
Parenting Attitudes, Behaviors and Developmental Delays in Children Aged 6-18 Months: Evidence from Rural China

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Months: Evidence from Rural China

1. Introduction

The first years of life comprise a critical developmental period that has implications for lifelong outcomes due to rapid brain development and brain malleability during these early years (Currie & Almond, 2011; Attanasio, Cattan, Fitzsimons, Meghir, & Rubio-Codina, 2015; Knudsen, 2004; Knudsen, Heckman, Cameron, & Shonkoff, 2006; Huttenlocher, 1979). In these first few years, young children begin to build an important base for their lifelong cognitive, linguistic, and social emotional abilities (Park, 2012; Bowman, Donovan, & Burns, 2000; Lugo-Gil & Tamis-LeMonda, 2008).

The proven importance of this early development stage has encouraged researchers to delve more deeply into the underlying factors that may be associated with cognitive, language and social emotional development during this period. A number of studies have shown that the home learning environment that parents provide for their children is significantly linked to children's cognitive, language and social emotional performance (Park, 2012; Bowman et al., 2000; Bradley & Caldwell, 1982; Bradley, Caldwell, & Elardo, 1979; Anders et al., 2012). Specifically, many researchers have demonstrated the importance of parenting behaviors in their children's early childhood development (Landry, Smith, & Swank, 2006; Landry, Smith, Miller-Loncar & Swank, 1997; Park, 2012; Lugo-Gil and Tamis-LeMonda, 2008; Chang Park, Singh & Sung, 2009; Parker, Boak, Griffin, Ripple & Peay, 1999). Parenting activities such as *telling*

stories, singing songs and using toys to play with the child are commonly used as positive parent-child interaction measures with proven links to early language acquisition and improved cognitive and social emotional development (Paulson, Dauber, & Leiferman, 2006; Field, 2010; Bus, 2001; Barrueco, López, & Miles, 2007; Isbell, Sobol, Lindauer, & Lowrance, 2004; Bornstein & Putnick, 2012).

Meanwhile, early studies have already showed that one of the fundamental problems in social psychology involves the relationship between attitudes and behaviors (Bentler & Speckart, 1981; Kahle & Berman, 1979). Moreover, a substantial amount of effect still has been devoted to the question that how parental attitudes relate to parental behaviors, which displays that individual differences in parents' global child-rearing attitudes were assumed to reflect differences in aggregate parental behavior (Holden & Edwards, 1989; Nover, Shore, Timberlake, & Greenspan, 1984; Goodnow, 1988) and, consequently, to result in differential child cognitive, social emotional outcomes (Baker, Fenning, & Crnic, 2011; Miller, 1988; Miller, 1986; McGillicuddy-De Lisi, 1985). Therefore, we may surmise that if parents know the scientific raising method and believe that telling stories, singing songs and using toys to play with the child are beneficial for the child cognitive, language and social emotional development, they may further have more interaction with their child through these activities.

While previous studies have made important contributions in demonstrating the importance of positive parenting activities in early childhood development, most of the work has been done in the context of developed countries, and as such, little is known about the parenting environment, parental attitudes and behaviors in developing country

settings. In the limited set of studies that do exist, research has shown that the share of children with cognitive, language and social emotional delays is higher in developing countries (Grantham-McGregor et al., 2007; Bornstein & Putnick, 2012; Barrueco et al., 2007).

To our knowledge, however, almost no studies are about parenting behaviors in *rural* China. Published studies on this topic are mainly focused in urban China (Liu, Zhang D, Wang, Hao, & Zhang W, 2003; Gu, Gao, Li, & Wei, 2009). Due to the nature of different research approaches, few studies have used quantitative data and/or quantitative analysis to establish a correlative link between parenting behaviors and children's development.

In this paper, we aim to provide an empirically-based overview of parenting behaviors in rural China and to measure the correlation between parenting behaviors and children's cognitive, language and social emotional development. To do so, we report on the findings of a survey (n=448) of caregivers (henceforth, *caregivers*) of children aged 6 to 18 months in rural Hebei and Yunnan provinces, China. Specifically, we measure the attitudes of caregivers towards their children as well as the willingness of caregivers to provide a stimulating parenting environment. We seek to understand whether caregivers are willing to spend time engaging in activities that have been shown to improve their children's cognition, language, and social-emotional development. Next, we describe actual parenting behaviors in poor rural areas in China, measured by how often parents are telling stories, singing songs and using toys to play

with the child (henceforth, *parenting behaviors*). Finally, we measure the statistical correlation between parenting behaviors and children development.

