those received by only children.

This finding of no or negligible association may not be surprising given that among caregivers who had more than one child, almost all of them (96.6 percent) had only two children. This means that in our sample (and in rural China today more generally), we are considering the decline in quality associated with adding only one more child. Theoretically, of course, any negative trade-off in child quality due to extra children should be notably less severe when going from one to two children than in the case of going from one to three or four or more additional children.

The finding is also consistent with research by Zhou and colleagues.³⁷ Their study examined multiple outcomes pertaining to health, nutrition, education, and cognition in a large rural Chinese sample and found that—with the exception of anemia rates—children with siblings are not disadvantaged compared to their coun-

36. Hongbin Li, Junsen Zhang, and Yi Zhu, "The Quantity-Quality Trade-Off of Children in a Developing Country: Identification Using Chinese Twins," *Demography* 45, no. 1 (2008): 223–43.

37. Hua Zhou, Di Mo, Renfu Luo, Ai Yue, and Scott Rozelle, "Are Children with Siblings Really More Vulnerable Than Only Children in Health, Cognition and Non-cognitive Outcomes? Evidence from a Multi-Province Dataset in China," *China & World Economy* 24, no. 3 (2016): 3–17.

terparts who are only children. This suggests that overall, there is little evidence for either the quantity/quality trade-off discussed above or the idea that caregivers rely on siblings to stimulate each other. In short, we conclude that the number of children is not an important correlate of parenting practices.

In line with this, we also find that the two populations—only children and children with siblings—exhibit comparable rates of cognitive delays. Around 46 percent of only children and 51 percent of children with siblings exhibit cognitive delays (table 3, col. 4). As with parenting, the adjusted difference is statistically indistinguishable from zero. To summarize, we find that the number of children reflects on neither the quality of parenting nor the rates of cognitive delays.

Parenting Practices and Left-Behind Toddlers

Do left-behind toddlers receive less frequent engagement from their caregivers? In rural China, left-behind children are children whose parents migrate to cities in pursuit of employment. Due to China's *hukou* system, migrant workers do not have the unequivocal right to put their children into the public school system when working and living in China's cities.³⁸ As a result, in most cases the parents leave the child behind in the countryside, and the child's paternal grandparents typically become the primary caregivers. In our sample, almost 40 percent of toddlers were cared for by someone other than their mother, with grandmothers representing the most common nonmother caregiver (table A1).

Ever since China's economic growth paved the way for large migratory patterns to urban areas (and especially to urban factories), left-behind children have received attention in the Chinese media and among scholars, primarily due to concerns that they bear the cost of the departure of their parents. Until recently, most studies have found that compared to children living with their parents, left-behind children are less healthy;³⁹ are at higher risk of excessive drinking, smoking, depression, and suicide;⁴⁰ receive less supervision for their schooling;⁴¹ and spend more time doing farm work.⁴² More recent studies, however, have contested these findings. Zhou and colleagues,⁴³ for example, examined a large sam-

38. Farzana Afridi, Sherry Xin Li, and Yufei Ren, "Social Identity and Inequality: The Impact of China's Hukou System," *Journal of Public Economics* 123 (March 2015): 17–29.

39. Zhaobao Jia et al., "Health-Related Quality of Life of 'Left-Behind Children': A Cross-Sectional Survey in Rural China," *Quality of Life Research* 19, no. 6 (2010): 775–80.

40. Zhengkui Liu, Xinying Li, and Xiaojia Ge, "Left Too Early: The Effects of Age at Separation from Parents on Chinese Rural Children's Symptoms of Anxiety and Depression," *American Journal of Public Health* 99, no. 11 (2009): 2049–54.

41. Ye Jingzhong and Pan Lu, "Differentiated Childhoods: Impacts of Rural Labor Migration on Left-Behind Children in China," *Journal of Peasant Studies* 38, no. 2 (2011): 355–77.

42. Hongqin Chang, Xiao-yuan Dong, and Fiona MacPhail, "Labor Migration and Time Use Patterns of the Left-Behind Children and Elderly in Rural China," *World Development* 39, no. 12 (2011): 2199–2210.

43. Chengchao Zhou et al., "China's Left-Behind Children: Impact of Parental Migration on Health, Nutrition, and Educational Outcomes," *Health Affairs* 34, no. 11 (2015): 1964–71.

ple of over 140,000 children in ten provinces and find no evidence that left-behind children are any worse off than other rural children. This is not to say left-behind toddlers are not vulnerable. Rather, other children in rural areas also perform equally poorly.⁴⁴ It is possible that this similarity in results derives from an income/care trade-off. Rural parents who migrate are substituting direct and stimulating parenting with remittances from their jobs in the city. Whether this income effect is substantial enough to offset the care effect remains unclear *ex ante*.

