Parental Migration and Children's Psychological and Cognitive Development in China:

Differences and Mediating Mechanisms

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Abstract

Internal migration has resulted in a large number of left-behind children in China. Despite growing attention to this population, important gaps remain in our understanding of their cognitive development and the factors that mediate the impact of migration on children. The present study draws on a new nationally representative survey of Chinese children to study the psychological and cognitive development of left-behind children. Results show that rural children left behind by both parents (but not by one parent) are worse off in both psychological well-being and cognitive development than rural children living with both parents. The disadvantage of left-behind children is mediated by their caregivers' emotional well-being, parenting practices, and education. We also find a pronounced rural-urban difference in children's cognitive development.

Introduction

The current large-scale internal migration in China has important implications for family

dynamics and children's well-being. More than 168 million rural people have left their villages to

seek work in cities (China National Bureau of Statistics, 2016). As a result, a sizeable fraction of

Chinese children have experienced parental migration during their childhood, either

accompanying their parents (migrant children) or being left behind by one or both parents (left-

behind children). As of 2010, the number of migrant children was estimated to be over 28

million, representing about 10% of all Chinese children (ACWF 2013). In comparison, the

number of left-behind children more than doubled: 61 million rural children, or about 22% of all

Chinese children under age 18, had spent at least part of their childhood with only one or neither

parent at home (ACWF 2013; Duan et al. 2013).

Migration represents a distinct form of family transition that likely has important

ramifications for children because it shapes both family material and non-material resources,

which are central to child development (Danziger and Waldfogel 2000; Yeung et al. 2002). Left-

behind children, despite receiving sizeable monetary remittances, often confront parent-child

separation and disruptions in family relationships and parenting practices. Migrant children,

while enjoying preserved family unity and improved economic conditions, often confront

institutional and social discrimination that prevents them from fully integrating into their host

communities. For both groups of children, the key question is how these opposing forces induced

by migration balance out to shape children's well-being and how the overall impact of migration may vary across different dimensions of child development (Xu, Wu, and Dronkers 2018).

The well-being of children of migrants has drawn substantial scholarly attention and has yielded many useful insights. However, two important gaps remain. First, existing research has focused on children's education and health, for which data are more readily available (Liang and Chen 2007; Lu 2012; Zhou et al. 2014). Although children's psychological outcomes have recently received increasing scrutiny (Ren and Treiman 2016; Wen and Lin 2012; Yeung and Gu 2016), there is much less systematic research on the cognitive development of these children (for notable exception, see Xu et al. 2018). This is a lacuna because cognitive and psychosocial developments are potentially key areas where left-behind and migrant children face particular vulnerabilities, as these dimensions are closely tied to non-material inputs from parents.

Second, previous research has centered on children's outcomes and has paid less attention to mediating mechanisms that can explain the effects of parental migration. Thus, we are left with the questions of why children may suffer from parental migration. For example, anecdotal evidence suggests that possible developmental deficits of left-behind children may be related to their less desirable family environments (Wang and Mesman 2015). Which aspects of the post-migration family environment constitute important mediating mechanisms?

To fill in these gaps, we use a nationally representative sample survey in 2012-2013 in China, designed by the authors specifically to examine the impacts of migration on families and children. The national representation allows us to assess the generality of the findings and offers

a more general view of the effect of parental migration on child outcomes than studies using local surveys. The rich set of information on key aspects of child development as well as family environments permit an in-depth analysis of the less well-studied dimensions of child well-being as well as underlying mediating channels. Among other items, we collected information on the Behavior Problems Index (BPI), a battery of questions that have been widely utilized with demonstrated validity (Peterson and Zill 1986; Achenbach and Edelbrock 1981). The BPI represents a more comprehensive and reliable measure of children's psychosocial functioning than separate scales composed of one or only a few items. In addition, we designed and carried out a cognitive assessment of children. The instrument, the Zhang-Yeung Test of Achievement developed by Houcan Zhang and W. Jean Yeung in 2012 for Chinese children, is valuable for studying cognitive development across diverse age groups of children (Yeung 2013). This study represents the first study using the Test on a national sample of children.

In the analysis, we focused on comparing several main groups of rural Chinese children: rural children in nonmigrant families, rural children left behind by one parent, and rural children left behind by both parents. To place the findings in the context of all Chinese children, we also compared rural children with two groups of urban children, namely migrant children and urban children in nonmigrant families. We further examined several mediating factors that may explain why children are affected by parental migration, taking advantage of the rich information available on the characteristics and behaviors of children's primary caregivers.

Background: Parental Migration and Child Development

Left-behind Children

For left-behind children, migration typically brings considerable economic improvement but at the same time may adversely affect children by separating children from their parents. Left-behind children inevitably experience reduced parental input and supervision and a less stimulating home environment for cognitive development (Graham and Jordan 2011; Hoang and Yeoh 2012). Concomitantly, remaining caregivers not only experience additional household responsibilities for childcare, home maintenance, and agricultural production, but also endure emotional burdens because of separation from their loved ones, usually their spouse or children (Lu 2012). These physical and psychological burdens subject the remaining caregivers to heightened stress, which further aggravates parenting deficits. The impaired psychological functioning of the caregivers may be inadvertently transferred to children, giving rise to emotional instability and depression (Hammen et al. 2012). Moreover, when elderly grandparents are the primary caregiver, they are also constrained by a lack of knowledge about the importance of positive parenting practices and cognitive stimulation. As a result, they read to or engage in stimulating play with children infrequently and often leave children to play by themselves or watch television (Chang et al. 2019). Exposure to the lack of supportive and attentive parenting practices undermines the social and psychological well-being of the children and delays their cognitive development.

It is worth noting that migration often brings economic benefits to their origin households

(Liang and Song 2018; World Bank 2016). Increased family economic resources benefits

children's intellectual and emotional development because well-off families are better able to

invest in children and provide a stimulating home environment (Yeung et al. 2002).

Nevertheless, the reduced quantity and quality of parenting can undermine the potential positive

economic effect of parental migration. The beneficial economic impact is premised on the

effective utilization of material resources on children. Parenting deficits make it difficult to fully

realize potential gains from improved household economies. Caregivers may be overwhelmed

with household survival needs and thus direct their energies and resources to basic household

maintenance rather than to improving children's well-being (Hildebrandt et al. 2005). The limited

education of alternative caregivers may further shift their attention and household resources

away from investment in children.