2. Study sample and methods

2.1 Sample Selection

Our study was conducted in 2014 in two prefectures located in Hebei and Yunnan provinces. From each of these two prefectures, one poor county were randomly selected to participate in the study. From each county, we then randomly selected one township (the middle level of administration between county and village) to participate in the study. The two townships are both far from the county seat and are comprised of both Han and ethnic minorities. The Han make up the majority of the population. The two sample townships have 22 villages and 21 villages respectively. The data we used in this study were collected from sample households over a three-week period in September 2015. A list of all registered births was obtained from the local family planning official in each village. All children in our desired age range (6-18 months) were enrolled in the study. Overall, our study uses data from 448 households in 43 villages across 2 townships. This means that there are 448 children aged 6-18 months and 448 primary caregivers in our sample.

2.2 Data Collection

Teams of trained enumerators collected socioeconomic information from all households participating in the study. We recorded the age and level of education of each caregiver/interviewee. We also asked about the caregiver's relationship with the

child and whether the family was receiving Minimum Living Standard Guarantee Payments (a poverty indicator and a form of government welfare for the lowest income families nationwide). Finally, enumerators recorded information about the child's gender, birth order and whether the child was born prematurely or not. The exact age of each child was obtained from his or her birth certificate. Each child's primary caregiver was given a detailed survey on parental and household characteristics, including who takes care of the child and stays at home with the child (parents, grandparents, brother or sister). Generally, the primary caregiver (defined as the person who typically carries the most responsibility for the child's care) was either the child's mother or grandmother.

Our survey also included a series of questions about the household's parenting environment, especially in terms of parenting attitudes and behaviors towards the child. We asked two types of questions. First, we asked what parents thought about their relationship with their children, including their willingness to play with, spend time with, and show emotion, love, or engage in physical contact with their children. Next, we asked caregivers about the frequency of telling stories, singing songs and using toys to play with the child in the previous 24 hours. We also asked more objective questions about exactly how many times caregivers hug or kiss or show affection to their children, how much time the child spends watching TV or videos, and how much time the child spends playing alone.

Child development is measured using the Bayley Scales of Infant and Toddler Development (BSID). The BSID is an internationally recognized, scaled test of infant

and toddler cognitive and motor development (Bayley, 1974). This test is well recognized in the psychological literature and is listed by the American Psychiatric Association as a way to diagnose certain developmental disorders (American Psychiatric Association, 2013). The first edition of this test (BSID) was formally adapted to the Chinese language and environment in 1992 (Yi, Luo, Yang, & Wan, 1993), following the example of other published studies that used the BSID to assess child development in China (Chang, Zeng, Brouwer, Kok, & Yan, 2013; Wu, Sheng, Shao, & Zhao, 2011).

In this study we use the third edition of the test. The BSID-III separates the original Mental Development Index (MDI) of the earlier versions of the BSID into cognitive and language scales (Bos, 2013; Bayley, 2006). The Cognitive Scale assesses play skills, information processing (attention to novelty, habituation, memory, and problem-solving), counting and number skills (Bayley, 2006). The Language Scale assesses communication skills including language and gestures (Bayley, 2006). Parent-report questionnaires are also incorporated into the BSID-III in order to assess a child's social-emotional state. The Social Emotional Scale assesses emotional and social functioning as well as sensory processing (Bayley, 2006).

All enumerators attended a weeklong training course on how to administer the BSID-III and another 2.5-day experiential learning program in the field. The test was administered one-on-one with households using a set of standardized toys and a detailed scoring sheet. The BSID-III takes into consideration each child's age in days, as well as whether he or she was a premature birth. These two factors, combined with

the child's performance on a series of tasks using the standardized toy kit, contribute to the establishment of independent, internationally standardized scores.

2.3 Statistical analysis

Our main variables defining parenting behaviors are: Did the caregiver (or any other family member) tell stories to the child yesterday? Did the caregiver (or any other family member) sing songs to the child yesterday? Did the caregiver (or any other family member) use toys to play with the child yesterday? We also create a variable by combining the previous three questions: Did the caregiver (or any other family member) tell stories or sing songs or use toys to play with the child yesterday (i.e. did one of three aforementioned parenting interventions yesterday)?

There were also several other questions that we use to assess parenting behaviors. Over the past two days, about how many times did the caregiver hug and kiss or otherwise show affection to your child? In a typical day, about how many minutes does the child watching TV or videos? In a typical day, how much time does your child spend playing by himself/herself?