The existing literature provides very little evidence about the left-behind children who are infants or toddlers. Most existing studies examine primary and high school students whose parents have migrated to cities.⁴⁵ Yet, there is some evidence that it is younger children, including infants and toddlers, who are more susceptible to the absence of their parents. Indeed, studies that have traced the child's age of separation from their parents have found that that the younger the child, the stronger the disruptive effects.⁴⁶

Our study sample of 18- to 30-month-old children allows us to determine whether left-behind toddlers are at a disadvantage in terms of quality parenting. We find that when the mother is the primary caregiver (which indicates that the toddler is *not* left behind),⁴⁷ the toddler is more likely to receive stimulating interaction by way of singing and play activities (table 3). In particular, 41 percent and 42 percent of toddlers living with their mothers are sung to and played with, respectively, versus 32 percent and 34 percent of toddlers cared for by nonmother caregivers (table 3). These differences are statistically significant (table A2), and their magnitudes are rather large given that less than 40 percent of all our sample caregivers are actually engaged in these activities. This suggests that left-behind toddlers are indeed on the receiving end of less frequent stimulating interaction.

Interestingly, when we look at the cross-section data from our study, we find that left-behind toddlers are not disadvantaged in terms of development (table 3, col. 4). When comparing them with toddlers living with their mother, we find

44. Similarly, Xiang Biao finds that the situation of left-behind children is not much worse than that of their peers in "How Far are the Left-Behind Left Behind? A Preliminary Study in Rural China," *Population, Space and Place* 13, no. 3 (2007): 179–91.

45. Jia et al., "Health-Related Quality of Life of 'Left-Behind Children'"; Zhaobao Jia and Wenhua Tian, "Loneliness of Left-Behind Children: A Cross-Sectional Survey in a Sample of Rural China," *Child: Care, Health and Development* 36, no. 6 (2010): 812–17; Jingzhong and Lu, "Differentiated Childhoods"; Yang Gao et al., "The Impact of Parental Migration on Health Status and Health Behaviours among Left Behind Adolescent School Children in China," *BMC Public Health* 10 (2010): 56; Bingyan He et al., "Depression Risk of 'Left-Behind Children' in Rural China," *Psychiatry Research* 200, nos. 2–3 (2012): 306–12; Yao Lu, "Education of Children Left Behind in Rural China," *Journal of Marriage and Family* 74, no. 2 (2012): 328–41; Liu, Li, and Ge, "Left Too Early"; Zhou et al., "China's Left-Behind Children"; Chang, Dong, and MacPhail, "Labor Migration and Time Use Patterns."

46. Liu, Li, and Ge, "Left Too Early"; Lu, "Education of Children Left Behind in Rural China."

47. Worth noting here is that the primary caregivers in our sample are mostly mother and grandmothers. Other caregivers such as fathers, grandfathers, and siblings constitute only 7.6 percent of the sample's caregivers (see table A1 for the detailed distribution of caregivers).

that the two populations exhibit comparable rates of cognitive delays (the difference is statistically indistinguishable from zero; see table A2). However, in another paper that two of the coauthors of this article have written, which takes advantage of the panel nature of the data set to track IQ (or cognition) of an infant/toddler over time,⁴⁸ it was found that when the mother leaves home and the grandmother becomes the primary caregiver of the child, the IQ of the child drops sharply and the decline is statistically significant. In other words, there is *causal* evidence that becoming left-behind leads to a large and negative effect on a toddler's level of cognitive development. Hence, while gender and the number of siblings appear not to matter, the *hukou* system and the inability of migrant mothers to remain with their children during the first years of development appears to contribute to a lower IQ among toddlers in rural China today.

Parenting Practices and Maternal Education

Does maternal education reflect on the parenting quality that the child receives? Internationally, a large literature links the mother's education to her child's health outcomes, such as in height and weight, immunization, and sometimes survival rates.⁴⁹ Some studies find this relationship persisting even when they adjust for potential confounders such as economic advantage and access to clean water (two factors that are highly correlated with educational attainment and are causally related to improved health).⁵⁰ If the children of educated mothers exhibit better healthcare in terms of these biological outcomes, it is theoretically plausible that they also receive better parenting and exhibit better developmental outcomes.

Our findings support this prediction. Among sample toddlers whose mothers are well educated (defined as attending senior high school, i.e., more than nine years of education), 19 percent are read to, 53 percent are sung to, and 48 percent are played with (table 3). Among toddlers of less-educated mothers, these rates stand much lower, at 11 percent, 34 percent, and 37 percent.⁵¹ After adjusting

48. Ai Yue et al., "The Effect of Maternal Migration on Early Childhood Development in Rural China," 2016, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2890108.

49. Kriti Vikram, Reeve Vanneman, and Sonalde Desai, "Linkages between Maternal Education and Childhood Immunization in India," *Social Science & Medicine* 75, no. 2 (2012): 331–39; Cesar G. Victoria et al., "Maternal Education in Relation to Early and Late Child Health Outcomes: Findings from a Brazilian Cohort Study," *Social Science & Medicine* 34, no. 8 (1992): 899–905; B. A. Abuya et al., "Influence of Maternal Education on Child Immunization and Stunting in Kenya," *Maternal and Child Health Journal* 15, no. 8 (2011): 1389–99; Emmanuela Gakidou et al., "Increased Educational Attainment and Its Effect on Child Mortality in 175 Countries between 1970 and 2009: A Systematic Analysis," *The Lancet* 376, no. 9745 (2010): 959–74; John G. Cleland and Jerome K. Van Ginneken, "Maternal Education and Child Survival in Developing Countries: The Search for Pathways of Influence," *Social Science & Medicine* 27, no. 12 (1988): 1357–68.

