How Income Shapes Preschoolers' Development in China

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Abstract

We examine how family income shapes pre-school children's cognitive development and behavior in China, where two critical structural factors have significantly shaped children's development: the large-scale internal migration and a key social stratification mechanism – the *hukou* system. We provide nuanced evidence for early childhood development by investigating the family investment and family stress models. Data from a national study in China are used to evaluate the mediating pathways through which income affects children. Two distinct mediating pathways are found. Family income is significantly associated with children's cognitive outcomes through the provision of a stimulating environment. Children's behavior problems are affected by how family income affects primary caregiver's depressive affect and punitive parenting practices. The developmental context are important to consider. Children in urban areas and those migrated to cities with parents outperform rural children in both verbal and numeracy tests. Children taken care of by fathers have more behavioral problems.

Key word: poverty, preschooler, family investment, family stress, developmental outcomes

Introduction

A large body of literature has documented the detrimental effect of poverty on children's development, including cognitive development, school attainment, health status, sand behavioral outcomes in western societies (Brooks-Gunn & Duncan, 1997; Connelly & Gayle, 2017; Duncan et al., 1998; Duncan et al., 2010; Guo & Harris, 2000; Mayer, 1997; Yeung & Conley, 2008). Children who grow up in low-income families tend to have poor cognitive development, manifest maladaptive social functioning and attain lower education than those from better-off families. More importantly, scholars indicate that such developmental deficits emerge from early childhood, even before the formal schooling, and increase as the children age (Dearden et al., 2011; Wei et al., 2015; Yeung et al., 2002; Yue et al., 2017; Yue et al., 2016). Most of these studies, however, are on Western context and focus on individual and family characteristics. Little attention has been paid to how the broader developmental context and policies affect this relationship and whether the relationship differ in developing countries. In this paper, we examine this relationship in China, where childhood poverty remains prevalent in China despite the country's meteoric rise in economic development during the last four decades in unique structural developmental context. A recent statistic indicates that around 3.3 to 4 million children aged 0 to 6 years lived in poverty in 2015[1]. Studies on young children living in the destitute areas in China reveal that a high proportion of them are cognitively delayed (Wei et al., 2015; Yue et al., 2017; Yue et al., 2016). In addition, an increasing income inequality, as a result of *hukou* system (household registration system), regional-biased developmental policy and a very large scale of internal labor migration (Xie & Zhou, 2014) deepens the developmental disparities among children growing up in poor and better off families. We investigate how family income and poverty affect the very early stage of child

[1] Wong, C. (2015 May 27). 4 million Chinese children live in extreme poverty: study. *Global times*. Retrieved from http://www.globaltimes.cn/content/923780.shtml. accessed on March 1, 2018.

development in China given its developmental context. Theoretically, this study provides nuanced empirical evidence and an international comparison about early childhood development. It highlights the importance of economic, cultural and policy contexts in child development literature. The findings provides insights into the social reproduction of the poverty and informs theoretical perspectives on poverty effects in non-western context. Knowledge about poverty effects informs future policy interventions that can reduce vicious cycles of intergenerational transfer of disadvantages and potentially enhance human resources and productivity of the workforce.

In the western countries, a variety of child care subsidies and publicly funded pre-kindergarten programs are available, especially for low income families. In contrast, in China, child care and preschool are not funded by the government. The expenditure of preschool is shouldered by individual families. Therefore, poverty is expected to be even stronger impact on early child development in China than in the western countries. In addition, there is a marked and increasing urban-rural disparity, considerable regional inequality and a large number of children left behind in rural areas by parents who migrate to cities to work and another large group of migrant children who left home and migrate to cities with their parents. These dramatic changes substantially affect family dynamic and children's development. Insufficient attention has been paid to how poverty affect early childhood development in China.

This study extends current research by exploring the poverty effect on developmental outcomes of preschoolers, aged 3 to 5, in China. We show that it is important to take into consideration of how the broader developmental context - *hukou* system, regional inequality and massive internal labor migration in China shape early child development. We evaluates how poverty affects the preschoolers' cognitive development and behavioral outcomes based on a large-scale nationally representative sample from the Urbanization and Labor Migration

Survey conducted in 2012-2013. Structural equation models (SEM) are used to examine the mechanisms through which family income and children's development are related.

We review literature on poverty effects on children's outcomes and identify gap in extant literature in the next section. Subsequently, we present the theoretical framework and methodology used in this study. Results and discussions conclude the paper.

Literature review

Studies have revealed a steep gap in the achievement and socioemotional development between children growing up in poor and better off families. Specifically, children from low income families tend to be lagging behind their counterparts from better off families in cognitive development, academic achievement and socioemotional development (Bailey & Dynarski, 2011; Bradley & Corwyn, 2002; Dickerson & Popli, 2016; Duncan et al., 1994; Goodman & Gregg, 2010; Kim & Um, 2018; McFarland, 2017; Reardon, 2011; Schoon et al., 2012). Scholars have also examined the pathways of income effect on children's development. Two perspectives: family investment and family stress models are identified in the literature.

Family investment and children's cognitive development

The first perspective emphasizes the family's investment in children, in the form of both money and time. As suggested by Becker and Tomes (1986), better off families increase the children's human capital through expenditure on their skills, learning, "credentials" and many other characteristics. Such education-promoting investments include schooling, supportive physical home environment and cognitively stimulating materials such as books and educational toys (Bradley et al., 2001a; Mayer, 1997; Yeung et al., 2002). Scholars observed that children in poor families tend to be exposed to less-organized home environment than the better-off children and to have limited access to a wide variety of different recreational and

learning materials (Bradley & Corwyn, 2002; Bradley et al., 2001a). In addition to monetary investment, non-monetary investment also differs across families. Mayer (1997) asserts that not only the family income differs, but also the characteristics of parents. The parents from high-income families are distinguished from their low-income counterparts in "skill, social adjustment, enthusiasm, dependability and hard work." Such differences in parental characteristics also lead to variations in investment of time and effort on the children. The non-monetary investment on the children can take the form of providing stimulating experience (e.g., read to children; engage in learning activities, visit a museum) (Bradley et al., 2001a; Mayer, 1997; Yeung et al., 2002). It is found that children growing up in poor families are less likely to experience shared book-reading with parents, and visit a library or museum, or attend a theatrical performance than their better-off counterparts (Bradley et al., 2001a; Mayer, 1997). Similarly, Lareau in her qualitative research (2003) also reported that middle-class parents tend to allocate more time to children on developmentally enhancing activities, such as reading and learning than the working-class parents.

Family stress and children's behavioral outcomes

The second perspective focuses on family stress related to low family income. This perspective suggests that economic hardship (e.g. poverty, job loss) is related to parents' emotional status through their perception of increased economic stress. Economic pressure is conceptualized as the psychological implication of poverty and economic hardship. Living in poverty may result in difficulties in paying bills and purchasing material necessities (Masarik & Conger, 2017). Such difficulties may further lead to the perception of stress, worry and frustration, thus, significantly increases the reports of economic stress (Masarik & Conger, 2017; Newland et al., 2013). These perceptions of increased economic stress, in turn, contribute to the depressive affect. As demonstrated by Voydanoff & Donnelly (1988), economic hardship

dramatically increases depressed feelings among those who reported experiencing strong economic pressure.

Moreover, being depressed, demoralized and pessimistic about the future may cause conflicts among family members and affect the family relationships, which results in disruption in effective parenting (Conger et al., 1992). Effective parenting includes parental responsiveness and warmth, consistent discipline, the appropriate level of parental supervision and monitoring (Pittman & Chase-Lansdale, 2001). Previous literature reveals that parental psychological distress may impede parents' ability to respond appropriately to children's physical and emotional needs (Conger et al., 2000; McLoyd, 1990). It may also lead to unsupportive parenting and less parental warmth (Newland et al., 2013; Pittman & Chase-Lansdale, 2001), and more parental rejection and harsh parenting (Linver et al., 2002; McFarland, 2017; McLoyd, 1990). Furthermore, studies indicate that parental warmth and supportive parenting promote good adjustment and a sense of wellbeing, while weak maternal responsiveness and frequent use of physical discipline are positively associated with increased behavior problems among children (Elder et al., 1985; Guo & Harris, 2000; Lu, 2014; McLeod & Shanahan, 1993; Yeung et al., 2002).