In our study, we use cognitive, language and social emotional scales to measure children's development. The composite scores for the Cognitive, Language, and Social Emotional scales are respectively age-standardized with an expected mean (standard deviation) of 105 (13) (Bos, 2013; Serenius et al., 2013; Lowe, Erickson, Schrader, & Duncan, 2012; Jary, Whitelaw, Walløe, & Thoresen, 2013), 109 (15) (Bos, 2013; Serenius et al., 2013; Jary et al., 2013) and 100 (15) (Peng et al., 2013; Chao, Tsou, Huang, & Chang-Chien, 2011). Children are mildly impaired in each of

the three domains if they have a score that is from -2 SD to less than -1 SD ($-2 \text{ SD} \leq \text{score} < -1 \text{ SD}$) (Anderson, De Luca, Hutchinson, Roberts, & Doyle, 2010). According to the given expected mean (standard deviation) from the references, we can count that mild impairment for each index is defined as $79 \leq \text{cognitive} < 92$, $79 \leq \text{language} < 94$, and $70 \leq \text{social emotional} < 85$. Children are considered to have moderate or severe impairment if they have a score that is less than -2 SD ($\text{score} < -2 \text{ SD}$) (Anderson et al., 2010). For each index, this is defined as $\text{cognitive} < 79$, $\text{language} < 79$ and $\text{social emotional} < 70$.

All statistical analyses were performed using STATA 13.0. P-values below 0.05 were considered statistically significant. The statistical significance of differences in parenting behaviors, cognitive, language and social emotional scores were assessed using ANOVA in STATA. STATA's multiple linear regression model was used to conduct the multivariate analysis. We included the following variables as potential confounders in the multivariate analysis: child's gender, child's age, whether the child was born prematurely, whether the child is an only child, whether the child's mother was identified as the primary caregiver, mother's level of education and age, and whether the family received Minimum Living Standard Guarantee Payments.

3. Results

The basic socioeconomic and demographic characteristics of study participants are reported in Table 1. Of the 448 children in this study, slightly over half (53.8%) were male (column 2, row 2). Around 4.2% of sample children were born prematurely

(column 2, row 4); 43.3% do not have a sibling (column 2, row 6). The mother is the primary caregiver for 86.8% of the children in the sample (column 2, row 8). In the case of most other households, the paternal grandmother is the primary caregiver for 10.5% of children in the sample. The majority of the mothers (72.1%) have completed fewer than 9 years of schooling (column 2, row 9); 65.0% are over 25 years of age (column 2, row 12). 12.5% of sample families report receiving Minimum Living Standard Guarantee Payments (column 2, row 14).

3.1 Parenting attitudes and behaviors

Caregiver attitudes towards parenting are shown in Table 2. The data shows that the majority of caregivers (88.8%) in the sample reported that they really enjoyed spending time with their children over the last month (column 3, row 1). Almost all caregivers (91.7%) reported that they generally got along well with the child (column 3, row 2), and that they found playing with the child to be fun and interesting (89.5%) over the last month (column 3, row 3). Only 5.4% of caregivers reported being irritated by the child over the last month (column 3, row 4), with only 8.9% of caregivers reporting that spending time with the child was stressful (column 3, row 5). Also, only 13.4% caregivers reported that they were ignored by their child when they talked to them in the previous month (column 3, row 6). Tellingly, in general, nearly all (95.6%) of caregivers believe that it is their responsibility to help children to learn about the world around them (column 3, row 8).

Also according to the survey data, while caregivers are willing to spend time with their child and find playing with their child is interesting, only 44.6% of

caregivers agree that they “know how to relate to my child on his/her level over the last month” (column 1, row 7). In addition, while 75% of caregivers agree that it is important for them to play with the child (column 3, row 9), a slightly lesser proportion of caregivers (67.9%) actually know how to play with the child (column 3, row 10).

In Table 3, we present data on the levels and types of interaction between caregivers and their children. We find that only 13.8% of caregivers told stories to the child on the day prior to the survey being administered (column 1, row 1). Similarly, slightly more than one third of caregivers (36.2%) sang to the child on the day prior to survey administration (column 1, row 2). We further find that 40.6% of parents did not use toys to play with the child on the day prior to the survey being administered (column 2, row 3). When we asked how many times caregivers hugged or kissed or otherwise showed affection to their children in the past two days, 44.9% reported doing so 6-10 times (column 1, row 6). On average, children spent an average of 34 minutes watching TV or videos per day (column 1, row 8) and 60 minutes per day playing alone (column 1, row 9).