50. Victoria et al., "Maternal Education."

51. More information on how illiteracy can be a barrier is discussed in the qualitative section under "Ignorance of What Good Parenting Practices Look Like."

for other characteristics, the differences remain large in magnitude (7, 18, and 10 percentage points). The magnitudes are in fact the largest of all five factors we examined—and they maintain strong statistical significance (table A2).

It is important to note that since we control for the type of caregiver in our linear regression (table A2), our finding suggests that the large correlation with maternal education trickles down to her child regardless of whether she herself is the primary caregiver. There are a number of potential mechanisms as to why this may be the case. First, educated mothers may provide books to the family, ensuring that the primary caregiver can read to the child even when the mother is absent. (Table A2 shows not only that caregivers are more likely to read to their child when the mother is educated but also that the mother's education is the only correlate that is pertinent to reading activities.) Second, an educated mother may disseminate her parenting knowledge to the other caregiver before leaving, increasing the possibility that her child receives a healthier amount of stimulating interaction.

To what extent has this affected cognitive development? Only 33 percent of the toddlers whose mothers attended senior high school or attained even higher levels of education were cognitively delayed, compared with 51 percent of the toddlers whose mothers' education stopped before senior high school. When we control for other caregiver-toddler characteristics, this difference is reduced slightly (from 18 percentage points to 16 percentage points) but is statistically significant (table A2). As such, the role that maternal education plays in parenting quality extends to the children's developmental outcomes.

But only 17 percent of the mothers in our sample have attended senior high school or higher levels of schooling (table A1). While this rate implies that the cognitive development of a majority of children in our sample, and in other areas of rural China, is negatively impacted, it also suggests that the development of future generations can be altered with effective educational policies that reduce dropout rates, especially among girls.

Parenting Practices and Relative Poverty

Does household income influence how parents interact with their children? It is not unlikely that poorer caregivers have to allocate more time for economic activities and, as a result, spend less time with their child. We tested this hypothesis using information on whether the household receives a government welfare benefit, the rural *dibao*, as a proxy for poverty. Around 24 percent of our sample households qualify for welfare, which means that their income is below a fixed government threshold (table A1).

Our results indicate that caregivers in these poor households are just as likely to engage in our focal parenting practices as caregivers in nonpoor households (table 3). The minor differences that do exist are small in magnitude and statis-

tically indistinguishable from zero (table A2). Several reasons explain the lack of an association between poverty and parenting practices. First, the relation between wealth and time for parenting is not straightforward. On one hand, as explained above, caregivers in poorer households may elect to work longer hours and thus have less time to engage with their children. At the same time, better-off households can afford to provide toddlers with better nutrition, toys, and learning resources. But when caregivers provide these items, they may be inclined to reduce their engagement—especially if they are unaware of the importance of stimulating interaction.⁵² These two conflicting factors might explain why our multivariate regression is unable to detect a clear effect (table A2). Second, while the availability of income theoretically allows for more resources for the child, such as books and educational toys, families with spare income may well not invest in such resources.⁵³ Finally, it also is possible that because the level of income of most rural families in this region is low, the differences between those families who receive *dibao* and those who do not is not that great.

Perhaps due to the similarity of parenting quality in the two groups of households, we observed that toddlers who grow up in subsidy-receiving households are developmentally comparable to their better-off counterparts. While some differences in the rate of cognitive delays appear between the two groups (table 3, col. 4), they are statistically indistinguishable from zero (table A2). Thus, we conclude that poverty is not a critical correlate of either parenting or cognitive delays. This, however, should not be construed as true for all rural parts of China. Our study was undertaken completely within nationally designated poverty counties, where, as discussed earlier, cognitive delays are highly prevalent. Our finding, however, shows that within this economically disadvantaged region, variations in poverty and prosperity among families do not provide a meaningful way to identify delayed cognition among toddlers.

Summary of Quantitative Results

Our quantitative findings paint a grim picture of parenting and child development. Our sample shows a high prevalence of developmental delays—nearly half of all rural toddlers in Shaanxi Province are cognitively delayed. Among older toddlers (aged 1–2.5 years), the rate of cognitive delays stands even higher at 57 percent. These delays are strongly associated with the lack of stimulating parenting practiced by the caregivers. Fewer than half of the caregivers in our sample

52. A discussion on parenting knowledge is included in the qualitative section under “Ignorance of Link between Parenting and Children’s Development.”

53. Ming Tsui, “Family Income, Home Environment, Parenting, and Mathematics Achievement of Children in China and the United States,” *Education and Urban Society* 37, no. 3 (2005): 336–55.

reported playing with their children, and even fewer reported singing or reading to their child.

From our investigation of the correlates of good parenting and cognitive delays, we know that several factors do not appear to be driving the high levels of poor cognitive development. According to our findings, rural Chinese caregivers do not discriminate in their parenting practices according to their child's gender. Similarly, the number of children within a household and the poverty of a family do not appear to be a barrier to good parenting.