Early childhood as a Critical Developmental Period

It is worth noting that experiences during the early childhood is crucial for the development in later stages. Brain development in early years is characterized by rapid growth with the fundamental aspects being well established before children start the primary school (National Scientific Council on the Developing Child, 2007). Brain development in early years also shows great malleability. It implies that intervention in brain development is easier and more effective during the early years than later. Studies in social science suggest that economic return to the investment in the early childhood is the largest compared to other periods

(Heckman, 2000). Moreover, children's development during early years exerts a long-lasting influence on their life chances in adulthood (Duncan et al., 1998; Hirschi, 2017; Piek et al., 2008; Yoshikawa, 1995).

Yet, except for few studies (Li et al., 2013; Zhang, 2012), most of the studies in China are focusing on the school-age child, especially middle school students (Long & Pang, 2016; Tsui,2005; Fang et al., 2018; Liu & Xie, 2015; Li & Qiu, 2016; Luo & Zhang, 2017; Zhang et al., 2015, Fang & Feng, 2008). The insufficient attention on young children may be attributed to the limited number of large scale represtantive datasets on young children.

The Chinese Context

Several distinct institutional and socioeconomic factors in China provide a unique opportunity to study the associations between poverty and young children' development. One distinction concerns the state-funded education system. In the western context, child care subsidies and publicly funded pre-kindergarten programs targeting the poor are available. In China, however, only the nine years compulsory education (six years of primary school and three years middle school) is funded by the government. The preschool education is completely self-funded. Therefore, family income is expected to be more crucial for preschool attendance in China than in the western societies.

In addition, China is characterized by many structural and socioeconomic factors, such as the *hukou* system and labor migration. The *hukou* system exerts an impact on children's development both through family income and the educational chance. Literature suggests that the *hukou* system is contributing to the enlarging rural-urban income gap. Residents with a rural *hukou* obtain fewer years of schooling, are less likely to hold a job in the state sector. They tend to be self-employed or unemployed, thus, have no access to employer-provided healthcare and other benefits (Liu, 2005; Wang, 2008). The *hukou* disparity is also shown in

the educational chance. Limited by the institutional barrier created by the *hukou* system, rural children have limited access to urban schools which enjoy more resources and thus higher school quality. The disadvantages of attending rural schools are accumulative, which penalizes the rural students' chances and capacity to get ahead and places them at the bottom of the educational stratification(Hao et al., 2014).

Another socioeconomic influence is labor migration. Driven by the regional and rural-urban inequality in income, a growing number of rural residents migrate to cities, mostly in the eastern areas, to seek better lives. Consequently, some migrants leave their children at home, while others bring their children to the cities. Parental migration may bring both positive and negative influences to the left behind children. On the one hand, remittance from a migrant parent could improve the family wealth and children's educational attainment insofar as more resources are devoted to children's education(Lu, 2012). On the other hand, parental absence would reduce the parental support and supervision, which are essential for children's development (Liu et al., 2009; Xu & Xie, 2015; Yeung & Gu, 2015). Moreover, parental migration also changes the family life and causes strain and conflicts in the family. The remaining parent may face more family responsibilities and obligations, which may lead to higher emotional distress, thus, reducing the quality and quantity of child care(Liu et al., 2009; Ren & Treiman, 2016).

Research Gap in Child Development Research in China

Current studies exploring the income effect on Chinese children's developmental outcomes mainly focus on the cognitive and educational outcomes (Fang & Feng, 2008; Li & Qiu, 2016; Lu & Liu, 2008; Sun et al., 2009). Very few studies have examined the poverty effect on children's behavioral outcomes (e.g. Sun et al, 2015). Moreover, the mechanism of the income effect has not been fully examined. Among the few studies on cognitive

development and education performance, the impacts of family investment in learning materials, school-related expense, parental involvement are investigated (Fang et al., 2018; Liu & Xie, 2015; Luo & Zhang, 2017; Zhang et al., 2015; Zhang & Xie, 2016). However, the investment in physical home environment and enriching activities are seldom explored in the studies in China. Methodologically, except for a few recent studies (e.g. Fang et al., 2018; Luo & Zhang, 2017; Zhang & Xie, 2016), most of the studies in China are based on regional data with small sample size, which casts doubts on the generalizability of the findings.

Research Methods

We aim to explore the mechanism of poverty effect on the developmental outcomes within the framework of family investment model and family stress model. Preschoolers aged 3 to 5 are evaluated in their verbal and math scores, and behavioral problems. Employing a new national representative dataset (Urbanization and Labor Migration Survey, 2012-2013) with structural equation modeling (SEM), this study evaluates the pathways of income effect. The impact of the *hukou* system, regional inequality and massive internal labor migration in China are also taken into consideration.

Key mediators proposed by family investment model and family stress model are examined in this study. For the family investment model, the mediators include physical home environment, child care cost, cognitively stimulating materials and activities with child. Family economic strain, maternal depression and both positive and negative parenting behaviors are used to capture the process described in the family stress model. The conceptual framework proposed by Yeung et al.'s study (2002) has been borrowed and adpated in this study. This study argues that the impact of family income works through two pathways (see figure 1). One pathway is through the monetary investment in children's learning environment, learning materials and schooling, and time investment through activiely engaging in a variety of indoor

and outdoor learning activities. The other pathway is through the negative impact of poverty. Low family income tends to increase family economic pressure and primary caregiver's (PCG) emotional distress, which, in turn, leads to more harsh parenting and less warm parenting. In addition, as suggested by Yeung et al.'s study (2002), the factors from these two models interact with each other. Investment variables such as supportive physical home environment and cognitively stimulating materials are also conductive to PCG's emotional wellbeings and parenting behaviors. Meanwhile, a depressed PCG is less likely to be actively involved in the enriching activies.

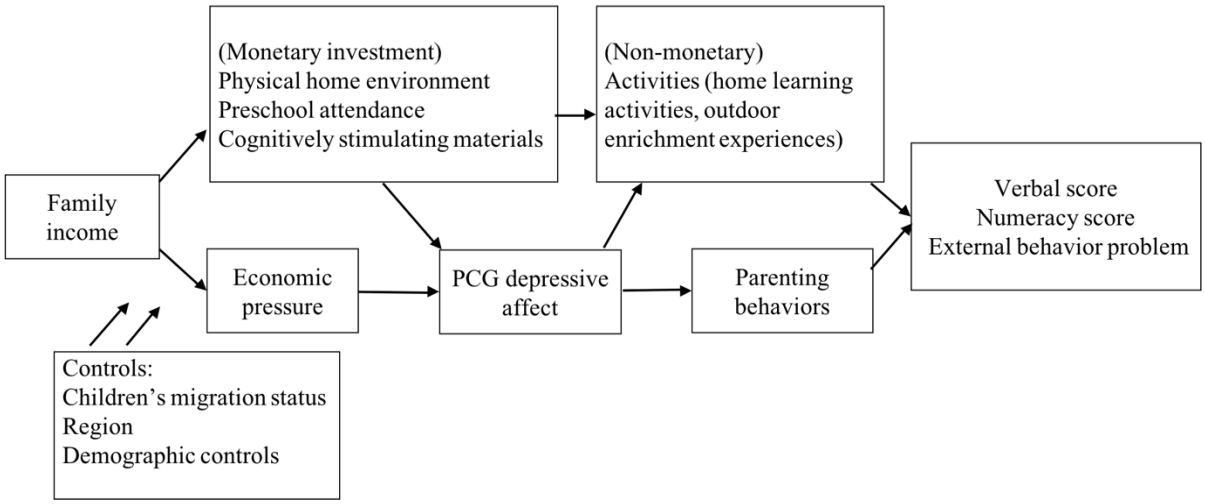

Figure 1 Conceptual framework

In addition to the family context, the associations between family income and children's developmental outcomes and the mediating pathways are also shaped by broarder socioeconomic structures such as labor migration, the *hukou* status and regional inequality. Labor migration brings extra economic resources due to the high wages in the cities, but the absence of the parent(s) would increase the family stress especially for the left behind parent, or grandparents. In addition, the regional inequality in economic development, as a legacy of the region-bias policies, also gives rise to inequality in family economic considitions and children's developments across region. This paper hypothesizes that 1) the impact of family

income on young preschoolers' cognitve development is mediated by the family investment indicators, 2) while the family stress indicators mediates the relationship between family income and preschoolers' external behavioral problems.

