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Parental Migration, Investment in Children, and Children's Non-cognitive Development: Evidence from Rural China^{*}

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Abstract

Many children worldwide are left behind by parents who are migrating for work. While previous literature has studied the effect of parental migration on children's educational outcomes and cognitive achievements, this study focuses on how parental migration affects children's non-cognitive development. We use longitudinal data of children in rural China and adopt labor market conditions in destination provinces as instrumental variables for parental endogenous migration choice. We find that parental migration has a significant negative effect on children's non-cognitive development. Differentiating inter- and intra-provincial migrations suggests that the negative effect of parental migration is mainly driven by inter-provincial migrations. We test four different mechanisms of how parental migration affects child development including parental financial inputs, parental time inputs, household bargaining, and children's own time input. Our results provide insights into the relative importance of different mechanisms in determining the effect of parental migration on children's non-cognitive skill formation.

Keywords: Left-behind Children, Parental Migration, Parental Input, Non-cognitive Development, China

JEL Classification: J12, J13, J24, J61, R23

1 Introduction

International and internal migrants together account for about 1 billion people worldwide (United Nation, 2013). Migrants often leave their children behind because of rigid migration policies, high cost of migration, or uncertain living conditions in the destination country or region. For example, in China, about 61 million children are left behind in rural areas by their parents who have migrated in search of jobs in cities.¹ This “left-behind children” phenomenon has received growing attention in the literature. So far, substantial research has studied the effect of parental migration on the developmental outcomes of children left behind, focusing mainly on educational attainment, cognitive skill development, and health outcomes.² Yet, primarily because of the lack of reliable data, studies on how parental migration affects left-behind children’s non-cognitive development remain limited. Moreover, we know even less about the underlying mechanisms through which parental migration affect children’s development.

This paper is among the first to examine the impact of parental migration on left-behind children’s non-cognitive outcomes by using the Gansu Survey of Children and Families (GSCF), a longitudinal study of children between 9 and 16 years old in rural China. The GSCF is one of the few datasets that measure children’s non-cognitive skills in a developing country context, which allows us to expand the scope of existing studies by linking parental migration to children’s non-cognitive development. More important, by taking advantage of the richness of the GSCF, this paper can evaluate the mechanisms behind parental migration in a more comprehensive way. Our results are not only important for understanding the consequences of parental migration, which is major phenomenon in developing countries, but also add to our knowledge about the formation of children’s non-cognitive skills in general.

Non-cognitive skills can be broadly defined as social-emotional skills, which are usually

¹This number is estimated based on the 2010 population census by the All-China Women’s Federation.

²These studies found that parental migration has significant effects on education outcomes (Cox-Edwards and Ureta, 2003; Yang, 2008; McKenzie and Rapoport, 2011; Amuedo-Dorantes and Pozo, 2010; Macours and Vakis, 2010; Powers, 2011; Nobles, 2011; Giannelli and Mangiavacchi, 2010; Acosta, 2011; Antman, 2011, 2012; Alcaraz et al., 2012; Kroeger and Anderson, 2014; Gibson and McKenzie, 2014; Zhang et al., 2014; Cortes, 2015; Binci and Giannelli, 2016) and health outcomes (Hildebrandt and McKenzie, 2005; Gibson et al., 2011b; De Brauw and Mu, 2011; Stillman et al., 2012; Mu and De Brauw, 2015). Also see Antman (2013) for a survey of the effects of migrant parents on the left-behind family.

referred to as the second dimension of individual heterogeneity in addition to cognitive skills in labor economics.³ Understanding the impact of parental migration on children’s non-cognitive skills is of particular interest given growing evidence that non-cognitive skills have a large impact on economic outcomes (Heckman and Rubinstein, 2001; Heckman et al., 2006; Flossmann et al., 2006; Lindqvist and Vestman, 2011; Kautz et al., 2014; Weinberger, 2014) and are more malleable in later childhood than cognitive skills (Borghans et al., 2008; Almlund et al., 2011; Akee et al., 2018).

Theoretically, parental migration can affect the non-cognitive development of children left behind through several mechanisms. Financial inputs and time inputs are two such mechanisms that have been heavily discussed in the literature. First, migration is usually motivated by and associated with higher income. Thus, migrant parents can send home remittances that are higher than the wages they could have earned at home. The additional financial resources can have a positive impact on children’s non-cognitive development by reducing emotional and behavioral problems caused by financial distress.⁴

Second, parental migration is likely reduces parental time inputs, which may have a negative impact on children’s non-cognitive development, especially considering that several studies have documented that parental time investments are vital on children’s non-cognitive outcomes (Cunha and Heckman, 2008; Cunha et al., 2010; Fiorini and Keane, 2014; Hsin and Felfe, 2014; Bono et al., 2016).⁵ Since the above two mechanisms work in opposite directions, the effect of parental migration on children’s non-cognitive development is theoretically ambiguous and can only be determined empirically.

The tradeoff between financial and time inputs has been intensively investigated in the

³These skills have many names in the literature including soft skills, personality traits, non-cognitive abilities, character skills, and socio-emotional skills. See Borghans et al. (2008); Almlund et al. (2011); Thiel and Thomsen (2013); Humphries and Kosse (2017) for measurements and interpretations of non-cognitive skills across different disciplines such as psycholog, sociologic and economics.

⁴Rapoport and Docquier (2006) and Yang (2011) both provide empirical evidence that migration increases remittances. Additionally, Akee et al. (2018) find that household financial wellbeing has large beneficial effects on children’s emotional and behavioral skills.

⁵Parental migration is also associated with parental absence which is found to have an adverse effect on children’s psychological development and emotional well-being (Ginther and Pollak, 2004; McLanahan et al., 2013). Most existing research on parental absence is in the context of developed countries where parental absence is usually caused by divorce, military separation, or non-martial childbearing. In developing countries such as China and Mexico, parental absence is usually caused by internal or international migration (Nobles, 2011).

literature studying the effect of mother’s labor supply and children’s human capital outcomes (See Heckman and Mosso (2014) for a recent review). These papers argue that an increase in maternal hours worked generates an income effect, with additional resources coming from a boost in labor income. At the same time, changes in maternal hours worked can also generate a substitution effect, with changes in the time that mothers allocate to childcare. Parental migration induces a similar tradeoff between family income and parental time inputs, but the empirical evidence on these mechanisms is limited.

Besides financial and time inputs, parental migration can affect child development through other important channels that are less discussed in the literature. On the one hand, many left-behind children have only one parent who is migrating, usually, the father. The father’s migration can increase his income, which might increase his bargaining powers over the mother. Because mothers are more likely to spend family resources on child development including education, nutrition, and health-related commodities (Hoddinott and Haddad, 1995; Li and Wu, 2011; Lépine and Strobl, 2013), the father’s migration can affect not only the amount of resources available to their children but also the amount of resources that are actually allocated to their children. Differentiating between the two is important because only the latter makes the real impact. While previous studies have emphasized the importance of intra-household bargaining in determining child outcomes, empirical studies are limited on how migration affects household bargaining and whether it is an important channel through which parental migration affects children outcomes.

On the other hand, parental migration can affect children’s development outcomes by affecting children’s own time allocation. Empirical evidence in child development literature suggests that how children spend time on their own becomes important as children grow into adolescence (see Kooreman (2007); Fiorini and Keane (2014); Del Boca et al. (2017) for examples). In the meantime, the effect of parental time investments on child development declines during adolescence (see Cunha and Heckman (2008); Del Boca et al. (2014, 2017) for examples). This decline occurs because adolescents begin to take responsibility for their own actions⁶ and their developmental outcomes begin to depend on their own decisions. Although

⁶Lundberg et al. (2009) distinguishes children’s decisions taken on their own and those shared with their parents, and find that the probability of children making independent decisions increases sharply between

the role of children’s own time investment has emerged in recent child development literature, this channel is seldom studied in the migration literature.⁷

To assess different mechanisms behind the effect of parental migration, we consider four different sets of outcome variables. First, we consider household income and child-related spending. Thus, we investigate not only the available financial resources, but also how they are allocated to children. Second, we consider variables measuring father’s decision power regarding a wide range of family decisions. These variables help us understand whether changes in intra-household bargaining is an important mechanism through which parental migration affects the allocation of financial resources to children. Third, we investigate the mechanism of parental time input by studying the effect of the father’s migration on how many hours the father and mother spend on helping children with homework and on playing and talking with children every week. The latter could be particularly salient in the context of non-cognitive development. Finally, we estimate how parental migration affects children’s own time allocation among different activities. The results shed some light on the relative importance of different mechanisms that drive the relationship between parental migration and children development.

Another important contribution of our paper is that we are able to distinguish between intra- and inter-provincial migration by looking at the information on parental migration destination. This distinction is important because it may have different impacts on left-behind children. In particular, the loss of parental supervision and interaction might be much more detrimental for inter-provincial migration with long-distance travel and infrequent returns, than for short-distance intra-provincial migrations.⁸ As we show later, intra-provincial migration generally has no significant effect on children’s outcomes, while the effect of inter-provincial migration is usually significant. This is probably because the fact that intra-provincial migrants could easily travel back and forth between the workplace and

the ages of 10 and 14.

⁷Antman (2011) is an exception that studies how the father’s U.S. migration affect children’s study and work hours.

⁸With one of the few papers on this subject, Su et al. (2018) noticed that migrants who have come from other provinces differ significantly from migrants who come from the same province as the destination city in a variety of individual characteristics. In general, the migrants from other provinces tend to be younger, more likely to be male, usually in better physical condition, but have fewer years of formal education.

home, so they are not fully absent from their children as parents who have migrated to different provinces. Existing studies on migration in China and in other countries usually do not distinguish the two types of migration.⁹ By exploring this new dimension of migration, our analysis improves the understanding of the impact of parental migration on left behind children.

The main difficulty in estimating the causal effect of parental migration on children left behind is the endogeneity problem associated with migration. To be more specific, migration is not randomly assigned, and one has to worry about unobserved characteristics that are related to migration can also influence the outcome of left-behind children. For example, an unobserved negative financial shock may have a negative impact on children's development and influence household migration decision. On the one hand, since the shock makes the sending household poorer, it may encourage the father to migrate. On the other hand, if migration is costly, such financial shock may prevent the father from migrating because it is unaffordable. Thus, the direction of such bias is theoretically uncertain. In addition, endogeneity may result from reverse causation, in which children's outcome is actually causing the father's migration rather than the other way around. For example, economic models of optimizing behavior suggest that the father's migration decision is likely to be responsive to their perception of children's behaviors. Thus, fathers are more likely to stay at home if their children face behavior challenges. In these scenarios, a simple ordinary least squares (OLS) estimation may underestimate the impact that a migrant father has on children's non-cognitive development.

The main approach taken by existing studies to address the endogeneity problem has been the use of instrumental variables (IV) for migration. In particular, a large number of studies have used variation in historical migration rates at the local level to identify the effect of migration (Hanson and Woodruff, 2003; Mansuri, 2006; McKenzie and Rapoport, 2011). One concern with historical migration rate as instrument is that this variable is likely to reflect the level of economic development at the local area that would affect children of migrants directly. More recent studies have adopted economic conditions in destination

⁹Antman (2012) is one exception, showing the different impacts of parental domestic and international migration on children left behind in Mexico.

areas as instruments (Yang, 2008; Amuedo-Dorantes and Pozo, 2010; Antman, 2011; Cortes, 2015). Such variables are arguably more valid since they are less likely to be correlated with local area unobservables. Section 2 provides a more detailed summary of the estimation methods that are adopted in the literature.

In this study, we address the endogeneity problem of parental migration by exploring the longitudinal data structure and by adopting instrumental variables. First, the longitudinal data structure makes it possible to adopt a child-level individual fixed effects model (FE) to address the possibility that some time-invariant characteristics may affect both the probability of parental migration and children’s development. Second, following the literature, we use labor market conditions in the destination provinces as instrumental variables.¹⁰ Though many papers have studied the impact of migration on children left behind in the context of rural-urban migration in China, few papers have adopted economic condition in destination areas as instruments. This probably happens because the commonly used datasets lack information on migration destination.

We construct two scores to measure children’s non-cognitive skills based on a series of questions provided in the GSCF regarding their internalizing and externalizing behavioral challenges. The two scores are standardized to have a mean of 0 and a standard deviation of 1. Our estimates show significant adverse effects of the father’s inter-provincial migration¹¹ on the non-cognitive skills of left-behind children, which reduces the scores by 0.03 and 0.06 points in regards to internalizing and externalizing behaviors, respectively. However, we find that the effects of intra-provincial migration, though still negative, are much smaller and insignificant. These results are robust with different specifications for our regression model, alternative instruments, and an alternative value-added model. Our results suggest that the inter-provincial migrations, which are quite common in China, is a much more serious problem in shaping the emotional well-being of children left behind, and therefore deserves greater policy attention. Further discussion on mechanisms shows that fathers’ migration is

¹⁰Rural migrants tend to work in the manufacturing and construction sector so that changes in wage and employment levels in those sectors are more likely to affect migration behavior but are unlikely to affect children’s development directly. As a robustness check, we use wage and employment in these sectors as instruments.

¹¹We focus on fathers’ inter-provincial migration because in our sample fathers are much more likely to migrate than mothers and intra-provincial migration has not been found to significantly affect child outcomes.

associated with an increase in family income, but not child-related spending probably due to the increasing bargaining power among fathers. More important, fathers' migration reduces the time parents spend talking and playing with their children. These two mechanisms might be the major driving forces behind the negative effect of the father's migration on left-behind children.