However, we have identified several factors that do appear to be associated with poor parenting and lower cognition. The *hukou* system and the habit of leaving children behind in the village with grandmothers while the mother returns to work in the city does appear to matter. Specifically, we find that grandmothers are not as engaged with the toddlers as their mothers are. In a companion paper,⁵⁴ it is shown that this disadvantage actually translates into a higher likelihood for the toddlers to exhibit a developmental delay. We also find that out of all the correlates we investigated, the mother's education has the strongest association with parenting, is the only factor associated with whether the caregiver reads with the child, and is strongly associated with whether a toddler experiences cognitive delays, holding other things constant.

While our quantitative study identifies these two critical factors associated with good parenting, it is unlikely that the absence of these alone explain the stark preponderance of inadequate parenting and the resulting cognitive delays. If parenting is not a correlate of gender, number of children, or relative poverty, then are there factors other than a mother's absence and a mother's dearth of education that cause rural children to be neglected? To answer this question, we investigated four potential barriers to sufficiently stimulating care that are hard to quantify. And so we explored each factor by way of in-depth interviews.

QUALITATIVE INFORMATION

As part of our effort to better understand why rural households lack good parenting practices, we conducted interviews with a subset of households that had participated in the quantitative data collection. In total, we visited 42 households in 11 villages across 10 townships in two nationally designated poverty counties in Shaanxi Province. All interviews were conducted one-on-one with the caregivers and transcribed. Each interview lasted 30–90 minutes and was semistructured: interviewers followed a scripted interview protocol but also had the freedom to diverge from this protocol in order to investigate the specific stories that emerged.

54. Yue et al., "Effect of Maternal Migration."

A Framework for Understanding Barriers to Good Parenting

Our interviews explored four potential barriers to good parenting:

1. Caregiver indifference toward their children (i.e., lack of affection or aspirations for the child's future)
2. Ignorance of any link between parenting and children's development
3. Ignorance of what good parenting practices are
4. Real and/or perceived time constraints

Our reasons for focusing on these four potential factors are as follows. First, uninvolved and indifferent childcare, combined with a lack of long-term aspirations for the child's future, could be a principle reason for poor parenting practices. Second, caregivers in rural areas may simply not know that young children are in a critical development phase during their first three years and that they would benefit from stimulation through such practices as reading, singing, and playing. This absence of understanding could pose a constraint even if caregivers were financially able to provide parenting inputs and were willing to take the time to do so. Third, even if caregivers understand the importance of such practices, if they cannot access information on how to properly engage with their child, they may be less willing and/or able to do so. Finally, even in situations where caregivers have sufficient information to engage in good parenting practices, time constraints could still limit their ability to do so sufficiently.

Barriers to Adequate Parenting

Lack of Aspirations for Children's Future

Even when poverty does not constrain parenting practices, children's cognitive development can be limited if caregivers do not care about raising their child to be smart or successful. Economists and other social scientists have often portrayed children in traditional society simply as a necessary input for household survival.⁵⁵ Children have been depicted as an asset for building families, as future laborers on the family farm, or as a guarantee of security in old age.⁵⁶ Under this theoretical model, caregivers are expected to invest in children's development in order to benefit themselves in the future and not necessarily with the goal of helping children to develop a capacity to rise out of poverty for their own well-being. If there was a general expectation that the children would not succeed in China's

55. Warren C. Robinson, "The Economic Theory of Fertility over Three Decades," *Population Studies* 51, no. 1 (1997): 63–74.

56. Harvey Leibenstein, "The Economic Theory of Fertility Decline," *Quarterly Journal of Economics* (1975): 1–31; Robinson, "Economic Theory of Fertility over Three Decades."

future economy and that investing extra time and effort in them would not bring future benefits to their parents and other caregivers, then it could be that rural caregivers would hold back such investments in the young children. In short, if families do not have an inherent love for their children, they may not be willing to invest in them.

This attitude, however, does not seem to be prevalent. In fact, after spending a small amount of time with the parents and grandparents of children in rural China, it became clear that there are strong feelings of love for their children and grandchildren, and caregivers have high hopes for their child's future success. Here are some typical statements:

I saw something on TV about how Americans are better than Chinese at 28 years old. I don't want my grandson to fall behind in the world. (Grandmother)

I hope he can do whatever he wants in life. (Mother)

Most respondents identified academic achievement as a desirable goal, particularly as a means to leave the village, avoid farm-based employment, and establish a path to a better life.

I hope she has a good future. I hope she will be better than her dad. These days, if you don't go to college, there's no future in the village. (Grandmother.)