Giving these competing processes, a critical question is whether migrant parents'

financial contributions outweigh the family disruptions caused by their absence. While family

economic and social environments are both important, they operate differentially for different

aspects of child development. Income may exert a large impact on the aspects of development

that are heavily shaped by material resources, such as school attendance and physical health.

When it comes to children's psychosocial and cognitive outcomes, familial social (non-material)

environments become the key (Haveman and Wolfe 1995).

The family processes just discussed are likely to vary by children's relationships with

migrant parents. The literature on child development demonstrates that children are more

adversely affected by maternal absence than by paternal absence, reflecting the traditional role of

mothers as primary caregivers (Yeoh and Lam 2006). It follows that children left behind with no

parent may endure the greatest disruptions in family arrangements and face particularly severe

emotional challenges because of the absence of both attachment figures and especially weak

parental support and supervision. In this scenario, children are cared for either by their

grandparents or by other relatives, who provide lower-quality care and are less invested in

children's well-being than are parents (Haveman and Wolfe 1995). Previous work demonstrates

that care from extended families is unable to replace parental care (De Brauw and Mu 2011).

Previous work, mostly based on small local studies, provides mixed evidence on the

psychosocial development of left-behind children in China. Some studies found these children to

be more likely to experience depression, anxiety or loneliness than their rural counterparts living

with both parents (He al. 2012; Jia and Tian 2010; Shi et al. 2016; Su et al. 2013; Zhao et al.

2014). Other studies, in contrast, suggested that left-behind children do not differ significantly in

emotional or behavioral well-being from other rural children (Fan et al. 2010; Hu, Lu, and Huang

2014; Luo, Tong, and Cheung 2018; Wen and Lin 2012). Accumulating evidence from national-

level studies also remains inconclusive. Some studies reported no impact of parental out-

migration on children's depression and self-concept (Ren and Treiman 2016; Xu and Xie 2015;

Yeung and Gu 2016), whereas others showed a negative impact (Xu et al. 2018).

Research on the cognitive development of left-behind children is even more scarce, with

some notable exceptions. Zhang et al. (2014) and Yue et al. (2017), which are based on surveys

conducted in a single province, show a negative impact of parental migration on left-behind

children's cognitive development. Bai et al. (2017) uses data in North Western region in China

and documents that left-behind children perform better in school. The mixed findings can be

partly due to the relatively small sample sizes, different measures and instruments used, and the

focus on specific geographical areas.

Migrant Children

Migrant children, unlike left-behind children, can potentially garner economic benefits without

sacrificing family unity. Because of large rural-urban disparities, moving to cities provides

migrant families with greater earning opportunities and better infrastructures. However,

improved economic conditions are not the entire story. Migration is compounded with

discontinuity in children's life and stressors in adjusting to a new environment. Adjustment of

migrant children to the host society is a complex process, which is often fraught with

acculturation stress that can undermine children's psychosocial development (Berry et al. 2006).

This is likely the case for migrant children in China, who are uprooted and suffer the loss of

support networks. In addition, migrant parents may struggle not only with acculturation stress

but also with economic pressures as they work tirelessly to make ends meet in cities. These

processes may diminish their ability to provide sufficient social and emotional support to

children, leading to parenting deficits (Emmen et al. 2013).

Beyond the adjustment difficulties, Chinese migrant children face a unique set of

challenges that exacerbate their difficulties exemplified in the *hukou* system. Although migrant

families typically achieve better economic conditions than they otherwise would in the

countryside, the institutional constraints marginalize migrants, relegating them to undesirable

living and working environments. The structural barriers also give rise to social discrimination

(Gu and Yeung 2020; Mao 2019). Migrant children often fall victim to prejudice, stereotyped as

undisciplined, lacking manners, and incompetent. They are sometimes rejected by local peers

and adults such as teachers and local parents (Wong et al. 2009). This social discrimination

creates psychologically stressful experiences and can have a detrimental impact on migrant

children's well-being. Altogether, the challenges facing migrant children can offset their potential

gains from migration.

A strand of literature has documented psychological problems facing migrant children

(Chen et al. 2009; Guo 2002; Lu and Zhou 2013; Wong et al. 2009). But most of these studies

compared migrant children with urban children, which is not the appropriate benchmark because

urban children have very different life chances and experiences from migrant children. Several

recent studies using national data (Ren and Treiman 2016; Xu and Xie 2015; Xu et al. 2018;

Yeung and Gu 2016) found no clear difference in self-concept or the risk of depression between

migrant children and rural nonmigrant children. Research on the cognitive development of

migrant children in China is extremely limited, with one notable exception. Hao and Yu (2017)

uses nationally representative survey data and find some cognitive advantage of migrant children

over rural children.

Mediating Mechanisms

To understand potential mediating mechanisms in the relationship between migration and child

development, we specifically examine three sets of mediating factors that reflect the

characteristics and behaviors of the primary caregiver of left-behind children, who tend to be

particularly vulnerable to parental migration.

The first mechanism through which parental migration adversely affects children's

development is reduced parenting. In the context of parental out-migration, parenting deficits can

arise partly because of the time and energy constraints on the caregivers, who may be

overburdened with maintaining the household and caring for children and may thus be less likely

to provide the warmth and nurture that children need. Therefore, we expect left-behind children

to show less favorable psychosocial and cognitive outcomes than rural children in nonmigrant

families partly because they receive less attentive and supportive parenting after parents migrate.

A second possible mechanism linking left-behind children with worse developmental

outcomes is the degree of emotional distress experienced by the caregivers. Stressed caregivers

are less able to foster nurturing and engaged relationships with children and to provide warm and

supportive parenting (Conger and Donnellan 2007). Rather, they are more likely to be aggressive

towards children and to demonstrate negative affect, which harm children's emotional and

cognitive functioning. In addition, the negative emotions of caregivers can be directly

transmitted to children. Being around a depressed caregiver generates a heightened level of

aggression and negativity, disrupting children's ability to regulate their emotions and engage in

learning (Liu and Wang 2015).

A final possible mechanism is the limited education of left-behind children's caregivers.