Data and sample

This study draws data from *The Urbanization and Children Development Study*, the child component of the *Urbanization and Labor Migration Survey* led and conducted by Tsinghua University during 2012 to 2013. The survey adopted a multi-stage stratified probability sample and covered 28 out of 31 provincial-level administrative divisions in mainland China (excluding Hainan, Qinghai, and Tibet). 6796 children aged 0-15 years old and their primary caregivers (PCG) were interviewed. A rich set of information has been gathered, including family socioeconomic status (SES), home environment, parenting practices, and a range of children outcomes (emotional, behavioral, cognitive, health, and education). The sample covers evenly four categories of children: left-behind children; migrant children; local urban children and local rural children. Therefore, the data contains an oversample of migrant children, and a population weight is used to adjust the sample distribution.

Children aged 3-5 (n=1352) are the focus of the assessment in this paper. In *The Urbanization and Children Development Study*, information was collected from the children's PCG, who can be either parent, or grandparent or others. This study compared children with different migration status and family structure. This study focuses on rural-to-urban migration which implies an improvement of lives. Other migration arrangements including rural-to-rural, urban-to-urban and urban-to-rural migration were excluded (134 children). Therefore, only four main groups of children were included: urban children living with two parents, rural children living with two parents, migrant children with parent(s) and left behind children (living with one parent or without parents). For ease of interpretation, another 7 children whose PCGs are others were also dropped. The analytic sample size is 1210.

Dependent Variables

Verbal and numeracy scores. The children's cognitive ability was measured by their scores on the verbal and numeracy tests of Zhang-Yeung Test of achievement[2]. The test includes two components – the verbal test and numeracy test. The verbal test is comprised of two subsets: (1) word identification and (2) passage comprehension subscales. Each subscale has 14 items respectively. The word identification subscale requires the respondents to identify the objects shown in the pictures. The passage comprehension subscale requires children to answer the literal or inferential questions based on the pictures. The numeracy test includes calculation and applied-problem subscales, which measure two crucial dimensions of mathematic skills. The numeracy test consists of 9 items of calculation and 15 items for the applied problem. In the applied-problem subscale, children are asked to respond to real life mathematics application questions including basic counting, adding and subtracting problems. The calculation part requires the respondents to do mathematics calculation such as 1+3=? and 14-6=?.

In both verbal and numeracy tests, children obtain one to three marks for a correct answer based on the difficulty of that item, while they get a zero mark if they answer wrongly. Raw scores of each test is calculated by taking the sum of the children's obtained marks. The raw scores range from 0 to 50 for each test. The verbal and numeracy scores are standardized by age before analysis.

External behavior problems. External behavior index was used to indicate children's behavioral outcomes. The index is constructed based on a list of 17 items extracted from

[2] The Zhang-Yeung cognitive test was designed by Zhang Houcan, a psychologist from Beijing Normal University with a specialization in developmental psychology, and Wei-Jun Jean Yeung, a sociologist at National University of Singapore, who is famous for her study of family and children's development. The tests were specifically created for the survey, and fully considered the differences across the developmental stages. Several rounds of pretests were conducted before the tests were finalized.

behavior problems scale designed by James Peterson and Nicholas Zill(Peterson & Zill, 1986)[3]. External behavior problem index includes behaviors such as aggression, delinquency, and hyperactivity. PCGs were asked to report children's frequency of behaviors using a 3-point Likert scale (not true, sometimes true, often true). The cronbach's α for the external behavior problem index was 0.85 in this study.

Independent variable

In this study, the main variable of interest is family income. Family income in the year before the survey was measured. The family income was averaged by the number of family members so as to exclude the influence of family size. Considering the nonlinearity of income effects, a logorithmic transformation of averaged income was applied. Bottom code and top code were applied for the extreme values below 1% and over 99%.

Mediators

Constructs of family investment

Four indicators were used to evaluate the family investment, including physical home environment, preschool attendance, cognitively stimulating materials provided to the children and activities with the children. The physical home environment was measured from three aspects: whether the home was cluttered or noisy and whether there is adequate light in the house. The variable physical home environment was created by taking the mean of these three items (7 points scales, reverse coded, Cronbach's α is 0.67). Preschool attendance was used as a proxy of family's financial investment in and value on children's education (1=yes, 0=no). Learning materials provided to children at home were constructed by 3 items. PCG was asked to report the number of books the children had (0=none, 4=more than 20); whether the children

[3] It is derived from the Achenbah Behavior Problems Checklist, Achenbach & Edelbrock, 1981

have access to tape recorders, MP3, DVD players or computer at home (0=no, 1=yes); and how many kinds of learning materials has the PCG used to help the children's learning (0=none, 4=all). The standardized items were averaged to create the cognitively stimulating materials (Cronbach's α is 0.73). Activities were measured in two aspects. PCGs were asked "how often did they do arts and crafts/ play sports / build or repair something /work or play on a computer /read books with children during the past month" (0=never, 4=every day). "How often did they take the children to a museum/ picnic/cinema/park/restaurant in the past year" (0=never, 4=more than once a month, Cronbach's α is 0.73).

Constructs in the family stress framework

Family economic pressure, PCG's depressive affect, and PCG's warm and punitive parenting practices were used to measure family stress. The family economic pressure was constructed by a dichotomize variable reporting whether the family could make expense and income meet at the end of a month (1=Yes, 0=No). PCG's depressive affect was assessed by Kessler Psychological Distress Scale (K6) (Kessler et al., 2002) . The PCGs reported the frequency of some feelings including nervous/ hopeless/ restless or fidgety in the last month (0=never to 4=always). The PCG's depressive index is constructed by taking the mean of the answers to these 6 items (Cronbach's α is 0.83). PCGs' parenting practices were reported by the interviewer in the home observation section. The warm parenting was constructed by 9 observational items such as "how often did PCG caress, kiss, or hug/ spontaneously praise child" and "how often did PCG's speech convey positive feelings about the child" (1=never to 3=always, Cronbach's α is 0.78). The punitive parenting practice comprises 4 observational items. Examples include "how often the PCG slapped or spanked/ scolded, derogated, or criticized/ shouted at/ expressed overt annoyance with child" (1=never to 3=always, Cronbach's α is 0. 66).

Control variables

In addition to these variables, an extensive battery of demographic characteristics and family characteristics were taken into consideration. Children's gender (1=boy, 0=girl), low birthweight status (1=yes 0=no), children's current health status (1=good, 0=bad) and whether the child is a single child (1=yes 0=no) were controlled. Children's migration statuses measured children's and parent's migration status, and children's *hukou* status. Children were categorized into five groups: rural children living with both parents; urban children living with both parents; migrant children; left-behind children. The migrant children refer to those living in an urban area but having a rural *hukou*. Left-behind children indicate those whose parent(s) have migrated to another county for work at the time of the interview. The rural children (two parents) were treated as the reference group.

Family characteristics include PCGs' cognitive ability, PCG's relationship to the child, father's educational level and the region they lived in. PCGs' cognitive ability was measured by the average score of 10 vocabulary test questions (0=low, 1=high, Cronbach's α is 0.89). PCG's relation to the child were divided into three categories: mother, father, grandparents, with the mother being the reference group. At the family level, father's educational level, which is moderately related to PCG's cognitive level (r=0.37, p<0.05) was also controlled. The region of residence was dichotomized as west and east.

Analytic strategy

To explore the mechanism of income effect on children's cognitive and behavioral outcome, this study employs the structural equation model to evaluate the mediating effects and the pathways. The structural equation model allows a simultaneous assessment of the direct and indirect effects of all predictors while considering a variety of control variables.

Moreover, the structural equation modeling is advantageous in dealing with missing values. In the analysis, the full information maximum-likelihood (FIML) method will be used for estimating parameters. Separate models for each outcome were constructed by using observations with valid data for that particular outcome.

Descriptive results will be presented first before those from multivariate analyses. The mediating role of the constructs of family investment model and family stress model were examined through a series of SEMs. In the models, we first include only family income and children's characteristics. Subsequently, we add PCG and family characteristics and the indicators for family investment and family stress models sequentially. The family investment models include physical home environment, preschool attendance, cognitively stimulating materials and activities. The family stress indicators include economic pressure, PCG's depressive affect, parenting behaviors. Finally, a full model was estimated.