The survey also asked caregivers about the sources of their parenting knowledge and practices (Table 4). The majority of caregivers obtain information from multiple sources. According to the findings, most caregivers (72.0%) obtained information about parenting practices from family members (column 1, row 2). Many caregivers (38.2%) also obtained information from friends (column 1, row 3) and the Internet (34.8%) (column 1, row 7). Fewer than 15.0% of caregivers in our sample

received information about parenting practices from local doctor, government personnel at the local family planning agency or the official village-level Women's representative of the National Women's Federation (column 1, row 4). In addition, other sources of information include TV, books or their own experiences.

3.2 Links between parenting behaviors and socioeconomic factors

Table 5 presents the bivariate associations between parenting behaviors and selected children and household characteristics. We find no statistically significant differences in parenting behaviors either by gender of the child ($p > 0.6$ in all cases) (column 2, 4, 6, and 8, row 1) or according to whether the family receives Minimum Living Standard Guarantee Payments ($p > 0.1$ in all cases) (column 2, 4, 6, and 8, row 9). Rates of telling stories, singing songs, and using toys to play with the child was significantly higher for children whose mother had completed more than 9 years of education ($p < 0.01$ in all cases) (column 2, 4, 6, and 8, row 7). Similarly, only children experience significantly higher rates for all three parenting activities than child who had siblings ($p < 0.05$ in all cases) (column 2, 4, 6, and 8, row 3). Moreover, mothers who were their child's primary caregivers were significantly more likely to use toys to play with the child in the day prior to survey administration ($p < 0.05$) (column 6, row 5).

3.3 Cognitive, language and social emotional development

BSID-III measures were available for all 448 children. The mean (standard deviation) cognitive, language and social emotional scores for the sample were 98.2 (12.6), 92.0 (13.3) and 88.3 (13.8) respectively (Table 6). Accordingly, 5.1% of

children showed moderate or severe impairment in their cognitive development (cognitive < 79) (column 1, row 2). Around 24.6% of children had a cognitive score between 79 and 92, indicating mild cognitive impairment (column 1, row 3). A total of 29.7% children scored below 92 on the cognitive scale, indicating some degree of impairment (column 1, row 4).

In examining the language score results, our data show that 14.7% of children had moderate or severe language impairment (language < 79) (column 1, row 6), while 39.3% of children had a language score between 79 and 94, indicating mild language impairment (column 1, row 7). Overall, a total of 54.0% children had a language score below 94, indicating some degree of impairment (column 1, row 8).

Finally, 4.2% of children showed moderate or severe impairment in their social emotional development (social emotional < 70) (column 1, row 10). Close to one third of children (30.8%) had mild impairment in their social emotional development (scoring between 70 and 85) (column 1, row 11). Similarly, at least 35.0% of children scored below 85, indicating some degree of impairment in their social emotional development (column 1, row 12).

3.4 Links between parenting behaviors and cognitive, language and social emotional development

Table 7 presents the bivariate associations between parenting behaviors and child development. In families where the caregiver sang songs to child yesterday, the child's language and social emotional scores were significantly higher than caregivers who did not sing songs to the child yesterday ($p < 0.01$) (column 5 and 7, row 3).

Similar positive correlations were found between caregivers' using toys to play with the child and the child's cognitive, language and social emotional scores ($p < 0.05$) (column 3, 5, and 7, row 5). In families where the caregiver reported that they did one of three activities yesterday (telling stories, singing songs, and using toys to play with the child), children's cognitive, language and social emotional scores were significantly higher than children who were in households where caregivers did not do one of three activities yesterday ($p < 0.01$) (column 3, 5, and 7, row 7).

3.5 Multivariate analysis

The results of the multivariate analysis are consistent with the findings of the bivariate analysis (Table 8). We find a significant positive correlation between singing songs and the child's language scores ($p < 0.05$) (column 3, row 2) and between using toys to play with the child and the child's cognitive scores ($p < 0.05$) (column 1, row 3). In households where the caregiver (or another member of the household) did one of the three activities (telling stories, singing songs or using toys to play with the child), the child's cognitive and language score are significantly higher than it is for children in households whose caregivers did not do one of the three activities ($p < 0.01$) (column 1 and 3, row 4). More precisely, our analysis shows that doing one of these three activities with their children is associated with a 3.98 points gain in the child's cognitive scores (column 1, row 4) and a 3.22 points gain in the child's language score (column 3, row 4). We also find a significant positive correlation between displays of parental affection (hug and kiss or otherwise) in the last two days and the child's social emotional score ($p < 0.01$) (column 5, row 5). However, we find

no significant link between either time spent playing by himself/herself per day ($p > 0.2$) (column 1, 3, and 5, row 6) or time spent watching TV or videos per day ($p > 0.3$) (column 1, 3, and 5, row 7) and child's cognitive, language or social emotional scores.