To summarize, these results make two major contributions to the literature on migration and child outcomes. First, by focusing on the effects of parental migration on children's non-cognitive development, our results expand the scope of existing studies that mostly examined cognitive and health outcomes. Second, with a rich set of variables on household expenditure and time allocation as well as intra-household bargaining, our results improve our understanding of the relative importance of different mechanisms through which parental migration affects children's non-cognitive development.

The remainder of the study is organized as follows. The next section provides background information. Section 3 introduces the data and provides summary statistics. Section 4 presents the empirical method. Section 5 reports estimation results and robustness checks. Section 6 provides a comprehensive discussion of the potential mechanisms. Section 7 discusses sub-sample results. We conclude with Section 8.

2 Background

2.1 Parental Migration and Development of Children Left Behind

There are almost 1 billion migrants worldwide, with 214 million international migrants and another 740 million internal migrants moving within countries (United Nation, 2013). The impact of migration on the school attainment of children left behind is one of the most intensively studied dimensions of the consequences of parental migration. The literature so far yields ambiguous predictions. On the one hand, a great deal of papers find that migration increases education attendance or enrollment (Cox-Edwards and Ureta, 2003; Acosta, 2011; Mansuri, 2006; Yang, 2008; Hanson and Woodruff, 2003; Antman, 2012; Binci and Giannelli, 2016; Gibson and McKenzie, 2014). On the other hand, a substantial number of studies

find that migration negatively impacts school attendance or enrollment (Amuedo-Dorantes and Pozo, 2010; Giannelli and Mangiavacchi, 2010; McKenzie and Rapoport, 2011; Kroeger and Anderson, 2014; Cortes, 2015). Empirical evidence on the effect of migration on children’s cognitive skills measured by test scores is relatively limited and is far from conclusive. For example, Macours and Vakis (2010) find that parental migration increases children’s academic performance in Nicaragua, while Powers (2011) find parental migration decreases children’s test scores in Mexico.

More important, to the best of our knowledge, no paper so far has employed a rigorous estimation method to study the impact of parental migration on non-cognitive skills of children left behind, although a small number of papers have found correlations between parental migration and psychological well-being of children left behind. For example, in Romania, Botezat and Pfeiffer (2014) find that children’s psychological well-being measured by whether they were bullied or were involved in conflicts is negatively associated with parental migration.¹²

The endogeneity of migration is one of the most important reasons that existing studies report mixed results regarding the impact of migration on children left behind. Researchers have applied various methods to address this problem. The main approach has been the use of instrumental variables for migration. The most commonly used instrumental variables can be categorized into two groups. The first group consists of a large number of studies that have used variation in historical migration rates at a local level to identify the effect of migration.¹³ The second group of more recent studies has adopted economic conditions in destination countries or regions as instruments, to better satisfy the validation condition. For example, Yang (2008) uses variation in exchange rate appreciation in migrants’ destinations to show that remittances result in an increase in child schooling. Amuedo-Dorantes and Pozo (2010) make use of unemployment and wages in U.S. destination states to identify the effects of remittances on expenditure patterns in Mexico. Antman (2011) uses employment condition in U.S. cities the potential migrant could select as a destination as instruments and

¹²Instead of looking at left-behind children, a few papers have studied the impact of migration on mental health or psychological well-being of elderly parents left behind (Antman, 2010) and of migrants themselves (Atella et al., 2019; Barrett and Mosca, 2013; Stillman et al., 2015).

¹³For examples, see Hanson and Woodruff (2003); Mansuri (2006); McKenzie and Rapoport (2011).

studied the effect of the father’s migration status on children’s school and work outcomes in Mexico. Gibson and McKenzie (2014) use the demand shocks in destination countries to study the effect of the mother’s migration on children left behind in the Philippines.

Recently, a small number of papers have adopted randomized trials to study the impact of migration on the household members who are left behind. Gibson et al. (2011a) study a migration lottery program in New Zealand that allows them to compare families of successful applicants who were authorized to migrate with families of applicants that were not allowed to migrate. Mergo (2016) uses the Diversity Visa lottery program to evaluate the effects of international migration on families left behind in Ethiopia. Although the experimental approach leads the way to promising solutions for the endogeneity problem, it is usually very costly and, thus, not easily applied to alternative contexts.¹⁴

Besides the endogeneity problem of migration, another major challenge of the existing literature is to identify the different mechanisms that drive the effect of parental migration. So far, the empirical evidence on the mechanisms of how parental migration affects child development is limited mainly because most socioeconomic surveys lack precise measures of parental investments and other factors that are important in the production of children’s skills. Nevertheless, the existing literature has provided some discussions on how parental migration affects material inputs and children’s own time allocation.

First, many studies have used household income or remittance as a proxy measure for material inputs in understanding the impact of parental migration on child development. A consensus in this strand of literature is that migration increases remittances and household income (Cox-Edwards and Ureta, 2003; Yang, 2008; Alcaraz et al., 2012; Gibson and McKenzie, 2014). The remittances can ease household budget constraint and, thereby, can potentially increase household spending on children. Thus, parental migration can have a positive impact on children’s development. However, increased household income may not always lead to an increased spending on children. For example, if the father’s migration increase his bargaining power and he chooses to spend less on children, then the father’s

¹⁴A few studies have applied the matching methods, which is not usually preferred because the method has to assume that selection into migration depends on observable characteristics only and match migrants with comparable non-migrants based on those observable characteristics. For example, see Esquivel and Huerta-Pineda (2007).

migration can reduce financial resources allocated to the children. The richness of our data allows us to not only look at the overall income but also child-specific expenditure on different categories.

Moreover, in the literature of child development, parental time inputs are considered as one of the most important determinants of child outcomes, however, we know relatively little about how migration affects the time allocation of parents. Though it is reasonable to assume that a parent who migrates will spend less time with his or her children, it is possible that the other parent who is left behind with the children will sacrifice leisure time to compensate for the reduced time inputs. The effect of migration on parental time inputs is seldom studied in the literature. Zhang et al. (2014) is one exception, providing summary statistics showing that families with migrant parents in China are less likely to tutor their children.¹⁵ Our paper goes beyond the current literature by providing causal evidence of parental migration on parental time inputs.

In the meanwhile, a few papers have studied how parental migration affects children's own time allocation. For example, McKenzie and Rapoport (2011) provides summary statistics showing that children with migrant parents are more likely to devote time in housework and family business. Antman (2011) studies how parental U.S. migration affects the number of hours per week that a child devotes to studying and working and finds that parental migration reduces study hours and increases work hours. Chen (2013) examines the time allocation of left-behind children in China and finds that children spend more time in household work. Migration costs can also directly affect children's school decision as shown in de Brauw and Giles (2017). They find a negative relationship between migrant opportunity and high school enrollment. With rich information on household spending, intra-household bargaining, and parent and child time allocation, our paper contributes to the literature by looking at the mechanisms behind the link of parental migration and child non-cognitive skills in a more comprehensive and coherent way.

¹⁵Zhang et al. (2014) also shows that families with migrant parents less likely to have a satisfying relationship between children and parents or other adults in the family.

2.2 Labor Migration and Children Left Behind in Rural China

Beginning in 1958, China started the household registration system (*hukou*) which categorized citizens into rural or urban residents and imposed strict restrictions on rural residents migrating to urban areas.¹⁶ These restrictions were only gradually relaxed by the government in the late 1980s when China's open-door economic reform led to the rising demand of labor in urban areas, while, concurrently, privatization of farming led to a surplus of labor in rural areas. Since then, hundreds of millions of rural migrant workers have travelled to cities to find jobs. According to a survey from the National Bureau of Statistics of China, the total number of rural migrant workers has grown from 104 million in 2002 to 168 million in 2015. Such a huge wave of rural-to-urban migration is unprecedented and has been described as the largest peacetime migration in human history (Zhao, 1999; Du et al., 2005).

Rural migrants are allowed to work and live in urban areas as temporary residents. However, they are not able to access the urban welfare system, including education health, and the social safety net, mainly because of the current *hukou* system. The majority of these migrant workers perform low-paying jobs and live in crowded conditions (World Bank, 2009). As a result, a considerable number of migrant parents choose to leave their children behind in their rural communities.¹⁷ Recent estimates based on the 2010 population census suggest that there are more than 61 million children aged 17 years or below that have been left behind by their parents in rural areas, which account for 37.7 percent of rural children and 21.9 percent of all children in China (Zhang et al., 2014).

This left-behind children phenomenon has attracted increasing attention from both policymakers and academic researchers. So far, despite the empirical evidence from other countries that produces very mixed results, a majority of studies in China find negative impacts of parental migration on educational outcomes of children left behind. To be more specific, these studies find that parental migration reduces school attendance (Meyerhoefer and Chen, 2011; Hu, 2012; Wang, 2014) and decreases test scores (Zhang et al., 2014; Zhao et al., 2014; Meng and Yamauchi, 2017). In contrast, Bai et al. (2017) finds that parental migration has

¹⁶See Song (2014) for a detailed introduction of the origins and changes of the *hukou* system in China.

¹⁷Despite an increasing number of rural children accompanying their parents and entering the migration process, single person migration remains the dominant pattern in the internal migratory flow in China (World Bank, 2009).

a positive impact on children’s academic performance.

More relevantly, some work has studied the effect of parental migration on children’s emotional or psychological well-being, and the evidence on this topic is far less conclusive and remains mainly descriptive. Some studies suggest that left behind children are more likely to have symptoms of anxiety and depression (Liu et al., 2009) and are more likely to feel sad and think of suicide or leave home (Gao et al., 2010). Other studies find that these impacts are insignificant (Xu and Xie, 2015; Ren and Treiman, 2016).

Thus, this paper makes two major contributions to the literature. First, it expands the scope of the current literature by studying the impact of parental migration on left-behind children in terms of non-cognitive skills, which is seldom studied in the literature in either China or other developing countries. More important, this paper improves the identification of the causal effect of parental migration in China by adopting economic conditions in destination areas as instrumental variables. As described section 2, these variables are commonly employed in the literature and have been proven to be valid instruments (Antman, 2013). However, to the best of our knowledge, not many papers on left-behind children in China have explored these variables.

The most similar paper to ours is (Lee and Park, 2010) which also uses the GSCF to study the effect of parental migration on child development using the GSCF. Our work differs in several important ways. First, our definition of migration is different. We define a father’s migration status by his workplace location which allows us to differentiate between inter- and intra-provincial migration. This differentiation is important because different types of migration lead to different impacts. Lee and Park (2010) defines a father as migrant if he is away from home for more than 3 months in the past year. Although this definition captures the fact that a migrant father may be away from home for a longer time, it is not clear whether the father is away consecutively or if the father travels back for the weekend. In both cases, fathers are defined as migrants, but the impact on their children might be quite different. In the latter case, fathers would still be able to communicate with their children on a regular base, while in the former case, communication is less likely to happen. Thus, that definition of migrant might be ambiguous if we can not differentiate between consecutively

away and only away during weekdays. More important, we evaluate the mechanisms of parental migration in a comprehensive way by exploring how the father’s migration affects parental investment, household bargaining, and children’s own time inputs. Thus, our results could complement findings in Lee and Park (2010) by improving our understanding of how parental migration affects child development.

3 Data and Summary Statistics

This study analyzes data from the GSCF, a longitudinal study of 2,000 children who were 9-12 years old in the year 2000 and living in 100 rural villages in Gansu. Gansu is located in the northwest of China (see Figure 1) and is one of the poorest provinces in the country. According to the National Bureau of Statistics (NBS), in 2001 and 2005, rural per capita income in Gansu ranked 30th out of 31 provinces. This study uses data from the first two waves of the GSCF, which were conducted in 2000 and 2004.¹⁸ The GSCF has a low sample attrition because 1,872 (93.6 percent) children of the original 2,000 children were re-interviewed in wave 2 (2004). In each wave, the GSCF collected detailed information for the target children on their developmental outcomes including cognitive and non-cognitive skills, as well as parental, household, and environmental factors that may affect these developmental outcomes.¹⁹

We impose a set of sample restrictions. First, given that the mother’s migration is rare in our sample,²⁰ we focus on the impact of the migrant father and restrict our sample to children whose mother stayed at home. Second, we exclude children whose parents are divorced or deceased to eliminate the confounding factors associated with the family structure.²¹ In

¹⁸Wave 3 of the GSCF was conducted in 2007-2009 when sample children were 17-21 years old. Since the impact of parental input becomes less important in shaping their non-cognitive skills (Cunha et al., 2010) at those ages, we choose to use only waves 1 and 2. Moreover, wave 3 covers a highly selective sample because its data collection process is different from previous waves. See Glewwe et al. (2017) for a more detailed explanation on this issue.

¹⁹Because of its richness on child development, the GSCF has been widely used to analyze how parental and school inputs affect children’s educational achievements, health outcomes, and non-cognitive behaviors. See Hannum and Zhang (2012); Leight and Liu (2016); Glewwe et al. (2016, 2017); Leight (2017) for examples.

²⁰In the GSCF, less than 3 percent of children have a migrant mother. Using the same data, Lee and Park (2010) reports the same migration rate for mothers.

²¹Compared with the United States, divorce is relatively uncommon in China. In 2000, the U.S. divorce rate (number of divorces per 1,000 population) was 4 according to the census, while China’s divorce rate was only around 1 according to the China Statistical Yearbook.

addition, to use a child fixed effects model, we exclude children that appear only in wave 1. We further drop observations with missing values of main variables. Our final data consists of 1,779 children with 3,558 observations.