Results

Descriptive analysis

Table 1 show that 54% of the sample children are boys and about half of the children in the sample were single child. In terms of child's health, only 6% of the children were born in low birthweight (birthweight <2500g), and 82% of them were rated by PCG as healthy. About 40percent of children were affected by labor migration, with 13% of children migrating to the city, and 27% of them being left behind by parents in rural areas. 44% of the children live with both parents in rural areas, and 17% were urban local children with both parents. It is also worth noting that although the mother constituted the majority (64%) of the primary care giver for the preschoolers, more than one fourth of PCG were grandparents (26%) and 10% of the PCG are fathers.30% of children in the sample were from the west.

Multivariate Analysis

Verbal Scores

Table 2 presents results from a series of SEMs. As seen, the The bivariate correlations between income and verbal and numeracy score are significant and around 0.2 respectively, and that between income and external behavior problem is weaker but also significant (-0.106). In the baseline model, the income coefficient is significant on verbal scores. After adding the mediators of the family investment model, the coefficient of income is reduced by half, and becomes insignificant suggesting that the income effect is mediated by the parameters in the investment model. Moreover, the variance explained is improved by around one fourth. A similar but smaller reduction on the coefficient of income is observed when the family stress mediators are added to the baseline model, and the explained variance increases slightly. In the final full model, no direct income effect is observed. The explained variance was increased to 16.3% in the full model, slightly higher than when only one set of mediators are controlled for.

Table 1. Descriptive analysis (weighted)

Variable	N	Mean	SD	Range
Developmental outcomes				
Verbal score (age standardized)	1078	0.00	1.00	-2.82-3.54
Numeracy score (age standardized)	1078	0.00	1.00	-2.48-3.39
External BPI	1173	1.55	0.34	1-3
Income				
Average income	1210	9.08	0.94	5.99-11.22
Family investment indicators				
Physical home environment	1082	4.57	1.18	1-7
Preschool	1187	0.67		0-1
Cognitively stimulation materials	1210	0.38	0.72	-0.94-2.12
Activities	1181	0.85	0.73	0-4
Family stress indicators				
Economic pressure	1177	0.15		0-1
PCG depression	1195	1.88	0.57	1-4
Warm Parenting	1201	2.32	0.46	1-3
Punitive Parenting	1203	1.29	0.33	1-3
Demographic control-child				
Age	1210	4.01	0.82	3-5
%Boy	1210	0.54		0-1
%Single child	1201	0.44		0-1
%Low birthweight	1205	0.06		0-1
%Children's health (ref. healthy)	1204	0.82		0-1
Child migration status				
%Rural children both parents	1210	0.44		1-4
%Urban children, both parents	1210	0.17		1-4
%Rural-urban migrant with parent(s)	1210	0.14		1-4
%Left behind children	1210	0.25		1-4
Demographic control-PCG				
PCG relation				
%Mother	1210	0.64		1-3
%Father	1210	0.10		1-3
%Grandparents	1210	0.26		1-3
PCG cognitive	1210	5.37	2.99	0-10
Demographic control-family				
Father's education	1187	5.08	2.43	1-13
%West	1210	0.30		0-1

Table 2. Unstandardized coefficient estimates of average family income on children's outcomes; summary of structural equation models tested: baseline, family investment, family stress, full models

	Verbal	Numeracy	External BPI
Bivariate correlation with family income	.199*	.190*	-.106*
Child control +income [a]			
Unstandardized β (*SE*) [b]	.101(.034)*	.110(.034)*	-.032(.017)+
R square	.096	.079	.046
Chi-square (*df*)	108.22(8)*	88.90(8)*	42.84(8)*
RMSEA [c]	0.00	0.00	0.00
All control + income [a] (baseline)			
Unstandardized β (*SE*) [b]	.060(.035)+	.052(.036)+	-.035(.018)+
R square	.129	.116	.060
Chi-square (*df*)	148.50(13)*	132.45(13)*	6.55(13)*
RMSEA [c]	0.00	0.00	0.00
Baseline + family investment			
Unstandardized β (*SE*) [b]	.038(.035)	.038(.035)	-.038(.018)*
R square	.158	.126	.067
Chi-square (*df*)	185.10(17)*	144.75(17)*	80.93(17)*
RMSEA [c]	0.00	0.00	0.00
Baseline + family stress			
Unstandardized β (*SE*) [b]	.053(.036)	.043(.036)	-.030(.019)
R square	0.138	0.120	.105
Chi-square (*df*)	157.08(17)*	137.23(17)*	126.00(17)*
RMSEA [c]	0.00	0.00	0.00
Baseline + family investment+ family stress			
Unstandardized β (*SE*) [b]	.037(.035)	.033(.036)	-.033(.018)+
R square	.163	.131	.119
Chi-square (*df*)	190.31(21)*	149.70(21)*	143.80(21)*
RMSEA [c]	0.00	0.00	0.00

Note: RMSEA: Root mean squared error of approximation

[a] Controls include: child's gender, low birthweight status, current health status, whether single child, child's migration status, PCGs' cognitive ability, PCG's relationship to the child, father's educational level and the region of residence.

[b] Unstandardized βs indicates the direct path between income and the outcome.

[c] Other fit indices (e.g. Comparative fit index and Tucker-Lewis index) for all models were greater than .95.

*p<.05, +p<.1

Numeracy Scores

For numeracy score, similar findings are observed. When adding the family investment mediators to the baseline model, the income coefficient is reduced by 27% and the direct income effect disappears. Adding the family stress mediators reduces the income coefficient by about 17%. Both sets of mediators improve the percent of variance explained. When either set of mediators are added to themodels, the coefficient of the income is insignificant, and the explained variation reaches 13.1%. These findings indicate that the family investment mediators explained more of the variance in the cognitive scores than ?.

For the external behavior problem, a direct income effect which is marginally significant is observed in the baseline model. Adding the constructs from family investment model does not explain the income effect, whereas constructs of the family stress model mediate the income effect. In the stress model, income effect turns insignificant and the explained variance increases to 10.5%. After adding both sets of the constructs, the income coefficient is marginally significant though the explained portion of the variance has increased.

Overall fit of the Models

We examine several indicators to assess the fit of the SEM model including the Chi-square ($\chi 2$), the root mean square error of approximation (RMSEA), comparative fit index (CFI) and Tucker-Lewis Index (TLI). A low $\chi 2$ relative to degrees of freedom with an insignificant p value ($p > 0.05$) indicates a good model fitting. However, the $\chi 2$ is sensitive to the sample size, which means it nearly always rejects the model with a large sample size (Bentler & Bonett, 1980). For CFI and TLI, a cut-off value larger than 0.9 is recommended as the threshold (Hooper et al., 2008). For RMSEA, Hu and Bentler (1999) suggest a cut-off value close to 0.06 as an indicator of good fit. The CFI and TLI values for all three models are larger than 0.90, indicating a good fit of the models. The RMSEA values are lower than 0.06 for all three

models, indicating an excellent fit. Figure 2 to 4 describes the associations between family income, mediators from family investment model and family stress model and the three different outcomes. Both unstandardized and standardized coefficients (in boldface type) are presented. For ease of interpretation, only significant pathways are described in the figures.

For verbal score (Figure 2), no direct income effect is observed on the verbal ability after the mediators are controlled. The impacts of family income are primarily mediated by family investment indicators. Higher family income increases the chance of a child attending a preschool, which, in turn, positively predicts children's verbal scores. Higher family income is also associated with better physical home environment which affects children's verbal scores indirectly through cognitively stimulating materials and warm parenting behavior. This suggests that a supportive home environment, attending preschool, more cognitively stimulating materials at home significantly explain the income effect on children's verbal abilities. Of all family stress mediators, except for warm parenting behavior, other constructs do not predict the children's verbal scores directly. The subjective pressure of income stress negatively predicts the chance of attending preschool, which, in turn, is related to children's verbal abilities. Other pathways, such as PCG depression and punitive parenting behavior, which are closely related to family economic stress, are not significantly related to the verbal scores.