In order to make our analysis more comprehensive, we also make use of a multivariate regression looking at the association between doing *one of two* activities in the previous day and child development (Telling stories or singing songs; Telling stories or using toys to play with the child; Singing songs or using toys to play with the child) (Appendix Table 1). The results show that there are statistically significant correlations between telling stories or singing songs yesterday and the child's social emotional score ($p < 0.05$) (column 5, row 1), between telling stories or using toys to play with the child yesterday and the child's cognitive score ($p < 0.01$) (column 1, row 2), and between singing songs or using toys to play with the child yesterday and the child's cognitive score ($p < 0.01$) (column 1, row 3) and language score ($p < 0.05$) (column 3, row 3).

4. Discussion

One of the main objectives of this study is to document the attitudes and practices of parenting behaviors in rural China. In this paper, it is shown that while caregivers care deeply about their children and self-report that they want to do a good job of raising their children, actual practice falls short.

More specifically, we show that a high fraction of caregivers of children aged 6-18 months living in low-income areas of rural China do not regularly engage in

positive parenting practices such as telling stories, singing songs, or using toys to play with the child. When asked directly about their behaviors in the day prior to survey administration, rates of engaging in these behaviors ranged from a high of 59.4% using toys to play with the child to a low of 13.8% for telling stories.

What are the underlying reasons behind the failure of caregivers to engage in these behaviors? Looking at caregiver attitudes towards engaging with the child, we see that almost all caregivers (95.5%) believe that it is their responsibility to “help children to learn about the world around them” and have high expectations for their children’s future success. However, they don’t know what they should do and how they should do it. The most serious problem is that the majority of households (above 86.2%) did not tell stories to the child and only 44.7% of caregivers reported that they know how to relate to the child on his/her level. We therefore surmise that poor parenting behaviors are not a result of caregiver indifference to their children or a result of parental unwillingness to take responsibility.

Rather, we suspect that caregivers in rural China lack a reliable source of good information about what the most effective parenting behaviors are and how to parent their children. Most of the caregivers (72.0%) we surveyed reported learning about parenting from their family members. Only 14.7% of caregivers reported getting their information from more authoritative, government sources.

Additionally, we surmise that another reason for poor parenting practices is low levels of education among mothers. Table 5 show that there is a strong, statistically significant link between maternal education level and parenting behaviors.

Only 27.9% of mothers in our sample had schooling beyond 9 years. The more knowledgeable a mother is, the more she may be able to be aware of the link between positive parenting behaviors and children's development. More educated mothers may also be able to seek out specific information on healthy mother-child interaction and the importance of telling stories, and singing songs, and using toys to play with their child.

Our data further show that negative parenting behaviors are significantly negatively correlated with children development. Children with caregivers who did not engage in any of our three focus activities (telling stories, singing songs, using toys to play with the child) were significantly more likely to suffer from developmental delays compared with their peers. We can see that the actual practice falls short (especially for doing the three focus activities) from table 3 and slightly higher than one half of all children in our sample have language development delays and about one in three children experience delays in their cognitive and social emotional development from table 6. Table 8 further prove that the correlation between the parenting behaviors and children development.

The limited studies show that children development delays are in developing settings (Grantham-McGregor et al., 2007; Bornstein & Putnick, 2012; Barrueco et al., 2007), however, there is almost no studies about parenting behaviors and children development in rural China. The strength of the paper is that we provide an empirically-based studies about parenting behaviors and children development in rural China and give the insights into which exact dimensions of the parenting behaviors

are linked to children development delays. Moreover, to our knowledge, this study represents one of the only administrations of BSID-III ever conducted in rural China (Ye, Luo, Jin, Lei, & Gu, 2015).

One limitation of the study is its cross-sectional design, which does not allow us to identify causal relationships. Another possible source of bias stems from the fact that our study children were identified based on a list of registered children provided by the village family planning official, thus systematically excluding all unregistered children. The number of unregistered children has drastically declined in recent years, due to a combination of naturally declining fertility rates and loosening family planning policies. Indeed, a 2010 survey found the rate of unregistered children to be only around 0.12% (National Bureau of Statistics, 2011). We therefore believe that this bias is negligible.

5. Conclusions

Our study has several important implications. First, our data show that caregivers in rural China do not regularly engage in positive parenting practices. Given the correlations we observe between individual parenting behaviors and child development, these behaviors may be at least partly responsible for high rates of development delays in China. Therefore, if the government hopes to identify policies that can improve child development outcomes, one effective strategy may be to take steps to improve the ways in which parents interact with their children.