The GSCF provides a unique data source that enables us to study the development of children’s non-cognitive skills in the context of a developing country.²² It asks the respondent child a series of questions regarding their *internalizing* and *externalizing* behavioral challenges. The former captures intra-personal problems such as withdrawal, depression, and anxiety, and the latter captures inter-personal problems such as destructive behavior, aggression, and hyperactivity. We construct two variables measuring children’s non-cognitive skills that capture internalizing and externalizing behaviors separately. Each measurement is constructed by applying item response theory (IRT) to generate a single index based on a list of 17 questions (Andrich, 1978). We use the IRT approach to measure children’s non-cognitive skills.²³ An example of a question used for the internalizing index is whether you fully agreed, agreed, disagreed, or totally disagreed with the following statement: “I easily get anxious.” An example of a question used for the externalizing index is whether you fully agreed, agreed, disagreed, or totally disagreed with the following statement: “I often lose my temper with others.” A full list of questions is summarized in Appendix A1. The two scores are standardized to have a mean of 0 and a standard deviation of 1. A higher score means fewer behavioral problems and higher non-cognitive skills.²⁴

Throughout this paper, we define a father’s migration status by the location of his workplace. In particular, we define a father to be a non-migrant if his workplace is located in the village, an intra-provincial migrant if his workplace is located outside of the village but

²²See Borghans et al. (2008); Almlund et al. (2011); Thiel and Thomsen (2013); Humphries and Kosse (2017) for measurements and interpretations of non-cognitive skills across different disciplines.

²³IRT is a well-established method that the literature use to aggregate information from different measurements. It has several advantages than simply summarizing answers to different questions. Each question provides different information about the underlying non-cognitive skills that are being measured. There is no reason to believe that a score of 4 in one of the measure implies the same level of non-cognitive development as a score of 4 in another measure. For example, fully agreeing that “I steal things from others” might indicate something different than fully agreeing that “I often make fun of others.” Summing up the scores ignores this issue. If we think that each question is measured with some noise and that the variance in the noise is different across questions, then summing up the scores on each question will provide a very unreliable and noisy measure of the underlying non-cognitive skills.

²⁴Glewwe et al. (2017) and Leight and Liu (2016) constructed measures of non-cognitive skills the same way.

within Gansu province and an inter-provincial migrant if his workplace is located in another province outside of Gansu.²⁵ As we plan to adopt the child fixed effects model, it is important to have enough over-time variation in the father’s migration. We observe this variation in panel A of Table 1, which categorizes our sample children by their father’s migration status in 2000 and 2004. In 2000, 62.9 percent of fathers stayed in the home village, 30.8 percent migrated within the province, and 6.3 percent migrated out of the province. In 2004, 65.1 percent of fathers stayed in the home village, 26.5 percent migrated within the province, and 8.4 percent migrated out of the province. This trend is consistent with the growing migration rate at the national level (Su et al., 2018).²⁶

A further look at the longitudinal structure of our data shows a large variation of the father’s migration over time within a family (panel B of Table 1). The majority of fathers never migrated out of the province (88.5 percent). There are 2.6 percent of fathers migrated out of the province in both 2000 and 2004, 3.7 percent migrated out of the province only in 2000, and 5.2 percent migrated out of the province only in 2004. the majority of children live in families whose fathers never migrated (88.5 percent).

Table 2 shows the summary statistics for children in our final sample, as well as three subsamples defined by the father’s migration status. A clear relationship emerges between the father’s migration status and non-cognitive skills. Children with non-migrant fathers perform better in both internalizing and externalizing behaviors (higher scores for better non-cognitive skills) compared with children with migrant fathers. Among children with migrant fathers, those with fathers who migrated out of the province have the lowest non-cognitive scores. To be more specific, children with a non-migrant father have non-cognitive scores ranging from 0.019 to 0.003, children with an intra-provincial migrant father have

²⁵Previous papers usually define a migrant parent if he or she is away from home for certain period of time during the year. See Lee and Park (2010) and Zhang et al. (2014) for more information. As illustrated in Table A2, our definition is consistent with that in the literature as parents with a workplace outside of the village experienced much longer periods of time away from home.

²⁶In Table A2, we report the amount of months the father has been away from home in each category by years, showing that inter-provincial migrants have been away from home for a much longer time than intra-provincial immigrants (6 months versus 3 months) in 2000. In wave 2, the GSCF asked two different questions on how many months the father has been away. The first question asked how many months the father has been away consecutively, and the second question asked how many months the father has been away only during weekdays. As shown in Table A2, inter-provincial migrants are away for more months both consecutively and during weekdays than intra-provincial migrants (4.5 and 0.9 months versus 2.0 and 0.7 months).

non-cognitive scores range from -0.014 to 0.013, and children with an interprovincial migrant father have non-cognitive scores ranging from -0.115 to -0.078. That is, the farther away the father was from home, the lower scores the children had.²⁷

In terms of control variables, a first look at the statistics for all children (column (1) of Table 2) reveals that the average age of sample children is 13 years old and 47 percent of them are female. On average, fathers and mothers in our sample are 39 and 37 years old, respectively. Fathers had 6.7 years of education, while mothers had about 3.7 years, which suggests that most fathers do not finish junior middle school and most mothers barely finish elementary school. Families in our sample on average have 2.3 children, which suggests that the one-child policy was not strictly enforced in the rural area of Gansu. About 20 percent of families have at least one grandparent living with them. Regarding village level characteristics, the average village population in our sample is 1712, and the average arable land per capita is 2.2 mu (about 8.1 square meters). About 32.9 percent of villages are in plain terrain, 9.8 percent in hills terrain, 33.9 percent in mountain terrain, and 23.4 percent in other terrains. A majority of villages have their own elementary schools (83 percent), while a relatively smaller number of villages have their own middle schools (10 percent).

Columns (2)-(4) of Table 2 report the summary statistics across the three sub-samples according to the father's migration status, showing that most demographic characteristics across the three groups do not vary much. However, we do find some interesting differences, especially between the samples with an inter-provincial migrant father and other groups. For instance, fathers and mothers in the inter-provincial group have, on average, 5.9 and 2.4 years of education, which are the lowest among the three sub-samples. They also have more children and are more likely to have at least one grandparent at home. These characteristics are consistent with what has been found in Su et al. (2018).

Our instrumental variables are economic conditions in the recent past of destination provinces where the father is most likely to migrate. We identify the provinces to which fathers in our sample are most likely to migrate by looking at village-level information,

²⁷We also explore the differences in the distribution of these non-cognitive measures between children across the three sub-samples in Appendix Figure A1. It shows that of the distribution of internalizing scores is positioned slightly to the left for children whose father migrated out of Gansu province, but no distinct shift in the whole distribution is observed. The distributions of externalizing scores exhibit a similar pattern.

which asks the top migration destination of the village. That is, our instrument varies at the village level. As reported in Table 3, the top migration destinations for each village appeared to be relatively stable and are concentrated in certain provinces during our sample period. The most popular destination is Xinjiang province, which accounted for about 37 percent of the top migration destination in 2000 and 39 percent in 2004. Xinjiang is to the northwest of Gansu, but unlike Gansu, Xinjiang’s economy has been performing close to the national average ever since the mid-1990s, owing perhaps to the western development policies launched by China’s central government. One of the important goals of these policies is to enhance national unity and social stability by facilitating economic and social development in the west Goodman (2004).²⁸ In 2000, the average annual wage was 7,605 RMB in Xinjiang and 7,277 RMB in Gansu. The economic differences between Gansu and Xinjiang explain why there is a mass migration from one province to the other. This migration trend is consistent with what has been observed in studies on inter-migration in China (Su et al., 2018). Other common destinations include provinces near Gansu (Ningxia, Qinghai, and Shaanxi) or provinces in booming coastal regions (Guangdong and Beijing).²⁹

Once we have identified the destination provinces to which migrant fathers are most likely to move, we link the child observations with employment and wage data in the most likely destination province. The province-level employment and wage data are available from the China Labor Statistical Yearbook for 1999 and 2003. It is expected that these variables will act to stimulate migration. That is, potential migrants will be more likely to make the trip when employment and wage are high indicating a boom in those industries. As a robustness check, we also construct the instrumental variable using employment and wages in the manufacturing and construction sectors, separately.³⁰

To investigate the potential mechanisms of how the father’s migration affects children’s

²⁸Xinjiang has received particular attention from the central authorities because it borders Central Asia and has experienced a growth of separatist movements. To contain separatism, China’s central government has stepped up its efforts to improve living standards in Xinjiang and to crack down on separatism. Fiscal transfers from the central government to Xinjiang have increased from 5.91 billion RMB in 1996 to 18.4 billion RMB in 2001 (Information Office of the State Council 2003).

²⁹The GSCF also asked the migrant father which province his workplace was located in if his workplace was outside of Gansu. However, only about half of our observations have valid answers to this question.

³⁰Manufacturing and construction sectors employ a large number of migrant workers, but the employment and wage variables in those sectors are highly correlated with those at the aggregate level, so we construct our instrument based on aggregate variables.

outcomes, we explore variables that measure household financial inputs, household bargaining power, and parental and children’s time inputs. In particular, we measure household financial inputs by household income, household expenditure, and household item purchase. Table 4 panel 1 reports household income across different groups of households and shows that the average total household income is 10,121 RMB, which consists of about 62 percent (6,311 RMB) agriculture income and about 27 percent (2,721 RMB) labor income. Overall, the three groups of households have a similar level of household total income, but with quite different components. As expected, households with a migrant father have a much higher labor income (5,815 RMB, 4,854 RMB, and 1,412 RMB), but a much lower agriculture income (3781 RMB, 5387 RMB, and 7015 RMB) than households in which the father stays at home. Table 4 panel 2 reports, the annual expenditure on children’s clothes, school supplies, and children’s allowances are 234 RMB, 35 RMB, and 93 RMB, respectively. When we look at these expenditures by migration status of fathers, a clear trend emerges: households with a migrant father, especially an inter-provincial migrant father, have much lower spending on children. Table 4 panel 3 describes a similar story as in panel 2, showing that households with an inter-provincial migrant father are less likely to purchase reading materials, a dictionary, and desks for their children. Considering that different groups of households receive similar total household income (Table 2), financial constraints do not seem to be the main explanation of why households with migrant fathers spend less on their children.

Table 5 reports the father’s decision power relative to the mother, which is measured by the questions regarding whether the father is the decision-maker behind a wide range of family decisions. These decisions include the children’s schooling, how to treat the child, purchase of durable goods, management of family finances, planting of crops, and livestock transaction. Those questions are answered by the mother. If the father makes those decisions, the variables are coded as 1; if the mother makes the decision or if the parents make the decision together, the variables are coded as 0. Thus, the variables reflect the bargaining power of the father. Overall, the father is not the major decision maker in the household. On the management of the family finances, fathers have about a 42 percent probability of being the decision maker, which is the highest among all decisions asked in the survey.

Meanwhile, the father's migration status does not seem to cause large differences according to the summary statistics presented here.

Table 6 reports parental time inputs which are measured by weekly hours the father spends with his children. For a father who is absent from home, those variables reflect weekly hours he spends on those activities when he stays at home. We consider two variables: weekly hours helping children with their homework and weekly hours of playing or talking with children. Table 6 shows that even when they come back home, fathers with inter-provincial migration experience spend much less time playing and talking with their children (2.5 hours) compared with fathers who stay home (2.9 hours) and fathers who migrate within Gansu (2.8 hours). This might occur because when migrant fathers come home from other provinces, they have to take in charge of certain home production activities, such as house repairs, that are usually conducted by male members of the households. We indeed observe that inter-provincial migrant fathers spend about 12 hours on home production, while nonmigrant fathers and fathers migrant within Gansu only spend about 10 or 7 hours, respectively.³¹

A father's migration can also affect a mother's time inputs. Table 6 shows that on average mothers in our sample spend 30 hours on home production, 1.3 hours helping their children with homework and 3.7 hours playing and talking with their children every week. If the father migrated out of Gansu province, the mother will spend 4 more hours on home production comparing with the mother whose spouse stays at home. In the meantime, mothers will spend fewer hours with their children, especially helping their children with homework. Overall, summary statistics in Table 6 suggest that a father's migration status largely reduces the number of hours a father and mother can spend with their children, which is likely to be the major mechanism through which a father's migrant status affects children's development.

In the bottom panel of Table 6, we report children's time allocation measured by their weekly hours spent on home production, taking care of others, doing homework, and watching TV. Overall, we find that children with a migrant father are more likely to participate in

³¹Although we can not observe how many hours migrant fathers spend with their children when they are away from their residents, we reasonably assume that the time they spend with their children is quite limited because of their absence.

home production and caring for others, while the difference in doing homework and watching TV is not evident.