The results for numeracy score are slightly different. Preschool attendance primarily mediates the income effect on children's numeracy scores. The physical environment of the home, number of cognitively stimulating materials and activities do not have direct an impact on the numeracy scores. In addition, family stress mediators are not directly associated with children's performance in numeracy test.

Behavior Problems

Regarding children's external behavior problems, however, a direct income effect is observed even after controlling all the mediators and demographic factors. In other words, children living in better-off families tend to exhibit less external behavior problems than those from the low-income families. In addition, the PCG's depressive affect and punitive parenting partly mediate the income effect on preschoolers' conduct problems. Children living with a depressive PCG or a PCG who adopts more punitive parenting style are more likely to exhibit more behavior problems. The results also indicate that the physical home environment and cognitively stimulating materials indirectly affect children's behavior problems through their negative associations with PCG's depressive affect and punitive parenting. Inconsistent with previous studies and puzzling to us, this research finds that cognitively stimulating materials and activities increase children's externalizing behavior problems. Preliminary investigations show that this positive relationship exists only among children with rural hukou status and rural PCGs with higher cognitive skills provide more stimulating materials at home. One potential explanation may be that PCGs with higher cognitive level in rural households may be more aware of their children's behavior problems. Therefore, they may provide more stimulating materials and increase their involvement in different activities for children who already exhibit more conduct problems.

Based on the results discussed above, the mediators reveal different impact on different types of early child developmental outcome. Specifically, the family investment mediators tend to be more important to the development of early cognitive skills, while the family stress mediators are more likely to contribute to preschoolers' external behavior problems.

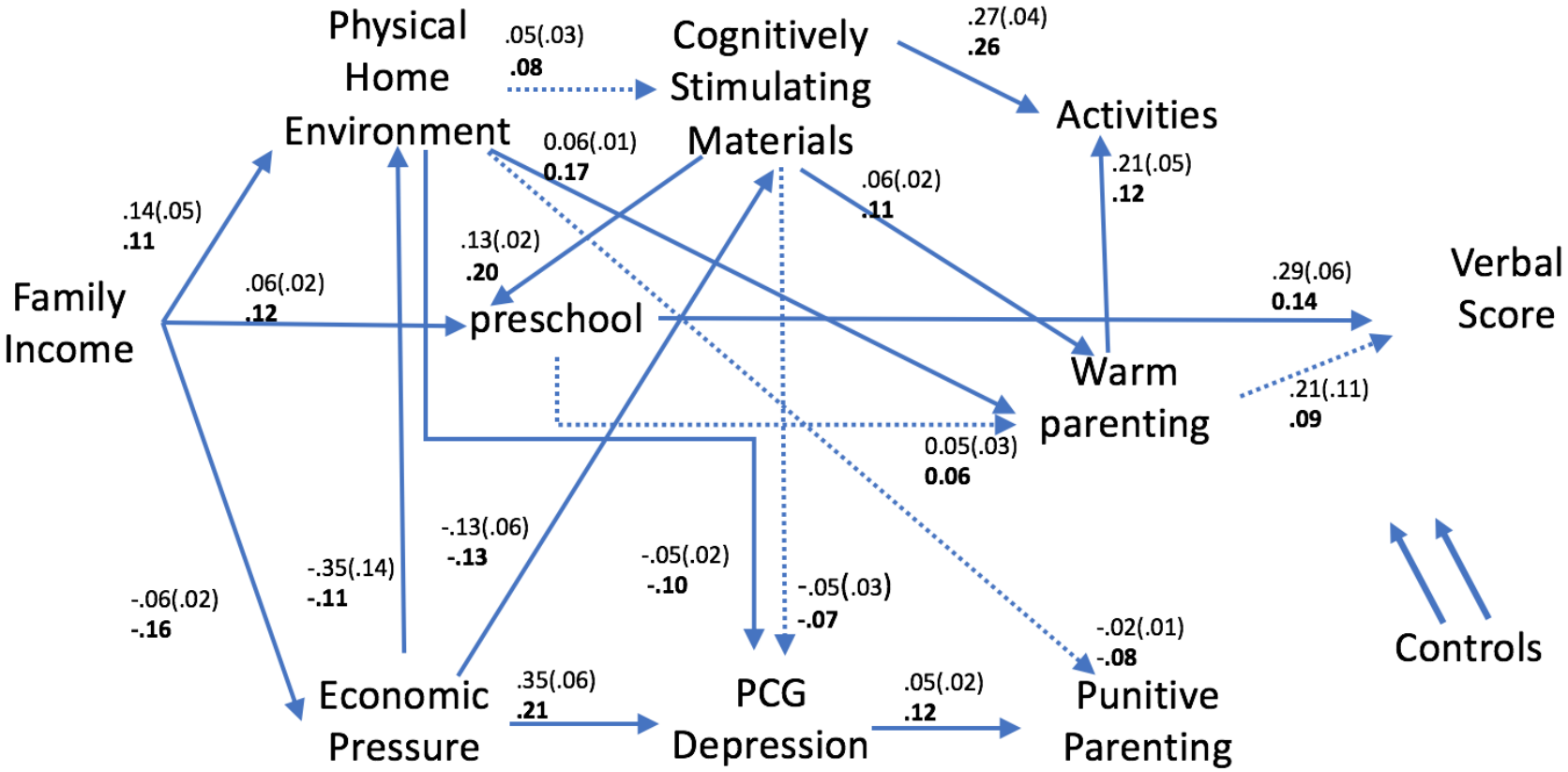

Figure 2. Unstandardized and standardized (bold face) parameter estimates (*SE*) in full model for verbal scores.

Paths with solid lines are significant at .05 level, and paths with dotted lines are significant at .10 level.