Our data further indicate that the areas of parenting behaviors most lacking in rural China seem to be telling stories and singing songs, although rates of using toys to play with the child are also low. In other words, during the time period in which verbal engagement has been shown to be crucial for a child's development, rural Chinese caregivers rarely tell stories and sing songs to their children. In many developed countries, caregivers of young children engage in parenting activities and attend parenting training sessions that teach them how to engage with their children in order to stimulate their children's development (Gutman & Feinstein, 2010; Bradley et al., 1989). China's rural areas may benefit from the adoption of a similar model of parental training and engagement.

Finally, our study underlines the stark lack of parenting information available to rural Chinese caregivers. Government sources of information on parenting are largely non-existent or at least unused. Most caregivers rely on their family members (such as grandparents) in shaping their parenting behaviors and strategies. Future interventions should attempt to address this information gap. For most caregivers, especially for young mothers, Internet-based information is becoming more accessible. However, due to the unreliability of Internet sources, there is actually very little useful information that caregivers can put to use. Regardless, villages have locally-based resources in the form of village doctors, family planning workers, and Women's Federation representatives. All of these representatives are responsible for contact with local families. One strategy for filling the information gap might be to harness these individuals and train them to disseminate available parenting information and to

teach village households positive parenting behaviors. Caregivers can also use internet-based information in conjunction with in-person training as a supplemental source of information.

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Table 1. Basic characteristics of sample children in rural Hebei and Yunnan Provinces, China (N=448)

Characteristics	Number of observations	Percent (%)
Gender		
Female	207	46.2
Male	241	53.8
Is the infant premature?		
No	429	95.8
Yes	19	4.2
Only-child		
No	254	56.7
Yes	194	43.3
Years of maternal education		
≤ 9 years	323	72.1
> 9 years	125	27.9
Maternal age		
Age ≤ 25	157	35.0
Age > 25	291	65.0
Families receive Minimum Living Standard Guarantee		
No	392	87.5
Yes	56	12.5

Data Source: Authors' survey.

Table 2. Caregiver attitudes towards parenting behaviors in rural Hebei and Yunnan Provinces, China (N=448)

	Disagree (%)	Unsure (%)	Agree (%)
Thinking back over the last month, do you agree or disagree with the following statements:			
I really enjoyed being with my child.	3.4	7.8	88.8
My child and I have gotten along very well.	2.0	6.3	91.7
Playing with my child was fun and interesting.	3.6	6.9	89.5
I got irritated with my child.	83.2	11.4	5.4
The time I have spent with my child has been very stressful.	84.8	6.3	8.9
My child ignored me when I talked to him/her.	70.1	16.5	13.4
I didn't know how to relate to my child on his/her level.	44.6	21.9	33.5
In general, how much do you agree or disagree with the following statement:			
Helping children to learn about the world around them is the responsibility of their parents/caregivers.	2.2	2.2	95.6
It's important for you to play with your child.	4.5	20.5	75.0
I know how to play with my child.	12.7	19.4	67.9

Data source: Authors' survey.

Table 3. Parenting behaviors of sample children in rural Hebei and Yunnan Provinces, China (N=448)

	Yes (%)	No (%)
Did caregiver (or any other family member) tell stories to the child yesterday?	13.8	86.2
Did caregiver (or any other family member) sing songs to the child yesterday?	36.2	63.8
Did caregiver (or any other family member) use toys to play with the child yesterday?	59.4	40.6
	Percent (%)	Number of observations
Over the past two days, about how many times do you hug and kiss or otherwise show affection to your baby? (Number of times)		
0	1.3	6
1-5	38.2	171
6-10	44.9	201
Eleven or higher	15.6	70
	Mean (Minutes)	
In a typical day, about how much time does your child spend watching TV or videos?	34.2	
In a typical day, about how much time does your child spend playing by himself/herself?	59.9	

Data source: Authors' survey.

Notes: "Mean (Minutes)" reports the average amount of time that sample children spent watching TV or videos, or playing by himself/herself in a typical day.

Table 4. Sources of information about parenting behaviors (N=448)

Information source	Percent (%)	Number of observations
Own experiences	12.3	55
Family members	72.0	318
Friends	38.2	171
Local doctor, local bureaus of family planning, or Women's representative	14.7	66
Books	15.8	77
TV	25.7	115
Internet	34.8	156

Data source: Authors' survey.