Previous research suggests that grandparents and other relatives charged with taking care of left-

behind children in China often possess limited human capital because they are older and missed

the educational expansion (Wang and Mesman 2015). A lower level of education of caregivers

may amplify the risk of children's emotional problems and cognitive delay because these

caregivers have lower aspirations for children, are less committed to the well-being of children,

and are less able to interact with children and meet their developmental needs (Bradley and

Corwyn 2002).

Overall, we expect both left-behind and migrant children to face challenges to their

psychological and cognitive development, but for different reasons and to different degrees. For

migrant children, acculturation and institutional challenges can offset the positive effect of

economic improvement and preserved family unity, and may lead to overall neutral or

unfavorable psychosocial outcomes. Left-behind children tend to be particularly vulnerable to

psychosocial problems and inferior cognitive development, conceivably even more so than

migrant children. This is because they suffer multiple sources of disadvantages manifested

through the mediating mechanisms.

Data and Methods

Data and Sample

Data are from a recent national probability sample survey, which we designed specifically to

understand the effect of migration on children in China. The Survey, *The Urbanization and Child*

Development Study was conducted as the child component of the *Urbanization and Labor*

Migration Survey conducted by Tsinghua University during 2012 and 2013. The survey covered

500 villages and neighborhoods in 28 provinces across the nation. In common with almost all

national samples in China these days, our sample omits a few sparsely populated provinces--

Hainan, Qinghai, and Tibet--which together includes less than 1.25% of the population. The

survey was based on a multi-stage stratified probability sample with an oversample of townships

with high rates of in-migration and out-migration. The survey additionally collected a probability

sample of migrants. These procedures were undertaken to ensure a sufficient number of migrant

children and left-behind children. Weights were constructed to combine the overall and migrant

samples. In the fieldwork, small area mapping and listing was used to select households within

each sampled community (Treiman et al. 2006). This strategy has been increasingly adopted in

national surveys in China.

The survey collected data on 6,796 children aged 0-15 at the time of the survey. It

includes children in the main groups of interest: rural children living with both parents, children

left behind by one or both migrant parents, as well as, for comparison, children of urban

nonmigrants and migrant children. Information was collected from children's primary caregivers

(PCG), defined as those primarily responsible for taking care of the child. Consent was obtained

from the PCG. A rich set of information was gathered, including family SES, home environment,

parenting practices, household socioeconomic status, and a range of child outcomes (emotional,

behavioral, cognitive, health, and education). The questionnaires and instruments were initially

prepared in English, then translated into Chinese, and back-translated to ensure accuracy. They

also were pre-tested before field implementation.

We restricted our analysis to rural children aged 3-15 because information on

psychosocial well-being and cognitive development was collected starting at age 3, consistent

with other surveys. We combined children across different age groups to increase the sample size

for detailed comparisons by migration status and to focus on the general picture. This is also

because the test for interactions between age and migration status was insignificant. Because our

study focuses on children affected by migration, we excluded a small proportion of children in

other types of non-intact families due to divorce or the death of one or both parents. Moreover,

we focus on rural-to-urban migration across counties or a higher level. Children in other types of

migration arrangements, such as rural-to-rural and migration within the same county, were

dropped from the analysis. The final analytical sample size was 4,338.

Variables

The key outcome variables are children's psychological and cognitive development.

Psychological development is measured by the Behavior Problems Index (BPI). The BPI was

created by Peterson and Zill (1986) to measure the frequency, range, and type of childhood emotional and behavioral problems through caregivers' report. It has been shown to be associated with clinically significant psychosocial symptoms (Studts 2008). It is a well-established index used in many major surveys such as the National Longitudinal Study of Youth and the Panel Study of Income Dynamics in the United States. In our survey, we translated and back-translated the BPI questions to ensure accuracy and equivalence. We pre-tested the battery of questions in the Chinese setting before field implementation. We used a total of 26 items that were available for children aged 3 and above. For each question, the PCG was asked to rate the child using a 3-point Likert scale (not true, sometimes true, often true). Based on factor analysis, the questions yield two constructs, namely internalizing and externalizing problems. We focus on internalizing problems, which involve problems that are directed inwardly, including sadness, depression, anxiety, fear, and withdrawal from social situations. This is because internalizing problems are more common than externalizing problems among Chinese children and tend to be less visible (Li et al. 2001). The scale includes 12 items (Appendix A), with a Cronbach's alpha of 0.86. The relatively high level of the Cronbach's alpha suggested high reliability of the BPI in our study setting. We summed the scores across items, with a higher value indicating more severe problems.

Cognitive development is measured by children's verbal scores on the Zhang-Yeung Test of Achievement. The test was specifically designed by Houcan Zhang and Wei-Jun Jean Yeung in 2012 to assess Chinese children's verbal and math achievements. The test consists of separate

age-specific tests for school-aged children. The test for 3-6 year-olds lasts for 10-15 minutes and those for school-aged children last for 20-40 minutes depends on child's age and ability. Each test consists of 2 subscales for a child's verbal ability to assess the vocabulary and passage comprehension skills and 2 subscales for math ability to assess children's calculation and applied problems skills. Test items for preschoolers were created through careful evaluation and reference to Chinese textbooks and published tests in other languages. Questions for school-aged children were drawn from materials from the curriculum for each grade in Chinese public schools. The items included in the test were chosen after careful evaluation in multiple pilot tests in schools in different areas in China (rural areas in Hubei, Beijing, and Zhuhai) and several rounds of revisions to ensure they are culturally and age appropriate, can distinguish students with different competency levels, and have good reliability and validity for the skillset tested.

The verbal test used in this paper include age-appropriate items for word (or phrase) recognition and passage comprehension. In this paper, we focus on verbal scores, which assess children's literacy skills, because literacy is more closely affected by children's social environment than numeracy (Chiswick and Miller 2001) and thus constitutes a particularly challenging area for left-behind children and migrant children. The verbal assessment consists of word identification and passage comprehension, with different questions by age groups. We summed the scores across all verbal items, with a higher value indicating greater verbal skills.