χ 2 /df= 9.5 ($p<0.05$) , RMSEA=0.026, CFI=0.956, TLI=0.914

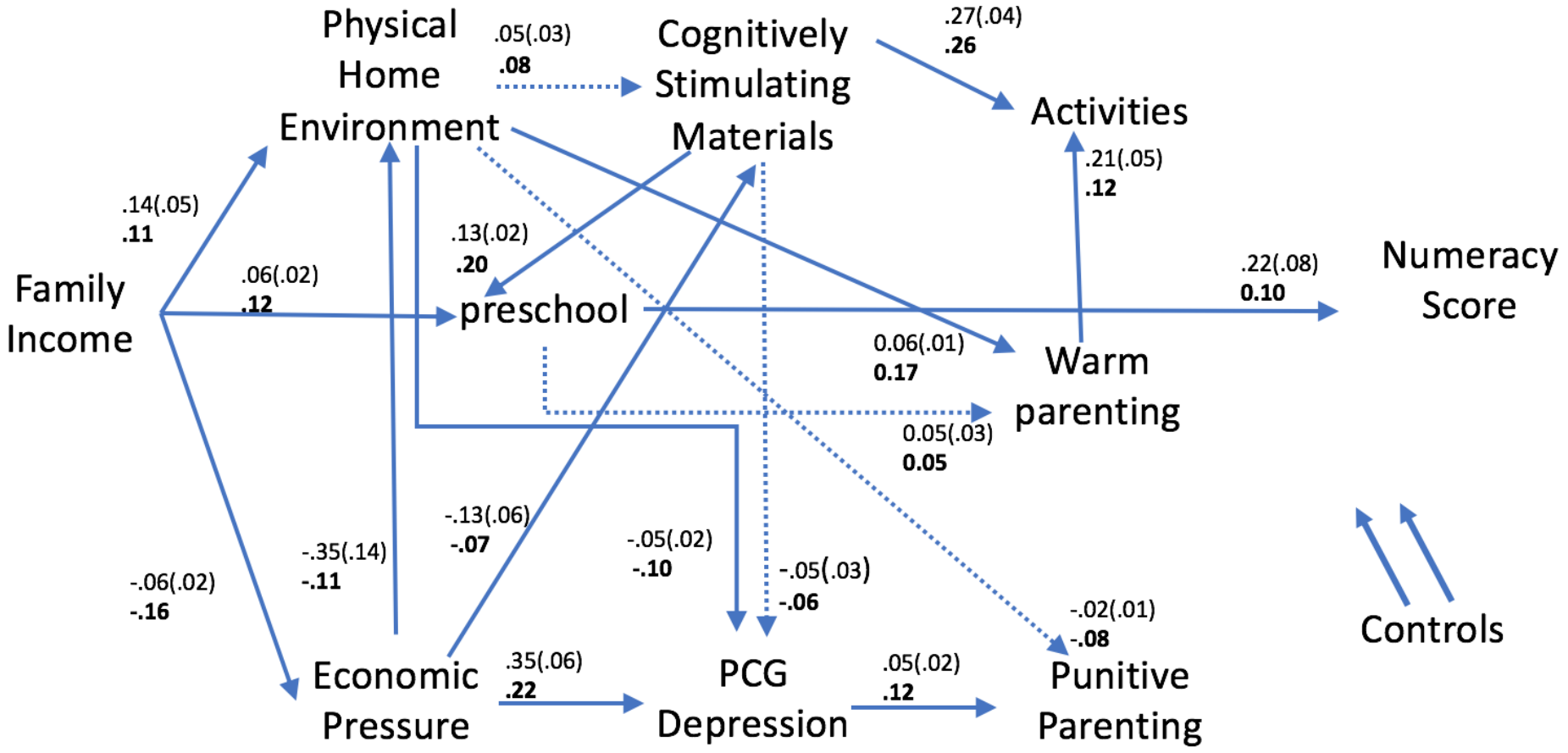

Figure 3. Unstandardized and standardized (bold face) parameter estimates (*SE*) in full model for numeracy scores. Paths with solid lines are significant at .05 level, and paths with dotted lines are significant at .10 level.
χ 2 /df= 9.3 ($p<0.05$) , RMSEA=0.026, CFI=0.955, TLI=0.913

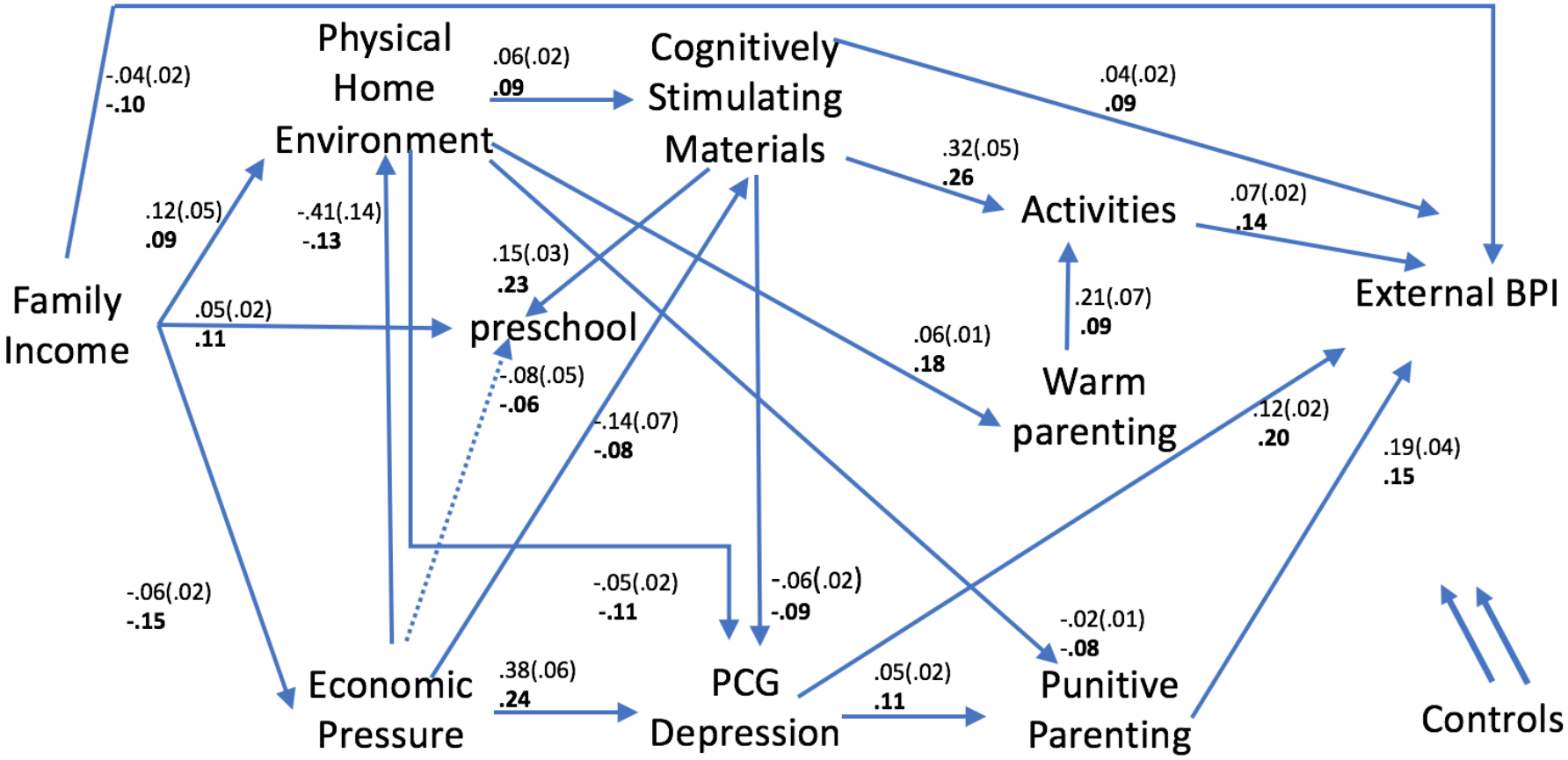

Figure 4. Unstandardized and standardized (bold face) parameter estimates (*SE*) in full model for external behavior problems.

Paths with solid lines are significant at .05 level, and paths with dotted lines are significant at .10 level.

$\chi 2$ /df= 10.1 ($p<0.05$) , RMSEA=0.026, CFI=0.955, TLI=0.913

The standardized direct and total effects of all variables on the three children outcomes were calculated to compare the relative magnitude of the association between all variables and the children outcomes (see Table 4). Some similar patterns are observed for verbal and numeracy scores. Of all the demographic controls, children's low birthweight status, migration status, PCG's cognitive level, PCG's relationship to the children, father's education, and region of residence are significantly associated with children's verbal and numeracy skills. Among these demographic controls, PCG's cognitive level and children's migration status have the largest total effect. Children whose PCG has a higher cognitive ability also tend to score higher. The urban children in intact families outperform their rural counterparts in verbal test. Migrating to the cities also improves the rural children's verbal scores. In addition, those born with low birthweight tend to be lagging behind the others. Of the mediators, preschool attendance, cognitively stimulating materials and warm parenting are conductive to children's verbal ability, with preschool attendance showing the largest total effect. For numeracy score, preschool attendance is the only significant mediators. For both verbal and numeracy scores, the family investment indicators have larger total effects than the indicators of family stress model.

A direct negative income effect on children's behavior problems is observed even after controlling all the mediators and demographic variables. Among all demographic controls, the total effect of children's health is largest, with healthy children exhibiting less conduct problems. Different from cognitive abilities, PCG's cognitive level and living in the west region does not affect children's behavior problems. However, being taken care by father increases children's behavior problems. Of all mediators, PCG's depressive affect shows the largest total effect, followed by punitive parenting. The total effects of the indicators of family stress outweigh that of the indicators of family investment.