I hope he will study well. I want him to get into a good school, do well in school, and go to college or maybe work in a bank like his older cousin. (Grandmother)

I want my grandson to go to school. I did a lifetime of farm work, and I don't want my grandson to go through that. I hope he leaves the village to see what life outside is like. (Grandmother)

So what was the motivating factor behind these aspirations? Even our quantitative data found evidence that parents and grandparents care deeply for their children. Specifically, the pattern of aspirations found during caregiver interviews is supported by figure 1. The vast majority of caregivers (88.6 percent) reported that they enjoy spending, or are willing to spend, time with their young children. A full 83.7 percent of caregivers also indicated that they find playing with their children to be fun and interesting. Nearly all caregivers (94.9 percent) reported that they feel it is their responsibility to help their children learn about the world around them. When we asked whether caregivers spend money on the toddler if they thought it would improve their future, nearly all respondents said yes.

Our findings thus suggest that children in poor rural areas of China today are not seen merely as instruments to leverage family success. Instead, almost all

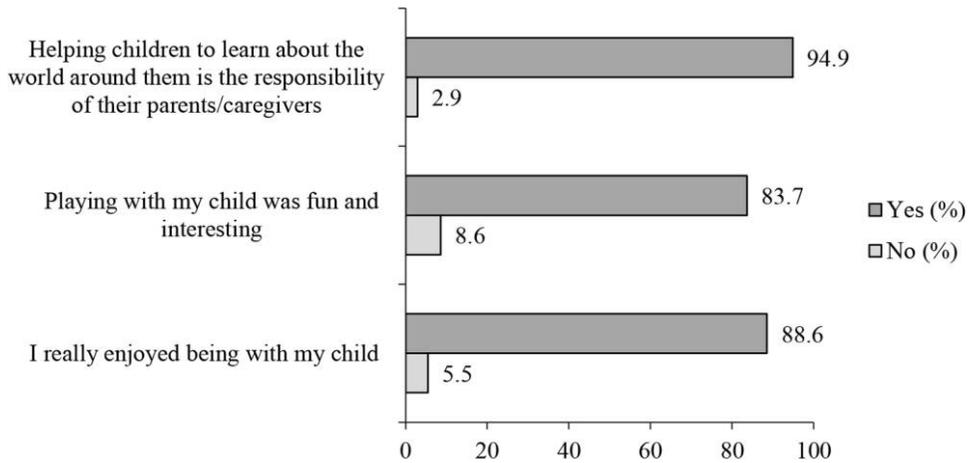


Figure 1. Parenting attitudes of sample caregivers. For the sake of clarity, the percent of sample caregivers who responded “Unsure” is not shown.

caregivers want their children to be happy and successful in their lives, regardless of whether or not this directly benefits the household. As such, the lack of reading, singing, and playing with children observed in the quantitative data does not stem from caregiver indifference.

Ignorance of Link between Parenting and Children’s Development

Even though most families want to help their children succeed both academically and in future off-farm employment, the caregivers may not realize that they should be providing stimulation for the toddler or recognize the significance of interacting more with the child. In rural areas, where parenting methods are often based on trial and error, if a child is unresponsive to any particular form of stimulation, families often simply stop engaging in that form of stimulation. But many positive forms of parental engagement do not lead to immediate visible responses from the child. For example, babies and toddlers may be too young to respond verbally to adults, but speaking to them directly still leads to increased brain activity and development. Without access to information that reinforces the importance of consistent stimulating interactions with children, it is easy for rural caregivers to perceive the child’s lack of visible response as an indicator that these interactions are ineffective, unimportant, and unnecessary:

We don’t tell him stories because he can’t understand; he doesn’t respond. He can’t even follow basic instructions like “don’t go outside,” so how could he follow a story?
(Father)

There are no children's books in the house. She wouldn't understand if I read to her; she wouldn't read the books, and would rip the pages instead. It is not important to read to her before school. (Mother)

His mom bought him three books last year on her way home from work, but he tossed them aside and never looked at them, so we sold them. Sure—it would be nice to learn a little from books now, but it's not necessary. (Grandmother)

Most of the caregivers we interviewed also believed that their child was too young to be read to or sung to. When asked if they had books for their child, both the father and grandmother of one child laughed and said, "He can't understand yet; he's too young."

Many families believed that a child's understanding will increase dramatically once they attend school, and as a result, they wait until the child goes to school to further engage with them:

I think she's too young to understand much now. She'll understand more once she goes to school, so I'll teach her more then. (Grandmother)

I think singing can be learned in school; her older sister learned it in school. (Mother)

These families often place greater importance on feeding and clothing their child:

I think he's old enough to understand stories now, like "Snow White" and "Robinson Crusoe," but we only read to him when he's bored or lonely. It's frustrating because he doesn't really listen. Reading is not very important to me; eating well and staying healthy are enough for me to worry about. (Grandmother)

She has a few toys. I think I should buy more food and clothes for her instead of toys. Toys are unnecessary. (Mother)

The most important stuff to teach her before school is basic stuff like using the bathroom. And manners. (Mother)

Some caregivers sang, read, or played with their child but did not do so frequently, because they believed these interactions only served specific purposes such as placating the child or putting him or her to sleep. They had little understanding of the impact on the child's cognitive and motor development:

I think the most important thing is that he's happy and doesn't cry. The only purpose of playing is to keep him from crying or fussing. (Grandmother)

I don't know if singing is important for her personal growth. I don't think so. I sing to her to calm her down. (Grandmother)