The key predictor is the child's migration status, which was divided into several categories: rural children (with local rural *hukou*) living with both parents; left-behind children

15

whose mother or father was a migrant; left-behind children whose father and mother were both

migrants; migrant children; and urban children living with both parents. Specifically, left-behind

children were defined as those whose parent(s) had migrated outside the county for work and

were living outside the county at the time of the interview. We focused on cross-county

migration, following the standard definition in China (ACWF 2013). This is because within-

county (e.g., cross-village or cross-township) migration involves shorter distances and more

limited change in the socioeconomic environment than longer-distance migration. Parents who

migrate within the same county often commute daily or regularly, which is different from the

typical left-behind situation where parents spend most of their time away from children. We did

not have a sufficient sample size to distinguish children left behind by only mothers versus only

fathers, as the majority of children left behind by one parent are separated from their fathers.

We explored the effect of three mediating variables, which reveal the social mechanisms

linking parental migration status and child development. "PCG's parenting practices" is a scale

comprised of a series of questions adapted from the parental warmth scale designed by Child

Trends and the parenting scale in PSID-CDS (Hofferth et al. 1997). The scale taps into parental

warmth and involvement in the last month. Sample items include how often the PCG spent time

with the child doing the child's favorite things, talked to the child, and joked or played with the

child. Responses were coded on a 1-5 scale where 1 indicates "Not in the past month" and 5

indicates "Every day." Items were coded in such a way that higher values indicate better

parenting and were then summed. The Chronbach's alpha is 0.86.

The second mediator, "PCG's emotional distress" scale, is based on the "Kessler K-6 Psychological Distress Scale" (Kessler et al. 2002). The scale is designed to yield a global measure of distress based on questions about anxiety and depressive symptoms that a person has experienced during the previous four weeks. Response items are based on a 1-5 scale where 1 indicates "All the time" and 5 indicates "None of the time." The items were reverse coded and summed, with a higher score indicating greater emotional distress. The scale has a Chronbach's alpha of 0.85. The third mediator is the PCG's education, measured by years of schooling. This variable was converted from the highest level of education attained. Details for all these variables are shown in Appendix B.

Control variables included the child's age and gender, whether there were siblings present at home, whether the child was a member of an ethnic minority, the PCG's age and gender, per capita family income (in quartiles, excluding remittances), and region of residence. We included both linear and quadratic age terms to capture possible nonlinear trajectories of change. The number of siblings, as well as the age and sex of the PCG, are likely to affect parenting style and intra-household resource allocation (Lu and Treiman 2008). Family income is known to strongly predict various domains of child development (Yeung et al. 2002). We included the region of current residence because of possible regional differences both in children's migration status and in children's psychosocial development (children in less developed regions may be more likely to be left behind and to exhibit worse outcomes). Including region allowed us to account for this source of confounding and at the same time specifically to assess underexplored regional

variation in children's BPI. We categorized region by a conventional four-region classification

(North and Northeast, East, South-Central, and West).

About 19% of the cases had missing data on at least one of the variables included in the

analysis. We thus used multiple imputation procedures to generate 10 complete datasets for

analysis (Rubin 2004). Results with and without multiple imputations were consistent.

Methods

To evaluate the overall effect of migration and the mediating mechanisms through which

migration affects children's outcomes, we used a structural equation modeling (SEM)

framework. This permits jointly estimating models that predict the mediators and those

predicting BPI (or cognitive development). This method partitions the effect of migration into

direct (unexplained) effects versus mediated (indirect) effects. Mediated effects are obtained

using the product-of-coefficients method, which multiplies the coefficients from the regression

of the mediating variables (MV) on the independent variables (IV) by the coefficients from the

regression of the dependent variables (DV) on the MV. The sets of coefficients and their

standard errors are obtained using generalized least squares in a "seemingly unrelated

regression" framework (Fernald et al. 2011), which takes account of correlated errors across

simultaneous regressions involving DV, MV, and IV. The seemingly unrelated regression

procedure is subsumed in the SEM framework as a structural model with no latent variables

(Baum 2006; Beasley 2008). It combines estimates from each regression (parameter estimates

18

and associated covariance matrices) into one parameter vector and simultaneous covariance

matrix. This approach has been adopted in child development research (Fernald et al. 2011;

Watts et al. 2015). We chose to estimate the mediating effects in a regression-based path model

framework because it can be combined with multiple imputations.

For each outcome variable, we estimated two models. The first includes children's

migration status and other control variables. The second adds mediators measuring PCG

characteristics and behaviors. In all models, we used rural children in nonmigrant families as the

reference category. This group provides the appropriate benchmark for rural-origin children (left-

behind and migrant children). In all models, we adjusted for sample weights and clustering of

children at the family level. For the mediation analysis we focused on differences between

children left behind by both parents and rural children with nonmigrant parents since, as shown

below, they represented the greatest contrast and analytically appropriate comparisons.

Results

Descriptive Statistics

Table 1 shows the distribution of children by migration status. About 16% of our analytic sample

were rural children living with both parents. Around 19% of children were left behind by one or

both migrant parents. The percentage of children with migrant mothers only was quite low

(1.3%). A little over half of the left-behind children had no parent at home. Migrant children

made up 13% of the sample, with the vast majority of them living with both parents. This is not

surprising because migrants tend to bring their children or start a family after they establish some

degree of stability. Taken together, 32% of all children in China—66% of rural children—were

affected by migration. Of children with migrant parents, 60% were left behind rather than

accompanying their parents to cities. Also, 7% of Chinese children age 3-15 lived in non-intact

families due to divorce or parental death. Another 6% of children underwent other types of

migration experience. When children were left behind by fathers, mothers usually remained the

primary caregiver (95%). When mothers migrated, fathers undertook the primary caregiving role

in 68% of the cases. When both parents migrated, almost all children (96%) were taken care of

by their grandparents.

[Table 1 about here]

Descriptive statistics are shown in Table 2, which is subdivided by rural children's

migration status. We see that left-behind children were slightly younger than were rural children

in nonmigrant families; this reflects the fact that migrants are disproportionately young. The

PCGs for left-behind children were much older than those for other groups of children,

especially when both parents migrated out, reflecting the fact that PCGs for left-behind children

were often grandparents. About 70% of rural children had siblings. Left-behind children were

less likely to belong to a minority group than other rural children. The distribution of income

reflects the motivation of people to migrate to secure higher incomes: families of left-behind

children were financially better-off than families of rural nonmigrant children. This could be

attributed partly to remittances from migrants. There also was regional variation in the

distribution of children. Left-behind children were concentrated disproportionately in the less

developed West and South-Central regions.