Table 4. Standardized direct and total effects of all variables on children outcomes

	Verbal		Numeracy		External BPI	
	Direct	Total	Direct	Total	Direct	Total
Income						
Family Average Income (Log)	0.01	0.05	-0.01	0.01	-0.10*	-0.11*
Family investment indicators						
Physical Home Environment	0.02	0.05	0.02	0.03	-0.02	0.02
Preschool	0.14*	0.14*	0.10*	0.11*	-0.01	-0.01
Cognitively Stimulating Materials	0.03	0.07*	0.01	0.03	0.07+	0.10*
Activities	0.03	0.03	0.00	0.00	0.11*	0.14*
Family Stress indicators						
Economic Pressure	0.01	0.00	-0.01	-0.01	-0.01	0.04
PCG Depression	0.02	0.02	0.05	0.05	0.20*	0.22*
Warm Parenting	0.09+	0.09*	0.05	0.05	-0.03	-0.01
Punitive Parenting	-0.01	-0.01	0.01	0.01	0.15*	0.15*
Demography control-Child						
Boy	0.02	0.01	-0.03	-0.03	0.00	0.00
Low Birthweight	-0.05	-0.06*	-0.07*	-0.08*	0.03	0.03
Child Health	0.06	0.06	0.07	0.07	-0.15*	-0.15*
Single Child	0.04	0.05	0.06	0.06	-0.05	-0.04
Children's Migration Status						
(Ref: Rural Children with both parents)						
Urban Children both parents	0.11*	0.14*	0.09*	0.10*	-0.08	-0.04
Migrant Children	0.10*	0.11*	0.15*	0.16*	-0.02	0.01
Left Behind Children	-0.06	-0.07	-0.04	-0.04	0.01	0.01
Demography control- PCG						
PCG Cognitive Ability	0.10*	0.14*	0.09*	0.11*	-0.06	-0.04
PCG relation (Ref: mother)						
Father	0.02	0.02	0.05	0.05	0.11*	0.11*
Grandparents	0.09*	0.09*	0.06	0.06	0.01	0.01
Demography control-Family						
Father's Education	0.07+	0.08*	0.09*	0.09*	0.07+	0.09*
West	-0.08*	-0.08*	-0.11*	-0.11*	0.02	0.01

*p<0.05, +p<0.1

Discussion

We examine the extent to which family income exerts an impact on prechoolers' cognitive and behavioral outcomes based on a national representative sample from Urbanization and Labor Migration Survey. Based on conceptual framework of the family investment and family stress models, this study finds that, consistent with early findings in the West, family income shapes children's early cognitive and behavioral through two distinct mediating pathways. .

Income effect on children's cognitive scores are primarily mediated by constructs of family investment model. Preschool attendance, cognitively stimulating materials are important to children's verbal and numeracy abilities. Among these factors, preschool attendance is most important to both verbal and numeracy abilities. In contrast, income effect on children's external behavior problems is primarily explained by constructs of family stress model. PCG's depressive affect and punitive parenting are two important mediators that explain the income effect on the behavior outcomes. After controlling the demographic variables and the mediating variables, the income effect becomes non-significant for the two cognitive outcomes, while it remains marginally significant for external behavior problems.

Both sets of indicators for family investment and family stress increase the explanatory power of the model. Furthermore, consistent with Yeung et al.'s results (2002), interactions between the mediators of family investment model and family stress model are observed. One the one hand, physical home environment and cognitively stimulating materials are conductive to PCG's emotional distress and parenting behaviors, which, in turn, affect children's behavior problems. On the other hand, economic pressure is negatively related to the physical environment of the home and preschool attendance, which are important for both verbal and numeracy abilities.

This study sheds light on the pathways that link family income and early childhood development in China, a new context where these issues have not yet been adequately examined. Based on a national representative sample, this study shows that income effect on

children's outcome emerges before children start formal schooling and illustrates the mediating role of both family investment and family stress models and that indicators in these two framework interact with each other In addition, we show it is critical to incorporate the broad developmental context in the child development literature as results reveal that children's migration status, being affected by both *hukou* system and parental labor migration, has an impact on cognitive outcomes. Both the urban children in intact families and migrant children outperform the rural children in intact families in both verbal and numeracy tests. In addition, children who live in the West region are significantly more disadvantaged than other children due to the unequal development in China. PCG's relationship to the children is also found to be important. Compare to mothers, being taken care by grandparents is not necessarily detrimental to the children's cognitive abilities, while being taken by fathers increases the children's behavioral problems. PCG's cognitive level significantly influences the children's verbal and numeracy scores. These findings suggest that in the Chinese context, *hukou* system, migration, region, and the PCG characteristics explain a great deal in the variations of children's development.

This study has some limitations. First, a few results in this study are inconsistent with the previous literature. For example, cognitively stimulating materials and activities are found to increase children's externalizing behavior problems. Preliminary exploration indicates a rural-urban distinction in the impact of these mediators. More works is warranted to explain such findings. Second, the evidence of wide rural-urban gap and by children's migration status shows that large developmental contexts have important impact on family dynamics, which, in turns, affect the children's development. Future work can further examine the differences in the mediating pathways across rural and urban, and different migration status. Finally, the cross-sectional nature of data used in this study limits the possibility of testing the reverse

causality between some key mediators and outcomes. For example, whether punitive parenting and PCG's depressive affect are attributed to children's external behavior problems.

In sum, we extend the literature on early childhood development by examining the pathways through which income affects children's outcomes in a non-western context. Results in this study confirms the distinct mediating role of family investment model and family stress model for children's cognitive and behavioral development respectively. It also underscores the role of the primary caregivers in the context of large internal migration and unequal social structure in contemporary China. These findings provide useful international comparison and have significant theoretical and policy implications.

Reference

Bailey, M. J., & Dynarski, S. M. (2011). *Gains and gaps: Changing inequality in US college entry and completion*. Retrieved from

Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin, 88*(3), 588.

Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual review of psychology, 53*(1), 371-399.

Bradley, R. H., Corwyn, R. F., McAdoo, H. P., & Garcia Coll, C. (2001a). The Home Environments of Children in the United States Part I: Variations by Age, Ethnicity, and Poverty Status. *Child Development, 72*(6), 1844-1867. doi:10.1111/1467-8624.t01-1-00382

Brooks-Gunn, J., & Duncan, G. J. (1997). The Effects of Poverty on Children. *The future of children, 7*(2). doi:10.2307/1602387

Conger, K. J., Rueter, M. A., & Conger, R. D. (2000). The role of economic pressure in the lives of parents and their adolescents: the family stress model.

Conger, R. D., Conger, K. J., Elder, G. H., Lorenz, F. O., Simons, R. L., & Whitbeck, L. B. (1992). A Family Process Model of Economic Hardship and Adjustment of Early Adolescent Boys. *Child Development, 63*(3), 526-541. doi:10.2307/1131344

Connelly, R., & Gayle, V. (2017). An investigation of social class inequalities in general cognitive ability in two British birth cohorts. *Br J Sociol*. doi:10.1111/1468-4446.12343

Dearden, L., Sibieta, L., & Sylva, K. (2011). *The socio-economic gradient in early child outcomes: evidence from the Millennium Cohort Study*. Retrieved from

Dickerson, A., & Popli, G. K. (2016). Persistent poverty and children's cognitive development: evidence from the UK Millennium Cohort Study. *Journal of the Royal Statistical Society: Series A (Statistics in Society), 179*(2), 535-558.

Duncan, G. J., Brooks- Gunn, J., & Klebanov, P. K. (1994). Economic deprivation and early childhood development. *Child Development, 65*(2), 296-318.

Duncan, G. J., Yeung, W. J., Brooks-Gunn, J., & Smith, J. R. (1998). How Much Does Childhood Poverty Affect the Life Chances of Children? *American Sociological Review, 63*(3), 406. doi:10.2307/2657556

Duncan, G. J., Ziol- Guest, K. M., & Kalil, A. (2010). Early- childhood poverty and adult attainment, behavior, and health. *Child Development, 81*(1), 306-325.

Elder, G. H., van Nguyen, T., & Caspi, A. (1985). Linking Family Hardship to Children's Lives. *Child Development, 56*(2). doi:10.2307/1129726

Fang, C., & Feng, X. (2008). Family Background and Academic Achievement:A Study on the Social Stratum Differentiation in Compulsory Education. *ZHEJIANG SOCIAL SCIENCES, 8*, 47-55. (In Chinese).

Fang, S., Huang, J., Curley, J., & Birkenmaier, J. (2018). Family assets, parental expectations, and children educational performance: An empirical examination from China. *Children and Youth Services Review, 87*, 60-68 %@ 0190-7409.

Goodman, A., & Gregg, P. (2010). *Poorer children's educational attainment: How important are attitudes and behaviour?* : Joseph Rowntree Foundation York.

Guo, G., & Harris, K. M. (2000). The Mechanisms Mediating the Effects of Poverty on Children's Intellectual Development. *Demography, 37*(4), 431-447. doi:10.1353/dem.2000.0005

Hao, L., Hu, A., & Lo, J. (2014). Two Aspects of the Rural-Urban Divide and Educational Stratification in China: A Trajectory Analysis. *Comp Educ Rev, 58*(3), 509-536. doi:10.1086/676828

Heckman, J. J. (2000). Invest in the very young. *Chicago: Ounce of Prevention Fund*.