Table 5. Parenting behaviors of sample children in rural Hebei and Yunnan Provinces, China, by child characteristics (N=448)

Child characteristics	Does caregiver (or any other family member) tell stories to the child yesterday? (Yes=1; No=0)		Does caregiver (or any other family member) sing to the child yesterday? (Yes=1; No=0)		Does caregiver (or any other family member) use toys to play with the child yesterday? (Yes=1; No=0)		Did caregiver (or any other family member) tell stories or sing songs or use toys to play with the child yesterday (did any of aforementioned three activities)? (Yes=1; No=0)	
	Mean ± SD	P-value	Mean ± SD	P-value	Mean ± SD	P-value	Mean ± SD	P-value
Gender								
Female	0.13 ± 0.34	0.65	0.36 ± 0.48	0.87	0.60 ± 0.49	0.65	0.69 ± 0.46	0.61
Male	0.15 ± 0.35		0.37 ± 0.48		0.59 ± 0.49		0.67 ± 0.47	
Only child								
No	0.09 ± 0.29	<0.01	0.31 ± 0.46	0.01	0.54 ± 0.50	<0.01	0.62 ± 0.49	<0.01
Yes	0.20 ± 0.40		0.43 ± 0.50		0.67 ± 0.47		0.75 ± 0.43	
Mother is primary caregiver								
No	0.15 ± 0.36	0.74	0.25 ± 0.44	0.07	0.46 ± 0.50	0.02	0.54 ± 0.50	0.02
Yes	0.14 ± 0.34		0.38 ± 0.49		0.61 ± 0.49		0.70 ± 0.46	
Years of Maternal Education								
≤ 9 years	0.11 ± 0.32	<0.01	0.32 ± 0.47	<0.01	0.54 ± 0.50	<0.01	0.63 ± 0.48	<0.01
> 9 years	0.21 ± 0.41		0.46 ± 0.50		0.74 ± 0.44		0.81 ± 0.40	
Family receives Minimum Living Standard Guarantee Payments								
No	0.14 ± 0.35	0.76	0.37 ± 0.48	0.21	0.60 ± 0.49	0.73	0.69 ± 0.46	0.13
Yes	0.13 ± 0.33		0.29 ± 0.46		0.57 ± 0.50		0.59 ± 0.50	

Data source: Authors' survey.

Notes: In Table 1, we measured seven child characteristics (Gender; Is the child premature; Only-child; Mother is primary caregiver; Years of Maternal Education; Maternal age; Family receives Minimum Living Standard Guarantee Payments). In Table 5, whether the child was born prematurely and maternal age are not shown for brevity; the link between both of these characteristics and parenting behaviors analyzed (in all cases) are not statistically significant.

Table 6. Cognitive, language and social emotional development scores of sample children in rural Hebei and Yunnan Provinces, China (N=448)

	Mean/Percent (%) ^a	Number of observations
Cognitive score	98.2 ± 12.6	
Moderate or severe (Cog < 79)	5.1 %	23
Mild (79 ≤ Cog < 92)	24.6 %	110
Total (Cog < 92)	29.7 %	133
Language score	92.0 ± 13.3	
Moderate or severe (Lang < 79)	14.7 %	66
Mild (79 ≤ Lang < 94)	39.3 %	176
Total (Lang < 94)	54.0 %	242
Social emotional score	88.3 ± 13.8	
Moderate or severe (Socemo < 70)	4.2 %	19
Mild (70 ≤ Socemo < 85)	30.8 %	138
Total (Socemo < 85)	35.0 %	157

Data source: Authors' survey.

Notes: We report results from the Cognitive scale, Language scale and Social Emotional scale in the BSID-III. "Moderate or severe" means that the child development score is less than -2 SD. "Mild" means that the child development score is more than -2 SD but less than -1 SD.

^aData are presented as mean ± SD (standard deviation) or percent (%).

Table 7. Cognitive, language and social emotional development of sample children in rural Hebei and Yunnan Provinces, China, by parenting behaviors (N=448)