As for the outcome variables and mediators, there seem to be few raw differences among

the various categories of children with respect to internalizing BPI scores. Left-behind children

seemed to fare worse in verbal tests. The PCGs of children left behind by both parents were least

involved while having the worst emotional health and lower levels of education than not only

rural nonmigrant children but also children left behind by one parent.

[Table 2 about here]

Regression Results

Results from regressions estimated by SEM procedures with multiple imputations are presented

in Table 3. Several key findings emerge. Rural children left behind by both parents were worse

off in psychological development and verbal scores than were rural nonmigrant children (Model

1). The disadvantage of these left-behind children was largely reduced in Model 2 after the

inclusion of mediating factors. (We defer discussion of the mediating mechanisms until the next

section.)

[Table 3 about here]

With respect to BPI, the differences for other groups of children were not significant.

These results suggest that children residing in urban areas, including both urban children and

migrant children, exhibited a similar level of psychosocial well-being to that of rural children in

nonmigrant families, net of individual and family characteristics. In particular, the psychosocial

outcomes of migrant children did not differ significantly from how they would fare if they were

to stay with their parents in the countryside. On the one hand, migrant children did not show

increased vulnerability in psychological and behavioral well-being relative to their rural and

urban nonmigrant counterparts. On the other hand, migration also did not produce any

psychosocial benefits for these children.

There were large rural-urban differences in literacy skills as measured by verbal scores.

Compared to rural nonmigrant children, urban nonmigrant children experienced a marked

advantage, which was not completely explained away by the mediating factors. Rural-urban

migrant children also showed a considerable advantage in verbal skills, especially when they

lived with both parents. For migrant children living with only one parent, the advantage became

marginally significant.

As for other covariates, there were no significant coefficients associated with gender for

BPI but boys fared worse in verbal tests than girls. Children's age had a curvilinear relationship

with verbal score: older children performed better but at a declining rate. PCG demographic

characteristics did not seem to matter in Model 1 but PCG age became significant in Model 2.

This suggests that after holding constant PCG characteristics (mediators), older PCG was

associated with better child outcomes. Having a sibling decreased verbal scores, especially in

large family sizes. Minority children also seemed to perform worse than Han children in verbal

tests. Children in more affluent families had better test scores. Region of residence was

correlated with children's outcomes. Children in less developed areas (South-Central and particularly West) were more likely to exhibit internalizing problems and perform more poorly in verbal tests than were children in Northern and Eastern China.

Mediating Mechanisms

PCG's characteristics and behaviors play an important role in explaining the vulnerabilities of children left behind by both parents. The mediating effect of each of the PCG's characteristics and behaviors is displayed in Table 4. With respect to internalizing problems, PCG's emotional distress had the largest mediating role. It accounted for almost 50% of the total effect of being left behind by both parents on internalizing BPI problems. PCG parenting practice was the next most important mediator. It channeled another 17% of the effect on internalizing BPI. A mediating role for PCG's education was not evident.

[Table 4 about here]

The bottom of Table 4 further shows substantial variation in all three mediators by children's migration status. Specifically, the PCGs of children left behind with neither parent were more likely to experience emotional distress, to show less attentiveness and warmth in parenting, and to have a lower level of education than the PCGs of rural children in nonmigrant families. Note that this does not necessarily mean that out-migration of both parents causes the PCG to be less educated and less engaged. Rather, the out-migration of parents means grandparents and other relatives assume the role of PCG; these alternative caregivers tend to

have lower levels of education and less favorable parenting practices. Inspecting the association

of the three mediators with BPI (Model 2 in Table 3), we see that better parenting practices

significantly reduced the risk of internalizing BPI problems. The emotional distress of the PCG

was especially important, as it constituted a significant risk factor for internalizing problems. The

education of the PCG was not significantly associated with children's psychosocial outcomes.

As for children's literacy skills, all three mediators play a significant and notable role.

PCG education explained for about 21% of the disadvantage of children left behind by both

parents. PCG parenting practices and emotional distress, respectively, channeled 15% and 9% of

the effect of being left behind. Altogether, these factors accounted for almost 50% of the

differences between left-behind children and rural non-migrant children.

Taken together, these results suggest that much of the disadvantage faced by children left

behind by both parents was due to the fact that, compared with other rural children, their PCGs

were more likely to be depressed, less likely to be warm and involved, and had lower education,

all of which negatively affected children's cognitive and psychological development. Once

accounting for these mechanisms, the total direct effect of parental migration on child

development is not significant. The mediating mechanisms are summarized in Figures 1 and 2.

[Figures 1 & 2 about Here]

Conclusions and Discussion

The present study examined the psychological and cognitive development of children in the context of massive rural-to-urban migration in China. It sought to extend existing research on the effect of migration on children's development in several ways. First, it used a recently available nationally representative survey that includes relatively under-explored dimensions of child development, especially cognitive outcomes. Second, we assessed not only how left-behind children fare relative to rural nonmigrant children but also *why* these children become particularly vulnerable by investigating potential mediating factors.

The results show that left-behind children experienced poorer literacy achievement and higher risks of psychological problems than rural children living with both parents. It is children left behind by both parents who experienced the greatest deficits in psychosocial and cognitive development. Children left behind with one parent (mostly with the mother) did not experience significantly heightened behavioral problems or lower cognitive development. In addition, migrant children did not differ significantly from rural nonmigrant children in psychological well-being and even enjoyed greater literacy skills. For migrant children and children left behind by one parent, a basic level of family unity and improved economic resources help shield against potential disruptions due to migration.

Much of the developmental disadvantage facing children left behind is mediated through the characteristics and behaviors of their PCGs, primarily their emotional distress, parenting practices, and education. The experience of being left behind with neither parent often entails a

lack of attentive and warm parenting and the presence of distressed alternative caregivers, mainly

grandparents. This deprives children of the supportive and stimulating home environment

required for optimal development. In addition, when it comes to children's cognitive

development, PCG education emerges as an important mediator. The primary caregivers of left-

behind children often have limited education, which further impedes their ability and motivation

to nurture children intellectually.

Migrant children tend to be protected by an improved standard of living and family unity.

They thus do not exhibit a significant disadvantage in psychosocial development relative to rural

nonmigrant children. But neither does migration benefit them, at least with respect to

psychological well-being. For these children, continuing social discrimination and unfair

treatment in cities is a daily reality. This could exacerbate the stress that they encounter above

and beyond the acculturation stress migrants typically experience.