Toys are not necessary but I buy them because I don't want her to cry in public. (Mother)

When asked whether she thought singing to the child is important, one grandmother responded:

What's important got to do with it? He likes it and that's enough. (Grandmother)

We haven't thought about the connection between playing with him and his development; there probably isn't a link. (Mother)

Even so, a large number of caregivers felt that the development of their children was inadequate. They often expressed a generally accepted notion that rural children are inferior in this respect to urban children:

I think that there are a lot of differences between rural and city children. City children are more outgoing. Rural children aren't as smart as city children. (Grandmother)

I don't want him to play with other village children. I want him to play with city kids. There aren't many things to see in the countryside. The development of rural children just can't compare to the development of city children. (Father)

City kids have more caretakers, and don't play with mud and water; rural kids play with mud no matter what their age. My daughter's development is the same as that of rural kids, but behind that of city kids. (Mother)

While such an awareness of cognitive delays was common, it did not preclude an ignorance of how it relates to parenting and a lack of understanding of the effect of stimulating activities on children's development.

Ignorance of What Good Parenting Practices Look Like

Our interviews revealed that caregivers do not know how to engage in good parenting practices. Data from our quantitative study show that most rural parents receive information on parenting from their own trial and error experience (25.2 percent) or from friends and family members (especially mothers and mothers-in-law—52.6 percent). Some caregivers also reported getting information

from TV shows that happen to include parents with young children. Many of them directly acknowledged a need for more and better information:

I want more information on teaching her. I only know what people tell me and what I see on my cell phone and on television. I also watched my older sister raise her child. Otherwise, I learn from trial and error. (Mother)

I don't really know how to take care of little kids. (Mother)

In certain situations, hard constraints bar caregivers from engaging in quality practices. Many of the caregivers we spoke to—especially grandmothers—said that they were illiterate, which precludes the ability to read with the toddler. Some also said they did not know or could not remember any stories to tell, and several said this was because they themselves were not told stories when they were children:

I'm illiterate and can't take good care of him. (Grandmother)

I think telling stories is important, because it can help her develop her intelligence. But I never went to school and I don't know how to read, so I don't know how to tell stories. (Grandmother)

[I don't know any stories because] as a kid, no one told stories! Who had time for stories? I was one of 10 kids; we had to help around the house and in the field. (Grandmother)

Caregivers voiced similar concerns with regard to singing to their children. In several cases, the primary caregiver either did not know any children's songs or was not able to sing songs in a way that the child would understand:

I think that singing children's songs to my granddaughter is important but nobody in our family knows how to. (Grandfather)

I struggle to sing clearly so that he understands. I sometimes get the lyrics or pronunciation wrong. (Mother)

Although most caregivers said that they played with their children, many did not do so frequently or regularly. Also, our interviews revealed that when caregivers did play with their children, they did so randomly and were unaware of any structured games to play with their child. However, some recognized the importance of playing together and many remarked that they wished that there were a designated place they could go to learn how to play with their children:

I play with my granddaughter. I take her outside every day and I think she enjoys it. Sometimes I don't know what games to play with her, but I still think it's important. (Grandfather)

I want to learn more about how to play games with kids. (Mother)

When asked what they hoped to teach their children before they began school, an interesting pattern emerged. A majority of caregivers often confused early stimulation with academic learning or literacy instruction, and while they made some attempts toward these pursuits, they often noted that their own level of education was a major obstacle in the way:

The hardest part of parenting is teaching characters, drawing, and writing his name when I don't know how to myself. (Grandmother)

I want to teach her simple numbers, Mandarin . . . and manners, but right now she is too young and can't remember anything. My own Mandarin isn't that good, so it's hard to teach her. I don't know how to teach her numbers. I need to teach her simple numbers and Mandarin so that she will understand in school. (Mother)

I don't know how to teach or raise him. I want to teach him how to write numbers. To prepare for school, I teach him very basic characters and counting. I don't do enough to prepare him. I think I should do other things such as teaching him how to play with other kids, and I want to teach him more characters. I haven't done more because I don't have the ability to; I only went to middle school. It's important to teach these things because it is Chinese tradition to educate kids from a young age. (Mother)

Some caregivers also pointed out that they didn't know enough about the world around them and that this lack of knowledge was the main obstacle to educating their children:

I explain to her what cats and dogs are. However, I can't explain animals that she sees on television if I don't know what they are myself. (Mother)

Even if caregivers knew certain skills or concepts themselves, they struggled to communicate them to their children effectively:

I've thought about drawing 3 apples and teaching him how to draw, but it's hard to teach him. He scribbles over what I try to explain. I just don't know enough about teaching. There aren't any television programs for teaching children before preschool. (Grandmother)

Real and Perceived Time Constraints

Even in cases where caregivers recognize the importance of parenting practices, time constraints can prevent them from engaging in quality parenting practices. Parents spoke of being busy and complained of frequent exhaustion due to the hard labor involved in farming:

We don't tell him stories. . . . We are all super busy growing mushrooms. At certain times of the year, we only sleep four to five hours a night due to the busy mushroom growing season. (Father)

Especially when the parents were living away from the village to engage in work, leaving less able-bodied grandparents at home in the village to raise their children, there was scant time to spend on the child:

Reading is good because it helps her recognize characters. We have two books of characters that her mother bought. But I don't have time to read. (Grandmother)

How could playing not be important? But we don't play games. I don't have time. (Grandmother,)

I want to draw with him, teach him to sing, and recognize a few characters but I don't have time. I don't think I do enough. There just isn't enough time. (Grandmother)

Even so, to many caregivers, activities like washing clothes merited higher priority in the allocation of time than parenting. This was especially pronounced when caregivers placed little value on interacting with children at such a young age, which may explain why having more than one child did not appear to be associated with parenting quality.