4 Empirical Strategy

Since our primary goal is to estimate the effect of the father’s current migration on his children’s non-cognitive development, the simplest econometric framework might begin by estimating the following equation:

$$Y_{it} = \beta_0 + \beta_1 fm_{it} + \beta_2 X_{it} + \epsilon_{it},^{32} \quad (1)$$

where Y is the non-cognitive scores for child i at time t , which are measured for internalizing as well as externalizing behaviors. The effect of interest is captured by the coefficient on the fm variable, which is an indicator that equals 1 if the father migrates out of Gansu province and 0 otherwise. This means that the reference group in the analysis includes children with non-migrant fathers and children whose father migrates within the province. Although intra-provincial migration is not uncommon in our data (see Table 2), we focus on inter-provincial migrants here because additional analyses show that intra-provincial migration does not significantly affect children’s developmental outcomes.³³ Moreover, the binary definition of migration status also makes it possible to adopt destination shocks as instrument variables, which could help us better deal with the endogeneity problem of migration, while including intra-provincial migration may require additional instruments that are not available.³⁴

The vector of covariates X_{it} , includes a rich set of control variables. At the child level, we control for a child’s age and gender. At the parental level, we control for a father’s and mother’s age and education level. We include both parents’ education levels instead of just

³²The linear regression is applied because the non-linear models cannot accommodate the combined instrument variable and fixed effects estimation (Antman, 2011),

³³In Appendix Table A3, we estimate equation (1) includes the dummy indicating whether father migrates within the province in addition to the dummy that indicates whether father migrated out of the province. We find that the effect of intra-provincial is not significant for most outcome variables.

³⁴Many papers on children’s cognitive and non-cognitive development have adopted a production approach using a value-added model (Todd and Wolpin, 2003, 2007). Nevertheless, we adopt a value-added model as a robustness check. Our main results do not vary much with different model specification.

that of the household head to better capture children’s inheritable ability. More important, previous research has shown that a mother’s education has a stronger impact than a father’s education on a child’s developmental outcomes (Dickson et al., 2016). At the household level, we control for the number of siblings and whether the family lives together with at least one of the grandparents. The variables are important factors determining the available time and financial resources and how these resources allocated within a household. In addition, we include county fixed effects to avoid bias from omitted local-level factors.

As discussed, one concern with estimating equation (1) is that the OLS estimation method will yield biased estimates of β_1 since the fm_{it} variable is endogenous. First, fathers and children may share some personality traits that are persistent over time, and those traits may affect a father’s migration decisions and children’s behaviors simultaneously. The panel nature of the data allows a simple solution to correct for this type of endogeneity by adding child fixed effects. Thus, the regression model can be expressed as following:

$$Y_{it} = \beta_0 + \beta_1 fm_{it} + \beta_2 X_{it} + \eta_i + \epsilon_{it}, \quad (2)$$

where η_i captures time-invariant observed and unobserved heterogeneity at the individual child level. The identification of estimates of β_1 comes from fathers whose migration status has changed between 2000 and 2004. As illustrated in panel B of Table 1, 159 fathers have changed their migration status between 2000 and 2004, accounting for 8.9 percent of our sample. However, there could still be some sources of endogeneity that vary over time. For example, a negative shock to the family’s income may affect children’s psychosocial development, while at the same time, this shock could force the father to migrate for higher income or prevent the father from migrating by making migration unaffordable. In this case, the direction of such bias is theoretically uncertain. Moreover, parents may respond to realized poor behaviors by staying at home to accompany their children. The OLS estimate will be biased upward if we fail to control this bias.

To address this concern, we propose a set of instrumental variables that will only influence the child’s outcomes through their effects on the father’s migration status. The proposed instruments are based on labor market conditions in the destination provinces where the

father was most likely to migrate to.³⁵ Economic conditions in the recent past in the destination provinces can affect the father’s migration decision without influencing the children left behind directly.

The main empirical strategy then amounts to the estimation of equation (2) above by instrumental variables, where migration status is estimated through the following first stage regression:

$$fm_{it} = \alpha_0 + \alpha_1 Z_{it} + \alpha_2 X_{it} + \mu_i + \epsilon_{it}, \quad (3)$$

where Z_{it} is a vector of instrumental variables excluded from equation (2). The set of variables Z_{it} comprise of the employment and wage in the destination provinces to which the father was likely to migrate. Since the child fixed effects model with instrumental variable (FEIV) approach involves using repeated observations of children from the same family in different time periods, we cluster the standard errors at the level of the individual to allow for arbitrary correlation within the individual and across time.

5 Estimation Results

5.1 Main Results

Table 7 presents our main estimation results. In columns (1) and (5), we start with the simple OLS estimation, which assumes the father’s migration status is exogenous. The coefficient estimates on the dummy indicator for having an inter-provincial migrant father are negative and significant for both non-cognitive scores. In particular, having a father who migrates out of the province is associated with a 0.046 and 0.084 declines for internalizing and externalizing scores, respectively, compared to having a father who stays at home or migrate within the province.

The simple regression coefficients presented in columns (1) and (5) are subject to the potential endogeneity problem. As a first attempt to address this issue, we employ a child

³⁵ A growing number of papers have adopted economic conditions in the destination areas as instruments to estimate the effect of migration. For example, see Yang (2008); Amuedo-Dorantes and Pozo (2010); Antman (2011), and Cortes (2015).

fixed effects model to deal with the time-invariant source of endogeneity. Columns (3) and (7) report the estimation results of the fixed effects model. The estimates of the coefficient on inter-provincial migration remain significant and are consistently smaller in magnitude than in the linear regression estimates reported in columns (1) and (5) (-0.026 for internalizing behaviors and -0.055 for externalizing behaviors), which suggest that the inter-provincial migration is positively correlated with the omitted time-invariant determinants of a child's non-cognitive skills. This is consistent with the notion that migration households tend to pay less attention to children's development or are more financially distressed.

A fixed effect model helps to deal with the time-invariant omitted variable problem; however, the above results may still be contaminated by time-varying confounding factors and reverse causality problem. We deal with these problems with the instrumental variable method. Table 7 columns (2) and (6) report the estimation results for two-stage least square estimation and columns (4) and (8) report estimation results for the fixed effects model with instrumental variables. Consistent with the OLS and fixed effects model, the estimation coefficients for inter-provincial migration are significantly negative, -0.058 and -0.030 for the internalizing score and -0.088 and -0.059 for the externalizing score. More important, the estimated coefficients for father migration become larger after adopting instrumental variables in both models, which suggests that time-varying unobservables, such as negative income shocks, tend to prevent migration and bias down the estimation. The overall effects of a father's migration appear to have negative impacts on children's non-cognitive development. In terms of the mechanism behind this negative effect, we test the financial inputs, time inputs, and other related channels in later sections.

The first stage regression results are presented in Table 9 using both OLS and fixed effects models. Employment and wage levels in the top destination provinces are included together as instrumental variables. Both employment and wage levels are one year ahead of the survey year. As observed, both instruments are good predictors of the likelihood that the father's migration out of province. The point estimates in column (2), where we adopt the fixed effects model, indicate that an increase in employment by 1,000 percent would correspond to an increase in the probability of a father migrating by 0.02 percent and an increase in wage

by 1,000 RMB would increase the probability of paternal migration by 1.4 percent. Both coefficients are significant at the 1 percent level. As indicated at the bottom of Table 7, the F statistics on the weak instrument test ranges from 17 to 35 across different specifications, which are well above the critical values for weak instruments as reported by Stock et al. (2002). In addition, since there are two instrumental variables, an overidentification test is also possible, although it can be argued that if both instrumental variables are measuring the same economic forces, the test provides limited information (Sargan, 1988; Murray, 2006). Nevertheless, we fail to reject the null hypothesis of valid instruments according to the overidentification test.

In Table 8, we consider two alternative sets of instrumental variables by exploring employment and wage in the manufacturing and construction sectors which are most likely to hire migrant workers. The estimation results are quite similar to our main results, with F statistics on the weak instrument test ranging from 15 to 34 across different specifications. Table 9 columns (3)-(6) report the first-stage estimations using employment and wage in the manufacturing and construction sectors as instrumental variables for the father's migration. Estimates are qualitatively similar to our baseline case in columns (1) and (2).

Among the control variables, the child's age is consistently positive, which is intuitive as a child's non-cognitive skill improves as he or she matures. The estimate of the village population is largely positive, and whether the village has a middle school is consistently positive, which implies that community environment may have an important impact on child development (Kautz et al., 2014). In terms of externalizing behaviors, the coefficient for being female is significantly positive across all models, suggesting that female children, in general, are less likely to develop externalizing behavior problems. This finding is consistent with the literature and it is well documented that boys perform worse than girls on many non-cognitive dimensions (see, for example, Becker et al. (2010); Bertrand and Pan (2013)). In addition, the number of siblings and the presence of a grandparent are shown to be correlated to children's non-cognitive skills, but the correlations become statistically insignificant when we adopt the fixed effects model.

5.2 Robustness Check

Here we discuss the robustness of our results considering several possible alternative model specifications. First, one concern to our identification strategy lies in the exclusion restriction necessary for the instrumental variables estimation. It is possible that destination economic conditions affect child outcomes directly, perhaps because the national-level business cycle will affect both the destination province and the local economics, which will certainly affect the child outcomes. Another possible threat to the validity of our instruments could come from the fact that migrants from different regions may traditionally send migrants to specific provinces. In that case, the instruments could be simply capturing differences across regions, such as differences in overall economic development. To address these concerns, we include the county and the year interaction term in Table 10 columns (1) and (6). Our baseline results are robust to the inclusion of those variables.

In addition, the following sets of variables have been found to be relevant to explain children’s non-cognitive development in previous papers: (1) children’s cognitive skill and health status, (2) school inputs, and (3) parent health status. In Table 10 columns (2)-(4) and (7)-(9), we begin by considering the subsample of children for whom we can observe health status and cognitive skills. Health status is self-reported and range from 1 to 4, with the higher scores indicating better health. The cognitive skills are measured by math and language scores based on standardized tests developed for the survey by test experts in the Gansu Educational Bureau. The test scores are normalized by standard deviations from the mean score of children in the same grade level. We do not observe children’s cognitive skills for the full sample because only half the students were given language tests and the other half were given math tests in 2000. Nevertheless, the magnitude of the migration coefficients is very similar to that observed in our main estimation (columns (4) and (8) in Table 7), despite the increased standard errors caused by the smaller sample size.

In columns (3) and (8) of Table 10, we test for the omission of school inputs, using information about schools that are self-reported by the sample children.³⁶ These variables

³⁶The GSFS has a separate questionnaire which covers more detailed information on schools that were answered by the school principal. However, since a large proportion of observations (about 70 percent) in the household survey are missing school ID, merging variables from this questionnaire to our sample will

describe whether the sample children observe disruptive behaviors in the school, such as violent discipline, disruptive classes, absentee teachers, and school closing for no legitimate reasons. Again, we do not observe any change in our coefficients of interest. In columns (4) and (9), we check for a potential bias caused by the omission of parent’s health shocks by including two variables that measure parent’s health status. The two variables are self-reported and range from 1 to 4, with higher scores indicating better health. Estimation results show that our main results are robust to the inclusion of these measures of parents’ health conditions. Overall, we conclude from our sensitivity analysis that our results are relatively invariant with respect to these changes in the model specification.

In addition, household inputs such as purchased goods and services as well as time inputs may also affect children’s non-cognitive development. As mentioned by Todd and Wolpin (2007), one way to account for missing variables on such inputs is to approximate family income and parent allocation of time. However, their inclusion is problematic because they will be affected by the father’s migration, making it hard to interpret our estimation results (Ermisch and Francesconi, 2013; Bono et al., 2016). Nevertheless, in addition to the variables used in the benchmark specifications, we include a log of family annual income and the father’s and mother’s weekly hours spent with the children as control variables in columns (5) and (10) of Table 10. Regardless of the outcome, the estimates from the specification with added controls are remarkably similar to our baseline results. This provides strong evidence that the estimated effects are robust to the inclusion of other predictors of child outcomes.

Finally, regarding children’s cognitive and non-cognitive development, many studies have adopted valued-added model to deal with the potential omitted variable problem (Todd and Wolpin, 2003, 2007). This model includes the lagged outcome variables together with other control variables, assuming the lagged outcome variable are a sufficient statistic for all historical inputs and unobserved family and child characteristics that may affect children’s outcome.³⁷ However, since a value-added model with the individual fixed effect would require observing the sample children for more than two periods, it is not applicable to our main

dramatically reduce the sample size. Thus, we chose not to use this questionnaire.

³⁷This method has been applied by Bono et al. (2016) and Fiorini and Keane (2014).

estimation. Nevertheless, we estimated the value-added model without child fixed effect as a robustness check. We use the 2004 wave as our baseline sample, incorporating non-cognitive scores in wave 1 as commonly specified in the value-added model. Table 11 reports the estimates for a value-added model with and without instrumental variables. Our baseline results are robust to this alternative model specification.

6 Mechanisms

Our results so far suggest a negative impact of the father’s migration on child non-cognitive skill. It is then natural to ask how migration might have affected children’s development. We test several different channels that are found to be salient for children’s development broadly, including parental financial inputs, father’s bargaining power, parental time inputs, child time inputs, parenting style, and parent health conditions.

6.1 Parental Financial Inputs

As suggested in Hao and Yeung (2015) and Meyer and Sullivan (2008), household income is different from household consumption expenditure. The former measures the available financial resources and the latter measures the resource allocation. Distinguishing between the two will help clarify the mechanisms behind the effect of the father’s migration. Thus, we explore not only how the father’s migration affects household income but also how it affects children-specific spending.

In Table 12 panel A, we estimate a fixed effects instrumental variable model considering three outcome variables related to household income: total income, agriculture income, and labor income. As expected, households with a migrant father have significant lower agriculture income, but much higher labor income. Overall, the migrant father significantly increased household income by 76 percent.