Despite the merits of the survey data and the new insights we provided, a few limitations

warrant discussion. One important limitation of the study is that the data are cross-sectional,

thereby hindering our ability to address potential endogeneity bias in the relationship between

migration, PCG characteristics, and child development. For example, it is possible that children's

psychosocial problems aggravate PCG's distress, or that both are induced by some other factors.

Also, we do not have a sufficient sample size to distinguish children left behind by only the

mother versus only the father. There is still more to be done on this topic. Longitudinal studies

with a large sample size and rich information on child outcomes and mediating factors are

needed to more definitively pin down the effect of migration on children and its underlying

mechanisms.

We have studied children affected by migration in China, where the sheer magnitude and

societal implications of migration are unprecedented. Migrant children and left-behind children

are not unique to China but are commonplace in many developing and developed societies. The

overall effect of migration may be contingent on context. Although there tend to be some broad

similarities in migrant-sending areas, these areas differ in potentially important ways—for

example, in terms of the level of socioeconomic development and the patterns of migration

(World Bank 2005).

With respect to contextual differences, comparative family research sheds some light on

the factors shaping the importance of family resources for children's development. Lockheed,

Vail, and Fuller (1986) found that basic material inputs were most important for children's well-

being in resource-poor settings with inadequate or highly variable resources but were less

important in more developed contexts that have achieved a baseline level of physical security

and more expansive social welfare. Following this proposition, one may expect that the

economic benefits accrued from migration have a greater impact on children's development in

less developed settings and settings with limited public spending on human development than in

settings with more generous public resources.

Previous research, mostly based on single settings, displays considerable variability with

regard to the impact of migration. This implies that the relationship may vary by contexts that

affect the relative importance of the underlying psychosocial and economic processes associated

with migration. Existing research has commonly demonstrated a negative outcome of parental

migration in Mexico (Creighton et al. 2009; Halpern-Manners 2011; McKenzie and Rapoport

2006; Nobles 2011), a migrant-sending region that is comparatively more developed than many

other poorer sending areas. In contrast, the impact tends to be less adverse and may even turn

positive in more resource-constrained settings in Asia, Africa, and Latin America (Adams et al.

2008; Curran et al. 2004; Lu and Treiman 2011; Macours and Vakis 2010). A few studies take an

explicitly comparative approach. Chang et al. (2019) compare sending communities in China

characterized by different socioeconomic status. They find that the marginal effect of improved

household economies due to parental migration is greater in places with deeper poverty. By

contrast, increased income from migration has diminishing marginal returns for families in

wealthier areas and thus is unable to buffer the negative social ramifications of parental

migration. Lu (2014, 2015) examines the well-being of left-behind children in Mexico and

Indonesia. The studies find that the effect of parental migration is more detrimental and less

beneficial for children in Mexico than in Indonesia, presumably due to comparatively lower

levels of development and public spending in Indonesia. While a comparison of a small number

of settings cannot definitely pin down the contextual factors shaping cross-setting differences,

this line of research underscores the importance of a contextualized understanding.

In addition to contextual differences, differences in patterns of parental migration, such as

the duration of parental absence and the gender of migrant parents, can also shape the impact of

migration on children. In China, the length of parental absence due to migration tends to be

longer than in other developing countries. Based on estimates provided by the China Youth &

Children Research Center (2014), 46% of left-behind children experienced parent-child

separation for more than two years per absence, and 32% experienced a separation of more than

5 years. By contrast, internal migration in other countries, such as India and Vietnam, appears to

be more circular, with migrants typically spending somewhere between one to six months each

trip (Roy et al. 2015). In this respect, prolonged separation facing Chinese children may lead to a

more adverse impact of parental migration on children's development.

With respect to the gender of migrant parents, Chinese children often endure extended

separation from both parents. As shown in previous research and confirmed in the current study,

more than half of left-behind children in China are separated from both parents. Among the rest

of left-behind children, most are separated from their father. In many other countries, there is

significant emigration among women, which are often facilitated by government-sponsored guest

worker programs (for example, Philippines and Indonesia). This has led to a large number of

left-behind children without the mother. Such different constellations of parental migration can

have implications for the level of care deficits and family disruption and thus the impact of

migration on children left behind. Overall, we believe that a comparative lens into the issues of

parental migration and left-behind children is a fruitful direction for future research.

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Table 1. Percentage Distribution of the Migration Status of Children Age 3-15, China, 2012-2013

Children's Migration Status	Weighted Percentage	Unweighted N
Rural local, both parents	16.3	775
Rural left behind, father away	8.1	297
Rural left behind, mother away	1.3	55
Rural left behind, both parents away	9.7	415
Urban local, both parents	39.8	1,692
Rural-urban migrant children, both parents	11.2	1,008
Rural-urban migrant children, absent parent	1.4	96
Other migration types [a]	5.6	392
Divorced or dead parent	6.6	326
Total	100.0	5,056

[a.] This includes rural-rural, urban-urban, urban-rural, and within-county migration.

Table 2. Percentages (and Means and Standard Deviations for Continuous Variables) by Migration Status

	Rural children (w/ both parents)	Left-behind children by one parent	Left-behind children by both parents
Child is male	54.3	54.0	56.9
Child's age	8.7	8.6	7.6
	(3.7)	(3.7)	(3.5)
PCG is male	13.7	13.6	24.3
PCG's age	39.4	39.8	59.6
	(8.8)	(9.3)	(7.9)
Sibling			
Child has no sibling	29.5	18.8	30.6
Child has one sibling	49.8	56.0	48.7
Child has 2+ siblings	20.7	25.3	20.7
Child is minority	12.1	10.5	8.7
Family income quartiles			
Bottom 25%	41.1	29.8	12.8
Lower 25%	27.9	42.1	20.3
Upper 25%	20.3	22.7	41.9
Top 25%	10.6	5.4	25.1
Region			
North/Northeast	16.9	7.7	2.9
East	33.7	24.7	26.0
South-Central	30.6	36.9	32.8
West	18.8	30.7	38.3
PCG years of education	7.3	7.0	4.2
	(3.4)	(3.2)	(3.7)
PCG's emotional distress [a]	11.0	11.4	12.5
	(3.5)	(3.4)	(4.0)
PCG's parenting practices [b]	21.7	21.0	18.9
	(7.6)	(7.5)	(7.1)
Internalizing BPI	15.0	15.3	15.3
	(3.1)	(3.1)	(3.1)
Verbal score	24.9	23.8	23.6
	(11.4)	(11.3)	(9.9)
N	1,692	352	415