Hirschi, T. (2017). *Causes of delinquency*: Routledge.

Hooper, D., Coughlan, J., & Mullen, M. (2008). Structural equation modelling: Guidelines for determining model fit. *Articles*, 2.

Kessler, R. C., Andrews, G., Colpe, L. J., Hiripi, E., Mroczek, D. K., Normand, S. L. T., . . . Zaslavsky, A. M. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine, 32*(6), 959-976. doi:10.1017/s0033291702006074

Kim, D. H., & Um, M.-Y. (2018). The relationships among family income, parental depression, and adolescent aggression in South Korea: A latent growth mediation model. *Children and Youth Services Review, 84*, 168-175. doi:10.1016/j.childyouth.2017.11.025

Li, Y., Li, Y., Liu, L., & Lv, Y. (2013). The Effects of Home Learning Environment on Children’s Early Academic and Social Skills. *Psychological Development and Education, 29*(3), 268-276.

Li, Z., & Qiu, Z. (2016). Family Background and Children’s Academic Performance: Evidence from the compulsory education in China. *Sociological Studies, 4*, 121-144. (In Chinese).

Linver, M. R., Brooks-Gunn, J., & Kohen, D. E. (2002). Family processes as pathways from income to young children's development. *Developmental psychology, 38*(5), 719-734. doi:10.1037//0012-1649.38.5.719

Liu, A., & Xie, Y. (2015). Influences of monetary and non-monetary family resources on children's development in verbal ability in China. *Research in Social Stratification and Mobility, 40*, 59-70 %@ 0276-5624.

Liu, Z. (2005). Institution and inequality: the hukou system in China. *Journal of Comparative Economics, 33*(1), 133-157. doi:10.1016/j.jce.2004.11.001

Liu, Z., Li, X., & Ge, X. (2009). Left too early: the effects of age at separation from parents on Chinese rural children's symptoms of anxiety and depression. *Am J Public Health, 99*(11), 2049-2054.

Lu, K., & Liu, X. (2008). Student Performance and Family Socioeconomic Status: Results from a Survey of Compulsory Education in Western China. *Chinese Education & Society, 41*(5), 70-83. doi:10.2753/ced1061-1932410505

Lu, Y. (2012). Education of Children Left Behind in Rural China. *J Marriage Fam, 74*(2), 328-341. doi:10.1111/j.1741-3737.2011.00951.x

Lu, Y. (2014). Parental Migration and Education of Left-Behind Children: A Comparison of Two Settings. *J Marriage Fam, 76*(5), 1082-1098. doi:10.1111/jomf.12139

Luo, F., & Zhang, Y. (2017). Probing the SES-achievement connection in the fast-changing society of China: a comparison of urban, rural, and migrant students. *Asia Pacific Education Review, 18*(1), 101-113.

Masarik, A. S., & Conger, R. D. (2017). Stress and child development: a review of the Family Stress Model. *Curr Opin Psychol, 13*, 85-90. doi:10.1016/j.copsyc.2016.05.008

Mayer, S. E. (1997). *What money can't buy: Family income and children's life chances*: Harvard University Press.

McFarland, M. J. (2017). Poverty and Problem Behaviors Across the Early-Life Course: The Role of Sensitive Period Exposure. *Population Research and Policy Review*, 1-22. doi:10.1007/s11113-017-9442-4

McLeod, J. D., & Shanahan, M. J. (1993). Poverty, Parenting, and Children's Mental Health. *American Sociological Review, 58*(3), 351. doi:10.2307/2095905

McLoyd, V. C. (1990). The impact of economic hardship on Black families and children: Psychological distress, parenting, and socioemotional development. *Child Development, 61*(2), 311-346.

Newland, R. P., Crnic, K. A., Cox, M. J., & Mills-Koonce, W. R. (2013). The family model stress and maternal psychological symptoms: Mediated pathways from economic hardship to parenting. *Journal of family psychology, 27*(1), 96 %@ 1939-1293.

Peterson, J. L., & Zill, N. (1986). Marital Disruption, Parent-Child Relationships, and Behavior Problems in Children. *Journal of Marriage and the Family, 48*(2). doi:10.2307/352397

Piek, J. P., Dawson, L., Smith, L. M., & Gasson, N. (2008). The role of early fine and gross motor development on later motor and cognitive ability. *Human movement science, 27*(5), 668-681 doi:10.1016/j.humov.2007.11.002

Pittman, L. D., & Chase-Lansdale, P. L. (2001). African American Adolescent Girls in Impoverished Communities: Parenting Style and Adolescent Outcomes. *Journal of Research on Adolescence, 11*(2), 199-224. doi:10.1111/1532-7795.00010

Reardon, S. F. (2011). The widening academic achievement gap between the rich and the poor: New evidence and possible explanations. *Whither opportunity*, 91-116.

Ren, Q., & Treiman, D. J. (2016). The consequences of parental labor migration in China for children's emotional wellbeing. *Soc Sci Res, 58*, 46-67. doi:10.1016/j.ssresearch.2016.03.003

Schoon, I., Jones, E., Cheng, H., & Maughan, B. (2012). Family hardship, family instability, and cognitive development. *J Epidemiol Community Health, 66*(8), 716-722.

Sun, Z., Liu, Z., & Sun, B. (2009). Children’s Achievements and Their Families and Schools:A Study Based on the Rural Areas in Gansu Province.

Wang, F. (2008). *Boundaries and categories: Rising inequality in post-socialist urban China*: Stanford University Press.

Wei, Q. W., Zhang, J. X., Scherpbier, R. W., Zhao, C. X., Luo, S. S., Wang, X. L., & Guo, S. F. (2015). High prevalence of developmental delay among children under three years of age in poverty-stricken areas of China. *Public Health, 129*(12), 1610-1617. doi:10.1016/j.puhe.2015.07.036

Xie, Y., & Zhou, X. (2014). Income inequality in today's China. *Proc Natl Acad Sci U S A, 111*(19), 6928-6933. doi:10.1073/pnas.1403158111

Xu, H., & Xie, Y. (2015). The Causal Effects of Rural-to-Urban Migration on Children's Wellbeing in China. *Eur Sociol Rev, 2015*. doi:10.1093/esr/jcv009

Yeung, W.-J. J., & Gu, X. (2015). Left Behind by Parents in China: Internal Migration and Adolescents' Well-Being. *Marriage & Family Review, 52*(1-2), 127-161. doi:10.1080/01494929.2015.1111284

Yeung, W. J., & Conley, D. (2008). Black-white achievement gap and family wealth. *Child Dev, 79*(2), 303-324. doi:10.1111/j.1467-8624.2007.01127.x

Yeung, W. J., Linver, M. R., & Brooks-Gunn, J. (2002). How Money Matters for Young Children's Development: Parental Investment and Family Processes. *Child Development, 73*(6), 1861-1879. doi:10.1111/1467-8624.t01-1-00511

Yoshikawa, H. (1995). Long-Term Effects of Early Childhood Programs on Social Outcomes and Delinquency. *The future of children, 5*(3), 51-75 doi:10.2307/1602367

Yue, A., Shi, Y., Luo, R., Chen, J., Garth, J., Zhang, J., . . . Rozelle, S. (2017). China's Invisible Crisis: Cognitive Delays among Rural Toddlers and the Absence of Modern Parenting. *The China Journal, 78*(1), 000-000.

Yue, A., Sylvia, S., Bai, Y., Shi, Y., Luo , R., & Rozelle, S. (2016). The Effect of Maternal Migration on Early Childhood Development in Rural China.

Zhang, X. (2012). The effects of parental education and family income on mother–child relationships, father–child relationships, and family environments in the People's Republic of China. *Family process, 51*(4), 483-497.

Zhang, Y., Luo , F., Tao, S., Luo, L., & Dong, Q. (2015). Family Socioeconomic Status, Parental Investment and Migrant Children's Academic Achievement in China. *Journal od Psychological Science, 38*(1), 19-26. (In Chinese).

Zhang, Y., & Xie, Y. (2016). Family background, private tutoring, and children's educational performance in contemporary China. *Chinese Sociological Review, 48*(1), 64-82 %@ 2162-0555.