	Number of observations	Cognitive Score		Language Score		Social Emotional Score	
		Mean \pm SD	P-value	Mean \pm SD	P-value	Mean \pm SD	P-value
Did caregiver (or any other family member) tell stories to the child yesterday?							
Yes	62	100.2 \pm 11.6	0.20	94.3 \pm 13.7	0.16	93.3 \pm 14.5	<0.01
No	386	97.9 \pm 12.8		91.7 \pm 13.3		87.5 \pm 13.5	
Did caregiver (or any other family member) sing songs to the child yesterday?							
Yes	162	99.7 \pm 12.5	0.07	95.1 \pm 14.2	<0.01	90.8 \pm 13.6	<0.01
No	286	97.4 \pm 12.7		90.3 \pm 12.5		86.9 \pm 13.7	
Did caregiver (or any other family member) use toys to play with the child yesterday?							
Yes	266	99.8 \pm 13.0	<0.01	93.3 \pm 13.7	0.02	89.5 \pm 13.5	0.03
No	182	96.0 \pm 11.7		90.3 \pm 12.7		86.7 \pm 14.1	
Did caregiver (or any other family member) tell stories or sing songs or using toys to play with the child yesterday (did one of three aforementioned activities)?							
Yes	304	99.9 \pm 12.7	<0.01	93.6 \pm 13.6	<0.01	89.6 \pm 13.4	<0.01
No	144	94.8 \pm 11.7		88.8 \pm 12.2		85.6 \pm 14.3	

Data source: Authors' survey.

Note: Data are presented as Mean \pm SD (standard deviation) or P-value for categorical variables. We report results from the Cognitive scale, Language scale and Social Emotional scale in the BSID-III.

Table 8. Multivariate analysis between parenting behaviors and child development (N=448)

	Cognitive Score			Language Score			Social Emotional Score		
	Coefficient	95% CI	P-value	Coefficient	95% CI	P-value	Coefficient	95% CI	P-value
Told stories to child yesterday	0.87	(-1.94; 3.68)	0.54	1.17	(-2.85; 5.18)	0.56	4.01	(-0.52; 8.54)	0.08
Sang songs to child yesterday	0.63	(-1.73; 3.00)	0.59	3.17*	(0.17; 6.17)	0.04	2.60	(-0.28; 5.47)	0.08
Used toys to play with child yesterday	2.81*	(0.54; 5.08)	0.02	1.64	(-1.31; 4.58)	0.27	2.07	(-1.21; 5.35)	0.21
Did one of the three: tell stories, sing songs or use toys to play with child yesterday	3.98**	(1.67; 6.29)	0.001	3.22*	(0.14; 6.31)	0.04	3.09	(-0.25; 6.43)	0.07
Showed affection to child in past two days	0.016	(-0.13; 0.18)	0.78	0.09	(-0.04; 0.25)	0.14	0.24**	(0.10; 0.39)	0.001
Minutes that child spends playing by himself/herself per day	0.004	(-0.01; 0.17)	0.56	0.006	(-0.01; 0.02)	0.55	0.009	(-0.01; 0.02)	0.21
Minutes that child spends watching TV or videos per day	-0.007	(-0.22; 0.01)	0.40	-0.004	(-0.02; 0.01)	0.59	0.002	(-0.01; 0.02)	0.75

Data source: Authors' survey.

Notes: Confidence interval (CI) in parentheses. We report results from the Cognitive scale, Language scale and Social Emotional scale in the BSID-III. Regression estimates from multiple linear models adjusted for child's gender and age, whether the child was born prematurely, whether the child is an only child, whether the child's mother was identified as the primary caregiver, maternal educational level and age, whether the family received Minimum Living Standard Guarantee Payments, and province dummy. Clustering is at the village level. The results (which are not shown for brevity) were substantially the same.

** Significant at 1%, * significant at 5%.

Appendix Table 1. Multivariate analysis of doing one of two parenting behaviors and child development (N=448)

	Cognitive Score			Language Score			Social Emotional Score		
	Coefficient	95% CI	P-value	Coefficient	95% CI	P-value	Coefficient	95% CI	P-value
Told stories or sang songs yesterday	1.14	(-1.12; 3.40)	0.32	3.18	(-0.06; 6.41)	0.06	2.72*	(0.05; 5.40)	0.046
Told stories or used toys to play with their child yesterday	3.15**	(0.88; 5.43)	0.008	2.00	(-1.30; 5.30)	0.23	2.57	(-0.95; 6.09)	0.15
Sang songs or used toys to play with their child yesterday	3.60**	(1.37; 5.83)	0.002	2.82*	(0.03; 5.60)	0.047	2.61	(-0.68; 5.89)	0.12

Data source: Authors' survey.

Notes: Confidence interval (CI) in parentheses. We report results from the Cognitive scale, Language scale and Social Emotional scale in the BSID-III. Regression estimates from multiple linear models adjusted for gender, age, whether the child was born prematurely, whether the child is an only child, whether the child's mother was identified as the primary caregiver, maternal educational level and maternal age, whether the family received Minimum Living Standard Guarantee Payments, and province dummy. Clustering is at the village level. The results (which are not shown for brevity) were substantially the same.

** Significant at 1%, * significant at 5%.