[a] Range: 6 – 30 ; [b] Range: 8 – 40

Table 3. Regression Analysis of Child's Internalizing BPI and Verbal Score by Migration Status and Other Control Variables (Standard Errors in Parentheses)

	Internalizing BPI		Verbal development	
	Model 1	Model 2	Model 1	Model 2
Migration status (ref. rural local, both parents)				
Left behind, one parent away	-0.267	-0.304	-0.248	-0.151
	(0.197)	(0.193)	(0.697)	(0.704)
Left behind, both away	0.573*	0.175	-2.143*	-1.185
	(0.268)	(0.265)	(0.876)	(0.882)
Urban local, both parents	-0.079	-0.006	3.688***	2.256***
	(0.194)	(0.191)	(0.618)	(0.662)
Rural-urban migrant, both parents	0.360	0.312	1.905*	1.615*
	(0.347)	(0.318)	(0.800)	(0.767)
Rural-urban migrant, absent parent	0.155	-0.027	1.890+	2.129+
	(0.449)	(0.416)	(1.122)	(1.138)
Child is male	-0.013	-0.091	-1.313**	-1.069**
	(0.142)	(0.138)	(0.405)	(0.396)
Child's age	-0.062	-0.069	5.321***	5.405***
	(0.104)	(0.099)	(0.317)	(0.308)
Children's age squared	0.005	0.005	-0.292***	-0.293***
	(0.006)	(0.006)	(0.019)	(0.018)
PCG is male	-0.088	-0.011	0.017	-0.417
	(0.176)	(0.181)	(0.557)	(0.570)
PCG's age	-0.010	-0.016*	0.034	0.079***
	(0.007)	(0.008)	(0.023)	(0.024)
Sibling (ref. no sibling)				
Child has one sibling	0.152	0.040	-1.402**	-0.928+
	(0.154)	(0.152)	(0.478)	(0.475)
Child has two or more siblings	0.165	-0.249	-4.076***	-2.771***
	(0.308)	(0.274)	(0.806)	(0.768)
Child is minority	-0.313	-0.357	-1.645*	-1.558*
	(0.228)	(0.217)	(0.726)	(0.710)
Family income quartiles (ref. bottom 25%)				
Lower 25%	-0.277	-0.208	0.809	0.522
	(0.176)	(0.168)	(0.547)	(0.533)
Upper 25%	-0.301	-0.122	1.866**	1.208+
	(0.232)	(0.225)	(0.666)	(0.654)
Top 25%	-0.240	0.038	1.769*	0.806
	(0.225)	(0.225)	(0.726)	(0.733)
Region (ref. North/Northeast)				
East	0.205	-0.130	-1.250+	-0.662
	(0.183)	(0.182)	(0.752)	(0.721)
South-Central	0.833***	0.586**	-1.444+	-1.362+
	(0.214)	(0.202)	(0.773)	(0.743)
West	1.274***	0.756***	-2.699**	-1.692*
	(0.221)	(0.228)	(0.813)	(0.789)
PCG's parenting practices		-0.047***		0.150***
		(0.013)		(0.035)
PCG's emotional distress		0.228***		-0.154*
		(0.020)		(0.062)
PCG level of education		-0.011		0.338***
		(0.022)		(0.069)
Constant	14.927***	14.303***	6.275***	-0.852
	(0.477)	(0.671)	(1.626)	(2.103)
N (number of children)	4,338	4,338	4,338	4,338

+p < .1. *p < .05. **p < .01. ***p < .001.

Table 4. Mediation Analysis of Child's Internalizing BPI and Verbal Score by Migration Status (N = 4,338)

	Internalizing BPI			Verbal score		
	PCG emotional distress	PCG parenting practices	PCG level of education	PCG emotional distress	PCG parenting practices	PCG level of education
Indirect effect through each mediator	0.284***	0.099*	0.015	-0.192*	-0.319**	-0.447***
	(0.076)	(0.039)	(0.029)	(0.093)	(0.118)	(0.138)
Proportion of total effect mediated by each mediator	0.499	0.174	0.026	0.093	0.153	0.214
Migration status predicting each mediator (left behind by both parents vs. rural children with both parents)	1.248***	-2.121***	-1.324***	1.249***	-2.124***	-1.323***
	(0.316)	(0.595)	(0.308)	(0.315)	(0.594)	(0.308)

*p < .1. *p < .05. **p < .01. ***p < .001.