In panel B, we explore the effect of the father’s migration on children-specific spending, which includes annual expenditure on children’s clothes, school supplies, and children’s allowance. Surprisingly, our results show that the father’s migration significantly reduces

household expenditure on children’s clothes (67 percent) and has no significant impact on the expenditure of school supplies or allowance. These results imply that increased household income does not seem to be spent on improving children’s living condition. One may argue that households with a migrant father have spent the increased income on education materials which is not covered in panel B. We are not able to pin down the exact amount of expenditure on studying materials because the GSCF provides no such information; however, we are able to test whether the father’s migration has increased household expenditure on studying materials by exploring whether households have purchased certain study-related items for their children. In panel C, we investigate whether the household has purchased any reading material, a desk, or a dictionary for the children. Consistent with results in panel B, we observe that the father’s migration is associated with a lower probability of the child having reading materials other than a test book or dictionary.³⁸

Overall, results in Table 12 suggest that the father’s migration increased household income, but it does not necessarily increase and actually decreases household material inputs for children development. Considering that material inputs are important for children’s non-cognitive development (Cunha and Heckman, 2008; Cunha et al., 2010), the fact that the father’s migration reduces the material inputs is a potential mechanism behind its negative impact on children’s non-cognitive skills.³⁹

6.2 Father’s Bargaining Power

The father’s migration can affect not only how many financial resources are available to children by affecting household income but also how parents allocate these resources. Table 13 shows how the father’s migration affects the decision power of the father relative to the mother regarding a wide range of family decisions. Columns (1)-(3) show that the father’s migration increases the probability that he makes decisions on the children’s schooling, on how to treat children, and on how to manage the family finances. Columns (4)-(6) show that

³⁸In contrast, we find that household with a migrating father spend more on transportation and adult clothing. These results are available upon request.

³⁹It is worth noting that the father’s migration significantly increased household spending on adult clothing and transportation, which explains where the additional income has been spent among families with a migrant father.

the father’s migration is positively related with his decision power regarding the purchase of durable goods, planting crops, and transaction of livestock, though the estimated coefficients are not significant. These results are consistent with the literature, which finds that greater economic resources lead to greater bargaining power (Antman, 2014).

Overall, results in Table 13 suggest that the father’s migration increases his bargaining power, especially related to children’s education and financial inputs. The existing studies show that fathers, compared with mothers, are less likely to spend family resources on their children (Hoddinott and Haddad, 1995; Li and Wu, 2011; Lépine and Strobl, 2013). Our results suggest that fathers’ migration may reduce the amount of resources actually allocated to their children, which to some extent, explains why households with migrant fathers spend less on children’s clothes and are less likely to purchase study materials given that their household income has been increased (Table 12).

6.3 Parental Time Inputs

The father’s migration can affect the father and mother’s time allocation, which in turn would affect their time inputs on their children. On the one hand, the migrant father is absent for a substantial period of time, which reduces the time he can spend with his children. On the other hand, the mother who is left behind with the children may need to devote more time to other household matters, such as home production and farm work, when her spouse is away. It is intuitive that the father’s migration likely reduces parental time inputs on children. However, we are reluctant to jump to the conclusion that the mother will reduce her time inputs on children because she might sacrifice her leisure time to compensate for the time lost caused by the father’s migration.

To take a close look at this time input mechanism, we consider three variables that measure the father’s and mother’s time allocation, which include weekly hours of home production, weekly hours helping children with their homework, and playing or talking with children. For the migrant father, these variables reflect weekly hours he spends on those activities when he stays at home. Thus, the estimates largely underestimated the negative impact of the father’s migration on the father’s time inputs on children. Nevertheless, as

presented in panel A of Table 14, we find that the migrant father spends less time helping his children with their homework and less time playing and talking with his children even when the father is at home. Though the estimate on homework time is insignificant at -0.153, the effect on play and talk is significant at -0.500, which shows that they spend about 50 percent less time playing and talking with their children than fathers who stay home. Why do migrant fathers spend less time with their children when they come back? Shouldn't they spend more time to make up for the lost time when they are away? There are two potential explanations. First, a long-term absence makes it harder for the father to bond with his children and creates a communication barrier between the two. Second, the migrant father may have to devote substantial time to deal with family matters, such as repairing the house or socializing with other village members.

In panel B of Table 14, we present how the father's migration affects the mother's time allocation considering the same set of activities, including home production, helping children with homework, and playing or talking with children. As expected, column (1) shows that a mother with a migrant spouse is much more likely to engage in home production activities, which more or less explains why she spends less time communicating with her children as shown in column (3). Considering that the literature suggests investment in time plays an important role in determining children's non-cognitive development.⁴⁰, these results suggest that the lack of time inputs seems to be the main driving force behind the adverse effects of father's migration on children's non-cognitive skills.

6.4 Child Time Allocations

We also analyze the impact of the father's migration on time allocation made by children themselves. The GSCS asks the target child about his or her weekly hours spent on participating in home production, taking care of sick or elderly family members, doing homework, and watching TV. The estimation results are reported in the third panel of Table

⁴⁰Since most socioeconomic surveys lack appropriate measures of parental time, most studies have used mother's employment to proxy it. Only until recently have a few papers started to use time-use diaries to measure parent time investments. See Del Boca et al. (2014); Fiorini and Keane (2014); Del Boca et al. (2017) for examples of papers that have adopted time-use diaries to study the effects of parental time inputs on child outcomes in Australia, the United Kingdom, and the United States.

14. Columns (1) and (2) show that the father's migration significantly increases the time a child spends on home production and caring for others by 67 and 71 percent, respectively. Columns 3 and 4 show that the father's migration has no significant effect on the time the child spends on doing homework or watching TV. These results are consistent with Chen (2013), which exams the time allocation of left-behind children in China and finds that they spend more time in household work. Antman (2011) also studies children's time allocation and finds that children reduce study hours and increase work hours outside the home in response to a father's U.S. migration. The explanation of their results is that a father's migration is followed by a period of financial hardship for families in Mexico who may be financing the father's trip and also waiting for him to find a job in the United State. During this time period, children have to take financial responsibility for the household. Thus, they have to shift focus from schooling toward work outside of home. Our results are partially consistent with their findings, in the sense that we both find that left-behind children work more than other children. Our results are different from theirs in the sense that we find no significant impact on weekly hours doing homework. There are two reasons our results are different. First, their data measure total study hours, whereas we can only observe weekly hours of doing homework, which may be a major proportion of study hours. But it is possible that the father's migration decreases the total study hours by decreasing the time the child spends on reading or other studying activities. Second, it is possible that Chinese parents commonly have a high expectation about their children's education so they would make sure that their children spend enough time on studying before letting them engage in work-related activities. This explains why we observe nonsignificant effects of the father's migration on children's weekly hours of doing homework.

Spending more time on home production and caring for others may not have a direct negative impact on child development, but it implies that the child may have less time for other social activities that might be beneficial to their emotional and social well-being. The GSCS does not have questions regarding weekly hours of other major activities besides what we listed here. Thus, our results only provide indirect evidence that the father's migration affects children's own time allocation, which is a potential explanation that children's non-

cognitive skills are negatively affected. Moreover, the limited information from the GSCS makes it impossible to distinguish between the time the child spends on his or her own and the time actively supervised by a parent. Thus, the purpose of the above estimation is not to compare the importance of parental time and child time investment, but to provide insights on the possible mechanisms behind the negative effect of the father’s migration. Future work testing this channel requires a time diary of the targeted children. such as such as the one in Child Development Supplement (CDS) of the Panel Survey of Income Dynamics (PSID) ,that can be used to estimate the effect of parental migration on the time allocation of children more comprehensively.

6.5 Parenting Style and Parental Health

In addition to the mechanisms we have tested so far, the literature has emphasized other important determinants of child development. One is parenting style (Dooley and Stewart, 2007; Fiorini and Keane, 2014; Doepke and Zilibotti, 2017). Although there are no consistent measurements of parental style so far, the few papers that considered these kinds of variables commonly find that parenting style has an impact on child developmental outcomes. For example, Dooley and Stewart (2007) find that different aspects of parenting (positiveness, hostility, consistency, and punitiveness) are more important than family income in terms of determining children’s behavior and emotional outcomes. Fiorini and Keane (2014) find that parental warmth and effective discipline lead to better non-cognitive outcomes for children. More recently, Doepke and Zilibotti (2017) develops a theory to explain how parenting style plays an important role in determining children’s welfare and economic success. Parenting style can be an important channel through which parental migration affects child development. The GSCS provides limited information on parenting style. Nevertheless, we define harsh parenting style by the mother’s and child’s answer to the question “whether you beat your child/you are beaten when misbehaved.” Using the baseline fixed effects model with instrumental variables, our results in Appendix Table A7 show that the effect of the father’s migration on parenting style is insignificant. These results, however, do not imply that parenting style is not important in terms of explaining the link between a father’s migration

and his children’s development outcomes. Future work needs to measure parenting styles in a more comprehensive way to better test this mechanism.

The other determinant that was mentioned in the literature is parent’s health condition, which may have an impact on the quality of time parents spend with their children. For example, Ronda (2016) and Herbst (2017) find that maternal psychological distress and depression may have a negative impact on children’s outcomes. In the meantime, the migration literature has provided some evidence that migration increases the probability of being in poor physical and mental health (Antman, 2010; Barrett and Mosca, 2013). To test this mechanism, we investigate whether the father’s migration has an impact on the self-assessed health status of the father and mother.⁴¹ Appendix Table A7 provides the estimation results, showing that the father’s migration does not increase the probability of parents in poor health condition. However, we are reluctant to conclude that parent health status is not an important mechanism behind the link between parental migration and a child’s development, considering that our measure of health status is self-reported and does not differentiate between mental health and physical health. This is a mechanism worth testing in the future.⁴²

7 Discussion of Sub-sample Results

Table 15 reports the sub-sample estimation results and highlights some interesting patterns.⁴³ First, columns (1) and (2) show that the effects of father’s migration are larger among male children (-0.057 and -0.028) than those for female children (-0.065 and -0.047). We hypothesize that there are several explanations for this gender difference. First, the left-behind mother communicates better with girls while having difficulty dealing with teen boys. Sec-

⁴¹The assessment of the father’s and mother’s health condition is classified into five categories: very poor, poor, average, good, and very good. We group the first two and generate a dummy variable to indicate whether the father or mother has poor health.

⁴²Parents make decisions taking as given the production function of human capital. It is possible that parental migration will change parents view on the production function regarding the expectation of the economic return of their investment. However, without valid measurements on these variables, it is difficult to test these hypotheses empirically using our data.

⁴³As is often the case, however, the instruments are much weaker by subgroup, and the F statistic on the excluded instruments is only above 10 for the children whose father did not graduate from elementary school. The results should thus be interpreted with caution.

ond, lacking a positive male role model has a negative impact on a boy's development. Thus, maternal input could be a poorer substitute for the lack of paternal inputs when it comes to raising a boy. Third, as proposed in Bertrand and Pan (2013), the non-cognitive development of boys, unlike that of girls, appears extremely responsive to the quality of parental inputs, which is negatively associated with parental migration.⁴⁴ Nonetheless, we are not intending to decompose these different channels, and we leave it for future studies. This kind of gender difference has also been documented in recent child development literature, which finds that father absence, usually caused by divorce, has a greater influence on boys than girls. For example, Bertrand and Pan (2013) find that boys do especially poorly and are much more likely to develop behavior problems in broken families, which are usually associated with worse parental inputs. Figlio et al. (2019) find that family disadvantage disproportionately impedes the development of boys by using birth certificates matched to schooling records in Florida.

Columns (3)-(6) divide the sample children by their parents' education levels. We find that the negative effect of the father's migration is more evident if parents, especially mothers, are less educated. For example, if the mother has not graduated from elementary school, then the father's migration reduces internalizing and externalizing scores by 0.036 and 0.071 points. But if the mother has graduated from elementary school, the two coefficients are reduced to 0.025 and 0.05. These results suggest that mothers with better education are more likely to engage in high-quality parenting and can better mitigate the adverse effect caused by the father's absence (Carneiro et al., 2013).

Moreover, as previously discussed, lack of time inputs seems to be the major mechanism through which the father's migration affects his children's development. In that sense, it is possible that better infrastructure, such as having access to a telephone service, may help left-behind children connect and communicate with their fathers. In columns (7) and (8) of Table 15, we divide our sample children by whether their resident village has telephone services, but the negative effect of father's migration does not vary much across the two

⁴⁴Antman (2012) finds that a left-behind mother allocate more resources on girls relative to boys while the father migrates to the United States. However, this explanation may not apply in the context of rural China, considering the preference of boys over girls.

groups. This may be because telephone communication is not a good substitute for face-to-face communication in terms of parenting or because the telephone is not widely used among migrant families to maintain effective communication between the migrant father and his children left behind.

8 Conclusion

This paper sets out to identify the effects of a father’s migration on his children’s non-cognitive development. By exploiting a longitudinal data set and using instrumental variables based on the destination provinces, we identify a negative effect of a father’s migration. We explore several possible mechanisms behind this negative effect. First, we find that a fathers’ migration is associated with an increase in family income, which, however, does not lead to an increase in child-related spending. In the meanwhile, our results show that a fathers migration increases his decision power on financial allocation within the family, which provides a potential explanation of the observed divergence in family income and spending. More important, a father’s migration reduces the time both parents spend talking and playing with their children. Overall, the father’s migration reduces both parent financial and time inputs, which might be the two major driving forces behind the negative effect of a father’s migration on left-behind children.

These results expand the scope of current literature by uncovering negative consequences of parental migration that is rarely studied in the literature. More important, our discussion on potential mechanisms suggest that relevant policies are urgently needed to help migrant parents improve their financial and time inputs on children. Considering that non-cognitive skill is a vital dimension of human capital, these policies would have an important impact on increasing inter-generational mobility and on reducing rural-urban inequality.