CONCLUSION

Early childhood developmental delays are alarmingly commonplace in rural China. In our rural sample from poor counties in Shaanxi Province, almost one in two toddlers under age three are cognitively delayed. Consider the scenario where the rate of cognitive delays in urban and wealthy rural parts of China is around 15 percent (the normal rate in any healthy population anywhere in the world given a normal distribution of cognitive development).⁵⁷ As there is approximately a

57. Scott Rozelle, "Human Capital Roots of the Middle Income Trap: Rural China's Health, Nutrition and Education" (presentation, Xi'an, China, November 15, 2016).

1:1 poor rural-urban population ratio in China today, around one-third of all Chinese toddlers nationwide may be cognitively delayed.

How does this affect China's educational challenge to reduce dropout rates and increase attainment levels? Based on our study, by the first day of primary school almost one-third of students are already behind, held back by cognitive delays. As they advance in their academic career, these delays would not only hinder their learning but also push them toward dropping out,⁵⁸ a trend that contributes to poor overall attainment levels. This is not to say that the educational system is not accountable when it comes to making room for students with varying ability levels; in fact, there is a large body of literature identifying ways in which China's educational system can improve in this domain. What our findings suggest, however, is that inadequate ECD is partly responsible for the attainment challenges in the first place.

Moreover, the government will need to reckon with the implications of the high rates of cognitive delay on future labor force productivity. At a time when the economy is in dire need of innovative and high-skilled labor, almost one-third of the labor force will not be qualified due to their early age cognitive delays. Certainly, low-skill occupations in farming and factory work will still be necessary in a middle-income economy. But assigning so much of the Chinese labor force to jobs in these sectors due to prior cognitive delays is likely to make it less feasible to fuel China's economic engines amid the threats of the middle-income trap. Even if China does manage to attain the status of an advanced developed economy, it will not need that many individuals producing on assembly lines or performing cognitively undemanding employment tasks. If one-third of the entire labor force is cognitively challenged this would engender a social crisis, and possibly higher levels of crime and unemployment, which would in turn have negative impacts on productivity and investment.

The final and most important point here pertains to the personal level. An individual who has been hindered by cognitive delays is less able to benefit from an economy in which education is rewarded socially and monetarily.⁵⁹ Thus, before a child's third year his/her life chances become limited.

Our findings also point to the vital yet unrealized need to cognitively stimulate toddlers. As our analysis shows, activities like reading, singing, and playing with toddlers are significantly associated with a lower likelihood of the toddler experiencing a cognitive delay. The majority of caregivers we surveyed did not engage in

58. Hongmei Yi et al., "Dropping Out: Why Are Students Leaving Junior High in China's Poor Rural Areas?" *International Journal of Educational Development* 32, no. 4 (2012): 555–63.

59. In fact, recent studies have documented an increase in the returns to education: Haizheng Li, "Economic Transition and Returns to Education in China," *Economics of Education Review* 22, no. 3 (2003): 317–28; Zhiqiang Liu, "The External Returns to Education: Evidence from Chinese Cities," *Journal of Urban Economics* 61, no. 3 (2007): 542–64; Alan De Brauw and Scott Rozelle, "Reconciling the Returns to Education in Off-Farm Wage Employment in Rural China," *Review of Development Economics* 12, no. 1 (2008): 57–71.

adequate parenting practices. The reasons show this is not a result of gender-based discrimination: male and female toddlers in our sample developed similarly. Neither does it directly result from poverty: our quantitative analyses discounted this factor. Similarly, caregiver indifference did not emerge as concern: almost all caregivers expressed aspirations for, and a sense of responsibility towards, their children. Instead, the barriers to good parenting included mothers' absences due to work migration (an adverse effect of government policies that greatly hinder families' ability to move to a city) as well as low maternal education, inadequate parenting knowledge, and a lack of time. Taken together, these sources suggest that the ultimate source of the problem is a lack of sufficient knowledge about the importance of cognitively stimulating toddlers, how to go about doing so, and how it relates to their child's future well-being.

This lack of parenting knowledge is not surprising given the relative novelty of the child development field. In fact, it has often been the case that vital kinds of information (health information being one of them) are disproportionately unavailable to the poor. (One example of this pattern in the United States is that women of low socioeconomic status are ill informed regarding the dangers of smoking during pregnancy.)⁶⁰ Due to this inequity in accessing health information, as well as to the urgency of the ECD problem in rural China, proactive approaches are needed to disseminate parenting information.