Figure 1. Mediation model of left-behind children's internalizing BPI (* indicates coefficient significant at 0.05 level)
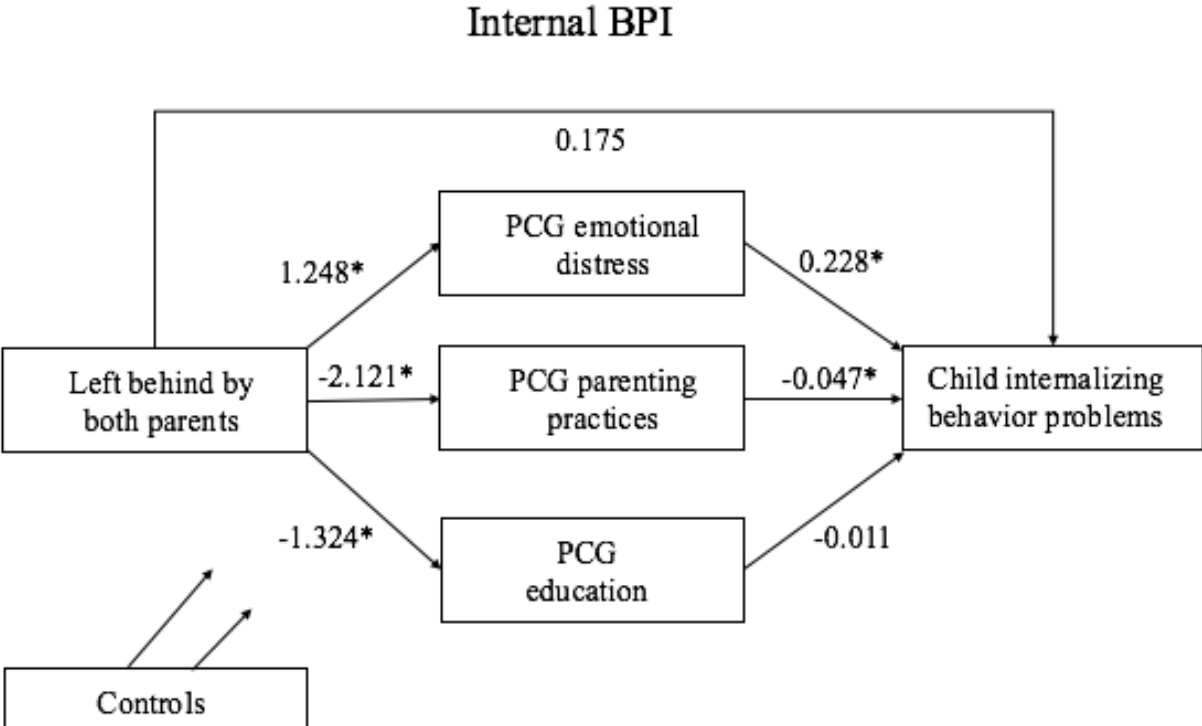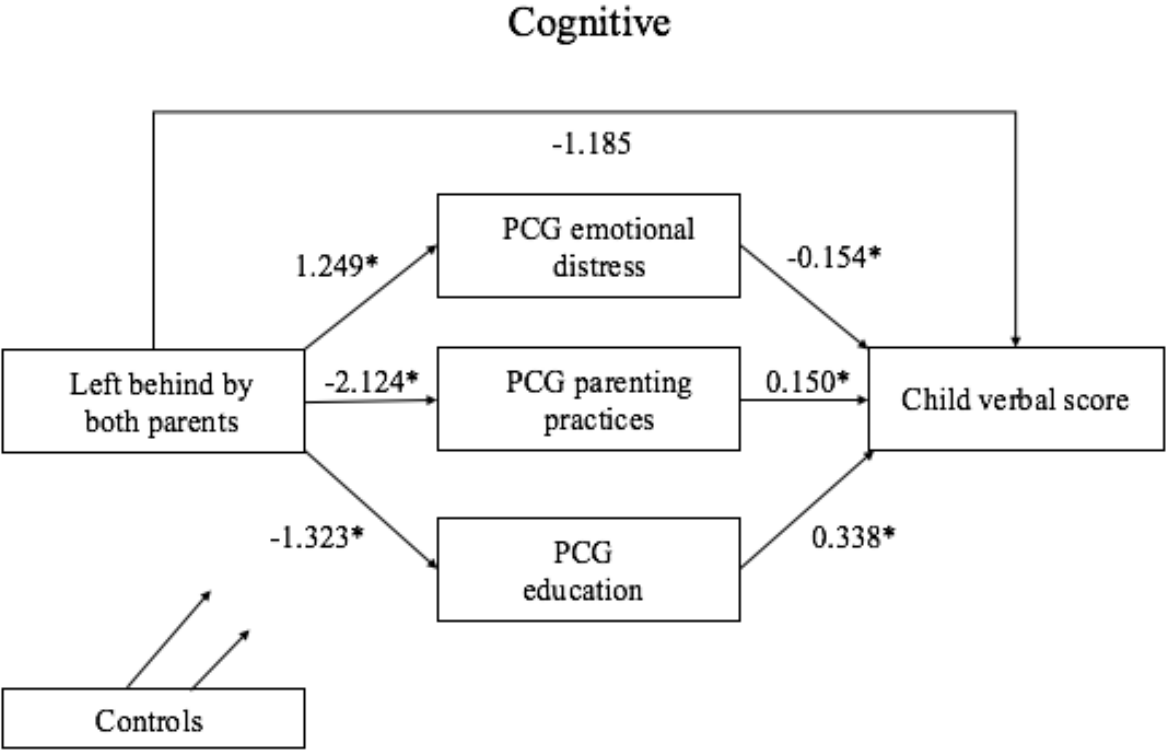

Internal BPI

Figure 2. Mediation model of left-behind children's verbal score (* indicates coefficient significant at 0.05 level)

Cognitive

Left behind by both parents

-1.185

1.249*   PCG emotional distress   -0.154*

-2.124*   PCG parenting practices   0.150*

-1.323*   PCG education   0.338*

Child verbal score

Controls

Appendix A. Internalizing BPI items

Question

(He/She) feels or complains that no one loves him/her.

(He/She) is rather high strung and nervous.

(He/She) cheats or tells lies.

(He/She) is too fearful or anxious.

(He/She) is easily confused, seems to be in a fog.

(He/She) has trouble getting along with other children

(He/She) feels worthless or inferior.

(He/She) is not liked by other children.

(He/She) has difficulty getting (his/her) mind off certain thoughts.

(He/She) is unhappy, sad or depressed.

(He/She) is withdrawn, does not get involved with others.

(He/She) breaks things on purpose or deliberately destroys (his/her)own or another's things.

Appendix B. Definition of mediating variables

Variables	Descriptions
PCG Parenting Practices	PCG's degree of involvement and warmth towards the child was measured by summing responses (on a 1-5 scale) to the following questions: How many times in the last month ("Not in the past month," "1 or 2 times in the past month," "About once a week," "Several times a week," "Every day) have you a. Spent time with (CHILD) doing one of (his/her) favorite things? b. Talked with (CHILD) about things interest him/her? c. Hugged or caressed (CHILD)? d. Joked or played with (CHILD)? e. Told (CHILD) you appreciated something (he/she) did? f. Talked with (CHILD) about (his/her) relationships, like relationships with friends? g. Talked with (CHILD) about current events, like things in the news? h. Talked with (CHILD) about (his/her) day?
PCG Emotional Distress	PCG's emotional distress was measured by summing responses (on a 1-5 scale) to the following questions: During the last 30 days, about how often (All of the time; most of the time; some of the time; a little of the time; none of the time) did you a. Feel nervous? b. Feel hopeless? c. Feel restless or fidgety? d. Feel that everything was an effort? e. Feel so sad that nothing could cheer you up? f. Feel worthless?
PCG's Education	PCG's years of schooling (continuous)