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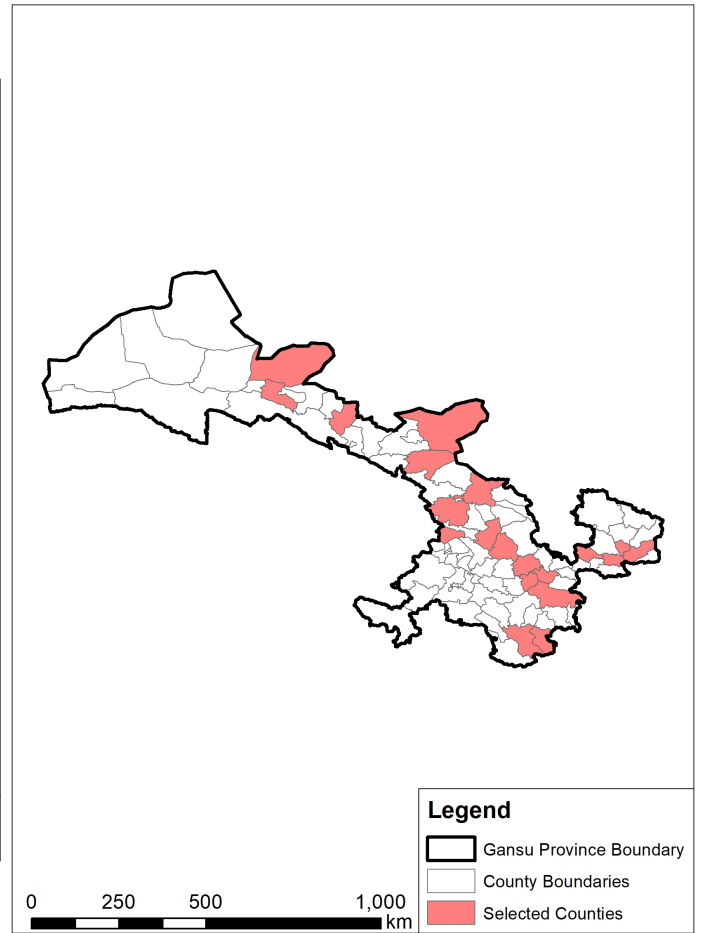
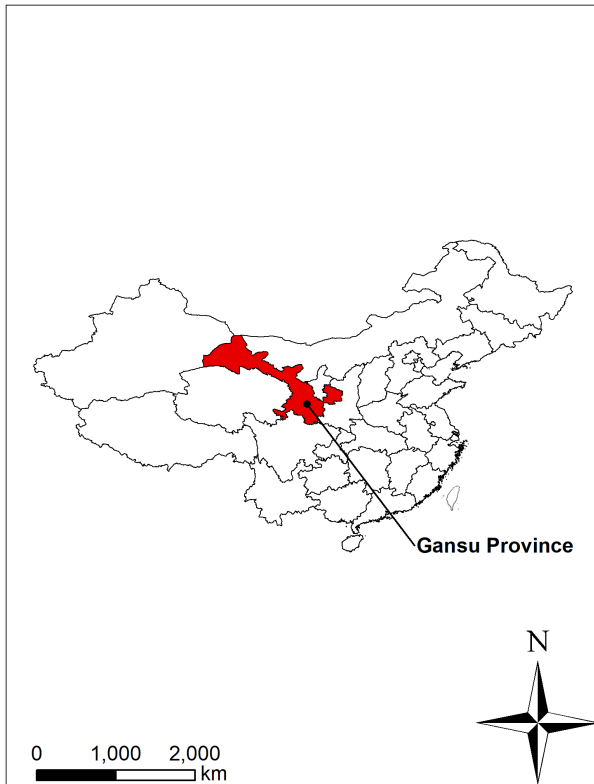
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Data from diva-gis.org

Figure 1: A Map of Gansu Province in China

Table 1: Father's Migration Status by Year

Panel A	2000		2004		Total	
	No.	%	No.	%	No.	%
Father Non-Migrant	1,119	62.9%	1,159	65.1%	2,278	64.0%
Intra-provincial Migrant	548	30.8%	471	26.5%	1,019	28.6%
Inter-provincial Migrant	112	6.3%	149	8.4%	261	7.3%
Total	1,779	100.0%	1,779	100.0%	3,558	100.0%

Panel B		
Inter-provincial Migrant	No.	%
only in 2000	66	3.7%
only in 2004	93	5.2%
in both years	46	2.6%
in neither year	1574	88.5%
Total	1,779	100.0%

Data source: Gansu Survey of Children and Families (GSCF) 2000 and 2004 waves.

Note: A father's migration status is defined by his workplace location. In particular, we define a father to be a non-migrant if his workplace is located in the village, an intra-provincial migrant if his workplace is located outside of the village but within Gansu province and an inter-provincial migrant if his workplace is located in another province outside of Gansu.

Table 2: Summary Statistics by Father's Migration Status

	Total	Father Non-migrant	Intra-provincial Migrant	Inter-provincial Migrant
Internalizing Score	0.000 (1.000)	0.019 (0.979)	-0.014 (1.027)	-0.115 (1.063)
Externalizing Score	0.000 (1.000)	0.003 (0.986)	0.013 (1.036)	-0.078 (0.984)
Child Female	0.469 (0.499)	0.464 (0.499)	0.485 (0.500)	0.441 (0.497)
Child's Age	12.999 (2.281)	13.019 (2.286)	12.892 (2.262)	13.240 (2.286)
Father's Age	39.493 (5.512)	39.865 (5.821)	38.919 (4.732)	38.485 (5.261)
Mother's Age	37.113 (4.958)	37.426 (5.221)	36.636 (4.200)	36.240 (5.091)
Father's Years of Education	6.757 (4.154)	6.648 (4.164)	7.213 (4.050)	5.931 (4.283)
Mother's Years of Education	3.749 (4.014)	3.761 (4.005)	4.066 (4.089)	2.402 (3.499)
Number of Siblings	1.329 (0.719)	1.338 (0.733)	1.289 (0.690)	1.406 (0.699)
Grandparent at Home	0.206 (0.405)	0.206 (0.404)	0.204 (0.403)	0.218 (0.414)
Village Population (1000)	1.712 (1.809)	1.677 (1.549)	1.872 (2.431)	1.384 (0.653)
Village has Primary School	0.830 (0.375)	0.806 (0.396)	0.871 (0.335)	0.881 (0.324)
Village has Middle School	0.101 (0.301)	0.104 (0.306)	0.099 (0.299)	0.077 (0.267)
Observations	3558	2,278	1019	261
% of Total Sample	100%	64.0%	28.6%	7.4%

Data source: Gansu Survey of Children and Families (GSCF) 2000 and 2004 waves.

Note: The sample includes children who appear in both 2000 and 2004 waves. Internalizing and externalizing scores have been standardized to have means equal to 0 and standard deviations equal to 1. Higher internalizing or externalizing scores indicate higher non-cognitive skills.

Table 3: Migration Destination Provinces

	2000		2004		Total	
	No.	%	No.	%	No.	%
Xinjiang	670	37.7%	693	39.0%	1,363	38.3%
Guangdong	225	12.6%	262	14.7%	487	13.7%
Ningxia	147	8.3%	147	8.3%	294	8.3%
Beijing	92	5.2%	110	6.2%	202	5.7%
Qinghai	89	5.0%	108	6.1%	197	5.5%
Shannxi	72	4.0%	55	3.1%	127	3.6%
Inner Mongolia	37	2.1%	53	3.0%	90	2.5%
Zhejiang	19	1.1%	50	2.8%	69	1.9%
Shanxi	45	2.5%	15	0.8%	60	1.7%
Tibet	18	1.0%	36	2.0%	54	1.5%
Fujian	18	1.0%	18	1.0%	36	1.0%
Tianjing	0	0.0%	33	1.9%	33	0.9%
Shanghai	0	0.0%	18	1.0%	18	0.5%
Gansu	347	19.5%	181	10.2%	528	14.8%
Total	1,779	100.0%	1,779	100.0%	3,558	100.0%

Data source: Gansu Survey of Children and Families (GSCF) 2000 and 2004 waves.

Note: Migration destination is a village-level variable. For example, in 2000, 670 observations in our sample live in villages where Xinjiang is reported as the most popular destination other than Gansu; 347 observations live in villages where no provinces other than Gansu are reported as migration destination.

Table 4: Parental Financial inputs by Father's Migration Status

	Total	Non-migrant	Intra-provincial Migrant	Inter-provincial Migrant
Annual Income (RMB)				
Agriculture	6311.93 (6231.03)	7015.41 (6705.68)	5387.53 (5371.45)	3781.05 (3206.67)
Labor	2721.10 (3655.96)	1412.29 (2920.97)	4854.39 (3518.95)	5815.44 (4146.84)
Total	10121.1 (10048.1)	10186.3 (11005.4)	10040.4 (7813.8)	9867.8 (9021.3)
Annual Expenditure (RMB)				
Children Clothes	234.8 (178.7)	244.1 (184.2)	228.6 (171.2)	178.3 (143.9)
School Supplies	35.4 (40.4)	36.8 (42.3)	33.8 (37.3)	29.8 (34.1)
Children's Allowance	93.4 (144.2)	98.1 (149.8)	85.9 (134.3)	82.3 (129.8)
Item (Dummy)				
Reading Materials	0.604 (0.489)	0.623 (0.485)	0.612 (0.488)	0.413 (0.493)
Dictionary	0.956 (0.204)	0.952 (0.213)	0.968 (0.175)	0.945 (0.229)
Desk or Bookshelf	0.626 (0.484)	0.630 (0.483)	0.645 (0.479)	0.520 (0.501)

Data source: Gansu Survey of Children and Families (GSCF) 2000 and 2004 waves.
Note: Total income includes agriculture and labor income. All monetary variables were converted to real terms (the year 2000 RMB value) using the national Consumer Price Index (CPI).

Table 5: Father's Bargaining Power by Father's Migration Status

	Total	Non-migrant	Intra-provincial Migrant	Inter-provincial Migrant
Decision on Child's School	0.18 (0.39)	0.20 (0.40)	0.15 (0.36)	0.19 (0.39)
Decision on How to Treat the Child	0.23 (0.42)	0.24 (0.43)	0.22 (0.41)	0.24 (0.43)
Decision on Purchase of New Durable Goods	0.23 (0.42)	0.24 (0.43)	0.20 (0.40)	0.22 (0.42)
Decision on Management of Family Finance	0.42 (0.49)	0.44 (0.50)	0.38 (0.49)	0.41 (0.49)
Decision on Planting of Crops	0.30 (0.46)	0.33 (0.47)	0.27 (0.44)	0.24 (0.43)
Decision on Livestock Transaction	0.34 (0.48)	0.37 (0.48)	0.31 (0.46)	0.30 (0.46)

Data source: Gansu Survey of Children and Families (GSCF) 2000 and 2004 waves.

Note: Questions regarding the power of decision-making in the family are reported by the mother. If the father makes decisions, the variables are coded as 1; if the mother makes the decision or the parents make decision together, the variables are coded as 0.

Table 6: Parental and Children's Own Time Inputs by Father's Migration Status

	Total	Non-migrant	Intra-provincial Migrant	Inter-provincial Migrant
Father Weekly Hours				
Home Production	9.368 (11.559)	9.795 (11.500)	7.727 (10.266)	12.178 (16.166)
Help Children with Homework	1.769 (3.062)	1.892 (3.165)	1.592 (2.943)	1.185 (2.183)
Play or Talk with Children	2.883 (3.741)	2.958 (3.826)	2.790 (3.613)	2.454 (3.290)
Mother Weekly Hours				
Home Production	30.172 (18.936)	29.125 (14.042)	31.539 (26.970)	34.096 (17.158)
Help Children with Homework	1.319 (2.688)	1.264 (2.607)	1.557 (2.982)	0.843 (1.964)
Play or Talk with Children	3.773 (4.928)	3.668 (4.988)	4.038 (4.975)	3.650 (4.099)
Child Weekly Hours				
Home Production	3.20 (5.44)	2.95 (5.17)	3.44 (5.71)	4.46 (6.36)
Take Care Others	0.59 (1.91)	0.55 (1.87)	0.61 (1.86)	0.89 (2.33)
Do Homework	10.05 (6.51)	9.78 (6.38)	10.50 (6.56)	10.63 (7.34)
Watch TV	6.32 (5.05)	6.26 (5.01)	6.42 (4.99)	6.35 (5.59)

Data source: Gansu Survey of Children and Families (GSCF) 2000 and 2004 waves.

Note: For the migrant father, weekly hours variables reflect the time he spends when he stays at home.