One potential candidate for this task of disseminating information is the existing health care system. Village health clinics could theoretically provide parenting information to women who are pregnant or who just gave birth, as well as to their husbands and caregivers in general. However, recent studies have raised serious questions about the quality of village clinics. One study found that only 20 percent of the surveyed rural clinicians had a senior high school or equivalent education and none had a university degree.⁶¹ Moreover, the treatments recommended by rural clinicians for patients presenting with common illnesses were correct only half the time.⁶² This stark reality speaks to a need for a source of parenting information that should bypass the formal health care sector.

The Health and Family Planning Commission (HFPC) may well be a better institution to tap. The HFPC is the government agency historically responsible for the enforcement of China's birth-reduction policy. As one of the largest bureaucracies in the world, an HFPC representative is permanently stationed in every village across China. As China's economy grew and birth rates naturally declined, the government has been moving away from enforcing such strict limits on births

60. Ellen Meara, "Why Is Health Related to Socioeconomic Status?" (working paper, National Bureau of Economic Research, Cambridge, MA, April 2001).

61. Sean Sylvia et al., "Survey Using Incognito Standardized Patients Shows Poor Quality Care in China's Rural Clinics," *Health Policy and Planning* 30, no. 3 (2015): 322–33.

62. *Ibid.*

and officially moved to a two-child policy in 2016.⁶³ As a result, the HFPC is looking for a new institutional mission and has turned its attention to ECD. As it currently stands, the institution already has the institutional reach, the bureaucratic capability, and considerable experience doing village outreach and running informational campaigns. It may be the perfect candidate for taking on the challenge of educating caregivers on how to improve interactions with young children.

It is especially critical that any informational campaign stresses the importance that the first few years of life can have on a child's long-term well-being. Stressing this may help alleviate the role of time constraints in shaping caregiver behavior—that is, if caregivers understand exactly how important good parenting practices are, they might well give greater priority to engaging in such practices.⁶⁴ Ultimately, bringing about a much needed improvement in the parenting culture will provide the economy with a more skilled labor force and provide rural China's new generations with an opportunity to thrive.

63. Wang Feng, Baochang Gu, and Yong Cai, "The End of China's One-Child Policy," *Studies in Family Planning* 47, no. 1 (2016): 83–86.

64. In developed countries, child-rearing training of various sorts often teaches caregivers why and how to engage with young children: Leslie Morrison Gutman and Leon Feinstein, "Parenting Behaviours and Children's Development from Infancy to Early Childhood: Changes, Continuities and Contributions," *Early Child Development and Care* 180, no. 4 (2010): 535–56; Robert H. Bradley et al., "Home Environment and Cognitive Development in the First 3 Years of Life: A Collaborative Study Involving Six Sites and Three Ethnic Groups in North America," *Developmental Psychology* 25, no. 2 (1989): 217–35.

APPENDIX

Table A1. Characteristics of Sample Toddlers

	Number of Toddlers	Percentage of Sample
Gender:		
Male	746	51.7
Female	696	48.3
Infant's birth:		
Normal	1,367	94.8
Premature	75	5.2
Siblings:		
Only child (at time of survey)*	884	61.3
One	539	37.4
Two or more	19	1.3
Primary caregiver:		
Mother	1,145	79.4
Grandmother	188	13.0
Other	109	7.6
Maternal educational attainment level:		
Middle school or lower (≤ 9 years)	1,197	83.0
Senior high school or higher (> 9 years)	245	17.0
Household receives welfare:		
No	1,098	76.1
Yes	344	23.9

Source: Authors' survey.

*Since the sample was randomly selected on the basis of the age of the babies (and not the age of the mother), we should expect, using simple demographic projections, that about 60–70 percent of mothers with only one baby will decide to have another child in the future. This means that, on average, around 80 percent of the families will have two children (most of the 80 percent) or more (with only a small fraction having three or more).

Table A2. Correlates of Parenting Practices

	Read to Child Yesterday (1)	Sang to Child Yesterday (2)	Used Toys to Play with Child Yesterday (3)	Cognitively Delayed Toddler (4)
Child's characteristics:				
Female	.01 (.02)	.03 (.03)	-.04 (.03)	-.05 (.03)
Only child	.02 (.02)	.04 (.03)	.06 (.03)	-.03 (.03)
Caregiver's characteristics:				
Mother is primary caregiver	.01 (.02)	.08* (.03)	.07* (.03)	-.03 (.03)
Mother attended high school	.07* (.03)	.18* (.04)	.10* (.04)	-.16* (.03)
Receives government subsidy	-.01 (.02)	-.04 (.03)	.03 (.03)	.06 (.03)
Controls	Yes	Yes	Yes	Yes
Observations	1,442	1,442	1,442	1,442
R ²	.01	.01	.03	.04

Note: Robust standard errors in parentheses. Attending high school is equivalent to advancing beyond the first nine years of schooling. All regressions above control for the mother's age (whether it is larger than the mean), and the child's age (whether it is larger than the mean).

* $p < .05$.