Table 7: Father's Migration Status and Child Non-cognitive Skills: Main Results

	Internalizing Score				Externalizing Score			
	OLS (1)	2SLS (2)	FE (3)	FE+IV (4)	OLS (5)	2SLS (6)	FE (7)	FE+IV (8)
Father Migration	-0.046*** (0.019)	-0.058** (0.031)	-0.026*** (0.010)	-0.030* (0.015)	-0.084*** (0.018)	-0.088*** (0.030)	-0.055*** (0.013)	-0.059*** (0.017)
Child's Age	-0.001 (0.019)	-0.001 (0.019)	0.036 (0.157)	0.033 (0.171)	0.049** (0.020)	0.049** (0.019)	0.025 (0.135)	0.023 (0.163)
Father's Age	-0.005 (0.007)	-0.005 (0.007)	-0.085 (0.115)	-0.086 (0.171)	0.004 (0.007)	0.004 (0.007)	0.031 (0.095)	0.030 (0.163)
Mother's Age	0.006 (0.007)	0.006 (0.007)	0.052 (0.092)	0.051 (0.170)	-0.001 (0.008)	-0.001 (0.008)	-0.053 (0.071)	-0.053 (0.163)
Number of Siblings	-0.044* (0.024)	-0.044* (0.024)	-0.269 (0.290)	-0.295 (0.238)	-0.030 (0.026)	-0.030 (0.025)	-0.268 (0.265)	-0.292 (0.227)
Grandparent at Home	0.057 (0.034)	0.057 (0.034)	0.212 (0.153)	0.190 (0.163)	0.089** (0.035)	0.089** (0.035)	0.053 (0.120)	0.033 (0.156)
Village log(Population)	0.094** (0.044)	0.094** (0.044)	0.153** (0.069)	0.165 (0.128)	0.046 (0.074)	0.046 (0.074)	0.256 (0.151)	0.267** (0.122)
Village has Elem. School	0.045 (0.071)	0.046 (0.070)	0.077 (0.091)	0.109 (0.075)	0.091 (0.090)	0.091 (0.088)	0.028 (0.085)	0.056 (0.072)
Village has Mid. School	0.223** (0.078)	0.225** (0.080)	0.226** (0.100)	0.203** (0.096)	0.171** (0.071)	0.171** (0.071)	0.230** (0.095)	0.208** (0.092)
Child Female	0.036 (0.058)	0.034 (0.056)			0.152** (0.065)	0.152** (0.064)		
Father's Years of Edu.	0.004 (0.004)	0.003 (0.004)			0.009*** (0.003)	0.009*** (0.003)		
Mother's Years of Edu.	-0.000 (0.004)	-0.001 (0.005)			-0.005 (0.006)	-0.005 (0.006)		
Constant	-0.555 (0.445)	-0.543 (0.436)	0.110 (4.160)	0.068 (4.446)	-1.069 (0.639)	-1.069 (0.642)	-1.113 (3.754)	-1.152 (4.243)
County dummies	Yes	Yes	No	No	Yes	Yes	No	No
F test		17.24		35.82		17.24		35.82
Over-identification test		0.11		0.79		0.11		0.79
Observations	3558	3558	3558	3558	3558	3558	3558	3558
R ²	0.205	0.202	0.013	0.008	0.029	0.028	0.014	0.009

Note: The dependent variables are the internalizing and externalizing scores. Higher internalizing or externalizing scores indicate higher non-cognitive skills. The instrumental variables include the employment and wage in the top destination provinces provided in the China Labor Statistical Yearbook. Standard errors in brackets are clustered at the individual level. Significant at *10% **5%, and ***1%.

Table 8: Father's Migration Status and Child Non-cognitive Skills: Alternative Instrumental Variables

	Internalizing Score				Externalizing Score			
	Manufacturing IV		Construction IV		Manufacturing IV		Construction IV	
	2SLS (1)	FE+IV (2)	2SLS (3)	FE+IV (4)	2SLS (5)	FE+IV (6)	2SLS (7)	FE+IV (8)
Father Migration	-0.054*** (0.024)	-0.035*** (0.018)	-0.044* (0.022)	-0.025 (0.019)	-0.084*** (0.033)	-0.057*** (0.025)	-0.087*** (0.029)	-0.069* (0.034)
Child's Age	-0.001 (0.020)	0.033 (0.172)	-0.001 (0.019)	0.034 (0.171)	0.049** (0.019)	0.023 (0.163)	0.050** (0.019)	0.023 (0.162)
Father's Age	-0.005 (0.007)	-0.086 (0.172)	-0.005 (0.007)	-0.086 (0.170)	0.004 (0.007)	0.030 (0.163)	0.004 (0.007)	0.030 (0.162)
Mother's Age	0.007 (0.007)	0.051 (0.172)	0.006 (0.007)	0.051 (0.170)	-0.001 (0.008)	-0.053 (0.163)	-0.001 (0.008)	-0.053 (0.161)
Number of Siblings	-0.044* (0.024)	-0.299 (0.240)	-0.044* (0.024)	-0.295 (0.238)	-0.029 (0.025)	-0.292 (0.227)	-0.030 (0.026)	-0.288 (0.226)
Grandparent at Home	0.058 (0.034)	0.187 (0.165)	0.057 (0.034)	0.191 (0.163)	0.089** (0.035)	0.033 (0.156)	0.088** (0.035)	0.036 (0.155)
Village log(Population)	0.095** (0.044)	0.167 (0.129)	0.094** (0.044)	0.165 (0.128)	0.046 (0.074)	0.267** (0.122)	0.046 (0.074)	0.265** (0.122)
Village has Elem. School	0.044 (0.071)	0.113 (0.075)	0.045 (0.071)	0.108 (0.074)	0.091 (0.088)	0.056 (0.071)	0.092 (0.088)	0.052 (0.071)
Village has Mid. School	0.220** (0.079)	0.200** (0.097)	0.223** (0.080)	0.203** (0.096)	0.170** (0.071)	0.208** (0.092)	0.173** (0.071)	0.211** (0.091)
Child Female	0.038 (0.056)		0.036 (0.056)		0.153** (0.064)		0.150** (0.063)	
Father's Years of Edu.	0.004 (0.004)		0.004 (0.004)		0.009*** (0.003)		0.009*** (0.003)	
Mother's Years of Edu.	-0.000 (0.005)		-0.000 (0.005)		-0.005 (0.006)		-0.005 (0.006)	
Constant	-0.570 (4.436)	0.062 (4.481)	-0.553 (4.435)	0.069 (4.440)	-1.074 (0.641)	-1.152 (4.243)	-1.056 (0.641)	-1.146 (4.216)
County dummies	Yes	No	Yes	No	Yes	No	Yes	No
F test	19.28	37.88	15.31	34.65	19.28	37.88	15.31	34.65
Over-identification test	0.09	0.11	0.91	0.77	0.09	0.11	0.91	0.77
Observations	3558	3558	3558	3558	3558	3558	3558	3558
R ²	0.010	0.011	0.005	0.004	0.020	0.020	0.006	0.005

Note: The dependent variables are the internalizing and externalizing scores. Higher internalizing or externalizing scores indicate higher non-cognitive skills. The alternative instrumental variables include employment and wage of the manufacturing and construction sectors in the top destination provinces provided in the China Labor Statistical Yearbook. Standard errors in brackets are clustered at the individual level. Significant at *10% **5%, and ***1%.

Table 9: Father's Migration Status and Child Non-cognitive Skills: First-Stage Regressions

	Total IV		Manufacturing IV		Construction IV	
	OLS (1)	FE (2)	OLS (3)	FE (4)	OLS (5)	FE (6)
Dest. Employment (1000)	0.002* (0.001)	0.001 (0.001)				
Dest. Wage (1000)	0.014*** (0.004)	0.010*** (0.002)				
Dest. Employment in Manuf. (1000)			0.005*** (0.001)	0.005*** (0.001)		
Dest. Wage in Manuf. (1000)			0.021*** (0.005)	0.014*** (0.003)		
Dest. Employment in Constr. (1000)					0.003*** (0.001)	0.006*** (0.001)
Dest. Wage in Constr. (1000)					0.010*** (0.002)	0.011*** (0.002)
Child's Age	0.001 (0.004)	-0.002 (0.007)	0.001 (0.004)	-0.001 (0.006)	0.001 (0.004)	0.001 (0.005)
Father's Age	-0.002** (0.001)	0.010 (0.011)	-0.001* (0.001)	0.009 (0.010)	-0.001* (0.001)	0.004 (0.006)
Mother's Age	-0.001 (0.002)	-0.011* (0.006)	-0.001 (0.002)	-0.011* (0.006)	-0.001 (0.002)	-0.009** (0.004)
Number of Siblings	-0.004 (0.007)	0.024 (0.028)	-0.002 (0.007)	0.026 (0.028)	-0.001 (0.007)	0.026 (0.028)
Grandparent at Home	-0.006 (0.010)	0.019 (0.028)	-0.007 (0.010)	0.019 (0.027)	-0.007 (0.009)	0.019 (0.027)
Village log(Population)	0.001 (0.013)	-0.002 (0.027)	0.003 (0.013)	-0.001 (0.027)	0.005 (0.013)	-0.000 (0.027)
Village has Elem. School	0.006 (0.014)	-0.031** (0.013)	0.006 (0.014)	-0.031** (0.013)	0.006 (0.014)	-0.031** (0.013)
Village has Mid. School	-0.030** (0.014)	-0.033* (0.019)	-0.026* (0.013)	-0.029 (0.019)	-0.026* (0.013)	-0.028 (0.019)
Child Female	-0.012 (0.007)		-0.012 (0.007)		-0.012 (0.007)	
Father's Years of Edu.	0.005*** (0.001)		0.005*** (0.001)		0.005*** (0.001)	
Mother's Years of Edu.	-0.002* (0.001)		-0.002* (0.001)		-0.002* (0.001)	
Constant	0.095 (0.084)	0.082 (0.263)	0.073 (0.081)	0.098 (0.258)	0.067 (0.080)	0.179 (0.228)
County dummies	Yes	No	Yes	No	Yes	No
Observations	3558	3558	3558	3558	3558	3558
R ²	0.125	0.040	0.137	0.045	0.143	0.049

Note: The dependent variable is whether father has migrated out of Gansu Province. Standard errors in brackets are clustered at the individual level. Significant at *10% **5%, and ***1%.

Table 10: Father's Migration Status and Child Non-cognitive Skills: Additional Controls

	Internalizing Score					Externalizing Score				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Father Migration	-0.027* (0.014)	-0.029* (0.015)	-0.021 (0.014)	-0.030* (0.015)	-0.024* (0.014)	-0.036*** (0.016)	-0.051*** (0.017)	-0.044*** (0.016)	-0.054*** (0.018)	-0.057*** (0.019)
Child Poor Health		-0.049 (0.093)					-0.068 (0.085)			
Chinese Test Score		0.043 (0.039)					0.057 (0.035)			
Student Violate Discipline			-0.082** (0.041)					-0.030 (0.040)		
Student Disrupt the Class			-0.048 (0.043)					0.003 (0.041)		
Teacher Absent			-0.223*** (0.047)					-0.146*** (0.045)		
School Close			-0.264*** (0.044)					-0.324*** (0.043)		
Father Poor Health				0.075 (0.072)					-0.043 (0.069)	
Mother Poor Health				-0.096 (0.069)					-0.009 (0.066)	
Log(Household Income)					0.007 (0.036)					0.020 (0.035)
Father log (Hours with Children)					0.093** (0.041)					0.062** (0.030)
Mother log (Hours with Children)					0.051 (0.041)					0.045 (0.039)
Constant	2.753 (4.516)	1.830 (5.996)	1.959 (4.205)	-0.341 (4.638)	1.205 (4.643)	2.657 (4.233)	2.349 (5.473)	0.605 (4.058)	-1.975 (4.438)	-0.322 (4.406)
County×Year dummies	Yes	No	No	No	No	Yes	No	No	No	No
F test	35.82	27.78	33.22	34.67	34.89	35.82	27.78	33.22	34.67	34.89
Over-identification test	0.72	0.89	0.79	0.77	0.77	0.72	0.89	0.79	0.77	0.77
Observations	3558	2547	3508	3529	3178	3558	2547	3508	3529	3178
R ²	0.007	0.011	0.008	0.008	0.009	0.007	0.011	0.008	0.008	0.009

Note: The dependent variables are the internalizing and externalizing scores. Higher internalizing or externalizing scores indicate higher non-cognitive skills. All regressions include control variables in Table 7 column (4). Standard errors in brackets are clustered at the individual level. Significant at *10% **5%, and ***1%.

Table 11: Father's Migration Status and Child Non-cognitive Skills:
Value-added Model

	Internalizing Score 2004		Externalizing Score 2004	
	OLS (1)	2SLS (2)	OLS (3)	2SLS (4)
Father Migration	-0.060** (0.025)	-0.082*** (0.035)	-0.079** (0.028)	-0.080*** (0.034)
Internalizing Score 2000	0.040 (0.029)	0.040 (0.029)		
Externalizing Score 2000			0.128*** (0.030)	0.128*** (0.029)
Child's Age	-0.139*** (0.027)	-0.139*** (0.027)	-0.088*** (0.025)	-0.088*** (0.025)
Father's Age	0.000 (0.008)	0.000 (0.008)	0.016* (0.008)	0.016* (0.008)
Mother's Age	0.003 (0.009)	0.002 (0.009)	-0.015 (0.011)	-0.015 (0.011)
Number of Siblings	-0.048 (0.044)	-0.049 (0.045)	-0.028 (0.038)	-0.027 (0.037)
Grandparent at Home	-0.003 (0.054)	-0.005 (0.054)	0.049 (0.055)	0.049 (0.056)
Village log(Population)	0.181*** (0.057)	0.179*** (0.058)	0.131* (0.076)	0.132* (0.075)
Village has Elem. School	-0.061 (0.190)	-0.059 (0.190)	0.052 (0.181)	0.051 (0.181)
Village has Mid. School	0.290*** (0.065)	0.292*** (0.064)	0.207*** (0.058)	0.206*** (0.055)
Child Female	0.024 (0.078)	0.024 (0.078)	0.219** (0.080)	0.219** (0.079)
Father's Years of Edu.	-0.007 (0.007)	-0.008 (0.007)	0.003 (0.006)	0.003 (0.006)
Mother's Years of Edu.	-0.002 (0.006)	-0.002 (0.006)	-0.006 (0.007)	-0.006 (0.007)
Constant	0.945 (0.603)	0.965 (0.599)	0.188 (0.674)	0.179 (0.676)
County dummies	Yes	Yes	Yes	Yes
F test		15.78		15.78
Over-identification test		0.43		0.43
Observations	1779	1779	1779	1779
R ²	0.052	0.034	0.067	0.049

Note: The dependent variables are the internalizing and externalizing scores. Higher internalizing or externalizing scores indicate higher non-cognitive skills. Standard errors in brackets are clustered at the individual level. Significant at *10% **5%, and ***1%.

Table 12: Mechanisms 1: Parental Financial Inputs

Panel A	log(Income)		
	Total (1)	Agriculture (2)	Labor (3)
Father Migration	0.761*** (0.215)	-0.929*** (0.243)	11.944*** (1.110)
F test	35.82	35.82	35.82
Over-identification test	1.85	2.97	1.16
Observations	3558	3558	3558
RMSE	0.705	0.533	4.602
Panel B	log(Expenditure)		
	Children Clothes (1)	School Supplies (2)	Allowance (3)
Father Migration	-0.671*** (0.249)	-0.291 (0.273)	0.055 (0.249)
F test	35.82	35.82	35.82
Over-identification test	2.01	0.06	1.84
Observations	3558	3558	3558
RMSE	0.770	0.997	0.892
Panel C	Items (dummy)		
	Reading Materials (1)	Desk (2)	Dictionary (3)
Father Migration	-0.378*** (0.130)	0.008 (0.055)	-0.254* (0.130)
F test	36.12	36.25	36.25
Over-identification test	3.99	0.30	0.53
Observations	3464	3494	3494
RMSE	0.422	0.192	0.421

Note: Total income includes farming, livestock, and labor income. All monetary variables were converted to real terms (the year 2000 RMB value) using CPI. Standard errors in brackets are clustered at the individual level. Significant at *10% **5%, and ***1%.

Table 13: Mechanisms 2: Father's Bargaining Power

	Child School (1)	Treat Child (2)	Family Finance (3)	Purchase Durables (4)	Plant Crops (5)	Livestock Transaction (6)
Father Migration	0.536** (0.255)	0.525** (0.229)	0.597** (0.251)	0.215 (0.277)	0.094 (0.257)	0.228 (0.270)
F test	36.55	36.69	35.57	37.22	36.95	36.58
Over-identification test	0.88	1.29	1.16	2.27	0.92	2.26
Observations	3474	3474	3474	3474	3478	3460
RMSE	0.424	0.380	0.410	0.462	0.429	0.448

Note: Questions regarding the power of decision-making in the family are reported by the mother. If the father makes decisions, the variables are coded as 1; if the mother makes the decision or the parents make decision together, the variables are coded as 0. Standard errors in brackets are clustered at the individual level. Significant at *10% **5%, and ***1%.

Table 14: Mechanisms 3: Parental and Children' Own Time Inputs

Panel A	Father Time Allocation			
	Home Production (1)	Time with Children (2)	Help Homework (3)	Play and Talk (4)
Father Migration	0.408 (0.320)	-0.540** (0.246)	-0.153 (0.215)	-0.500** (0.230)
F test	51.01	51.01	51.05	51.07
Over-identification test	2.46	1.68	5.63	8.66
Observations	3224	3224	3226	3228
RMSE	1.021	0.864	0.740	0.830
Panel B	Mother Time Allocation			
	Home Production (1)	Time with Children (2)	Help Homework (3)	Play and Talk (4)
Father Migration	0.440*** (0.167)	-0.242 (0.246)	-0.022 (0.196)	-0.570** (0.240)
F test	36.13	36.10	36.10	36.19
Over-identification test	4.15	8.22	0.01	11.71
Observations	3490	3490	3490	3496
RMSE	0.565	0.865	0.672	0.851
Panel C	Child Time Allocation			
	Home Production (1)	Take Care Others (2)	Do Homework (3)	Watch TV (4)
Father Migration	0.676*** (0.142)	0.713** (0.338)	-0.078 (0.466)	0.208 (0.464)
F test	35.84	35.84	35.84	35.84
Over-identification test	0.27	0.07	0.43	0.01
Observations	3558	3558	3558	3558
RMSE	0.900	0.560	0.773	0.769

Note: Time variables are measured as weekly hours in log. Standard errors in brackets are clustered at the individual level. Significant at *10% **5%, and ***1%.

Table 15: Father's Migration Status and Child Non-cognitive Skills: Subsample Results

	Child Gender		Mother Education		Father Education		Village Phone Service	
	Boys (1)	Girls (2)	Low (3)	High (4)	Low (5)	High (6)	No (7)	Yes (8)
Internalizing Score								
Father Migration	-0.057*** (0.018)	-0.028* (0.016)	-0.036* (0.021)	-0.025 (0.019)	-0.033* (0.018)	-0.028* (0.016)	-0.030 (0.030)	-0.029 (0.022)
F test	17.78	16.38	21.60	15.6	12.33	17.34	19.29	30.44
Over-identification test	0.08	0.00	0.31	0.03	0.49	0.27	0.91	0.08
Observations	1900	1658	1796	1762	806	2752	1502	2056
Externalizing Score								
Father Migration	-0.065*** (0.022)	-0.047*** (0.017)	-0.071*** (0.016)	-0.050*** (0.023)	-0.066*** (0.019)	-0.056*** (0.026)	-0.061*** (0.018)	-0.059*** (0.025)
F test	17.78	16.38	21.60	15.6	12.33	17.34	19.29	30.44
Over-identification test	0.06	0.09	0.07	0.91	1.21	1.29	0.063	0.26
Observations	1900	1658	1796	1762	806	2752	1502	2056

Note: Low-educated mothers and fathers are those who did not graduate from the elementary schools. Standard errors in brackets are clustered at the individual level. Significant at *10% **5%, and ***1%.

Appendix A Appendix Figures and Tables

Figure A1: Distribution of Non-cognitive Skills by Father’s Migration Status

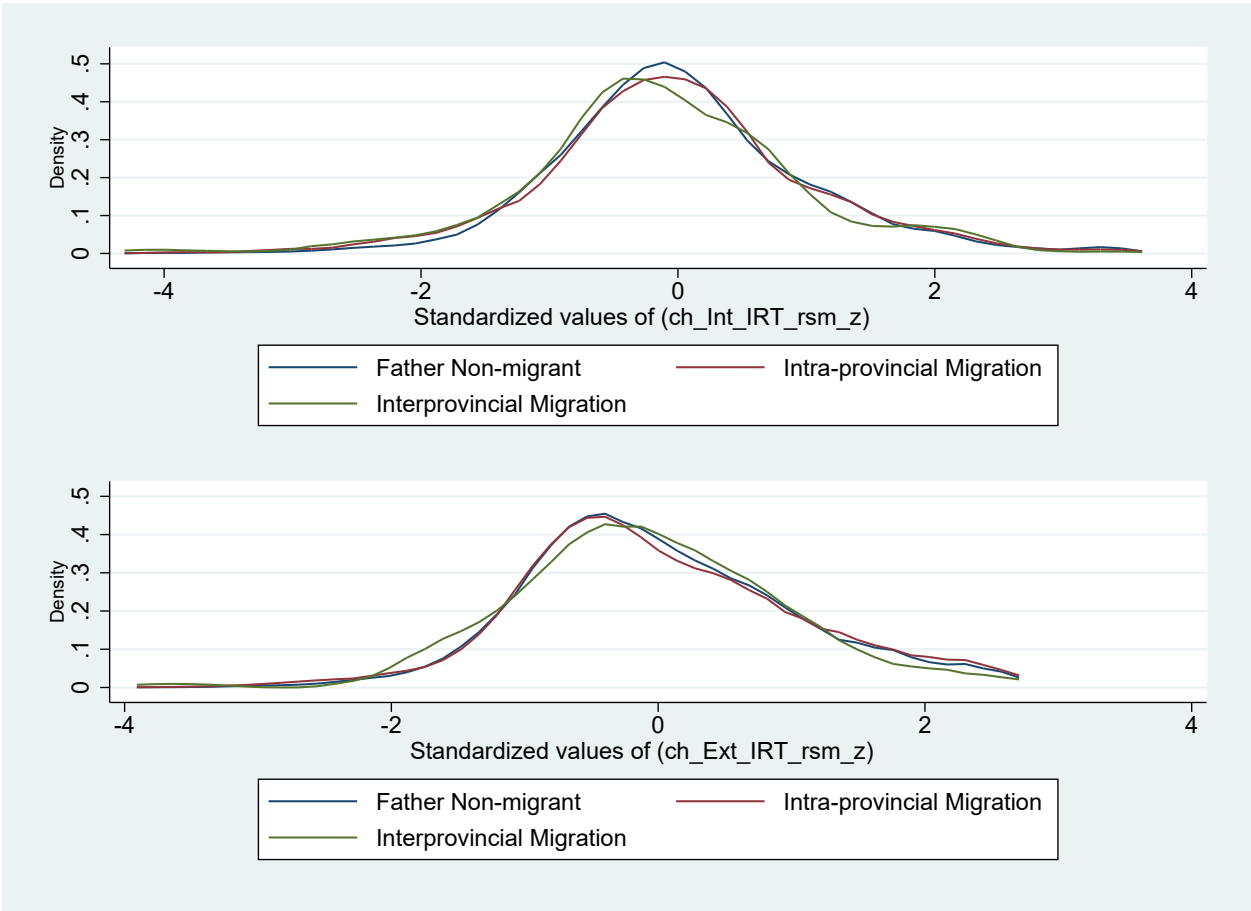


Table A1: Survey Questions on Children’s Non-cognitive Skills in GSCF
2000 and 2004 waves

Externalization Behavioral Problems
<ul style="list-style-type: none"> ◇ I break things on purpose ◇ I lose my temper with others ◇ Even if wrong, I am reluctant to listen to others ◇ I steal things from others or my home ◇ I like to show off my strengths in front of others ◇ I always want to be the center of attention ◇ I often quarrel with others ◇ I do not observe school discipline ◇ I like to brag ◇ It bothers me if others do things better than I do ◇ I act impulsively ◇ I often say obscenities ◇ I often make fun of others ◇ I sometimes tell lies ◇ I am easily angered ◇ I often disregard other people’s ideas ◇ I sometimes menace and even hurt others
Internalization Behavioral Problems
<ul style="list-style-type: none"> ◇ I don’t want others to meddle in my own business ◇ I can’t concentrate on what I am doing ◇ I have many strange/weird ideas (often daydream) ◇ I easily get flushed/frustrated/anxious ◇ I can’t do things well when my parents are not present ◇ I am very indifferent to others ◇ I am very shy ◇ I am often teased by classmates ◇ I do not feel guilty, even if I have done something wrong ◇ I feel inferior to others ◇ I often am suspicious of others ◇ I prefer to be alone ◇ I often feel nervous ◇ I am often bored ◇ I stay quiet when I am with my classmates or friends ◇ There is always something to worry about

Table A2: Father's Migration Duration: by Year

	2000		2004			
	Months Away		Months Away		Months Away	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Father Non-Migrant	0.428	(1.691)	0.082	(0.784)	0.040	(0.540)
Intra-provincial Migrant	3.09	(3.845)	2.014	(3.183)	0.679	(2.121)
Inter-provincial Migrant	6.109	(3.347)	4.466	(3.446)	0.912	(2.199)
Total	1.877	(3.289)	0.960	(2.428)	0.282	(1.377)

Note: A father's migration status is defined by his workplace location. In particular, we define a father to be a non-migrant if his workplace is located in the village, an intra-provincial migrant if his workplace is located outside of the village but within Gansu province and an inter-provincial migrant if his workplace is located in another province outside of Gansu.

Table A3: Father's Migration Status and Child Non-cognitive Skills:
Inter-provincial Migration VS. intra-provincial Migration

	Internalizing Score		Externalizing Score	
	OLS (1)	FE (2)	OLS (3)	FE (4)
Father Inter-provincial Migration	-0.082*** (0.021)	-0.066*** (0.026)	-0.091*** (0.023)	-0.067*** (0.094)
Father Intra-provincial Migration	-0.030 (0.048)	-0.035 (0.034)	-0.009 (0.037)	-0.006 (0.055)
County dummies	Yes	No	Yes	No
Observations	3558	3558	3558	3558
R ²	0.021	0.014	0.020	0.014

Note: The dependent variables are the internalizing and externalizing scores. Higher internalizing or externalizing scores indicate higher non-cognitive skills. Standard errors in brackets are clustered at the individual level. A father's migration status is defined by his workplace location. In particular, we define a father to be a non-migrant if his workplace is located in the village, an intra-provincial migrant if his workplace is located outside of the village but within Gansu province and an inter-provincial migrant if his workplace is located in another province outside of Gansu. Significant at *10% **5%, and ***1%.

Table A4: Father's Migration Status and Child
Non-cognitive Skills: Self-Esteem and Depression (2000)

	Self-Esteem		Depression	
	OLS (1)	2SLS (2)	OLS (3)	2SLS (4)
Father Migration	0.044 (0.032)	0.057* (0.033)	0.075*** (0.020)	0.066** (0.024)
County dummies	Yes	Yes	Yes	Yes
Observations	1779	1779	1779	1779
R ²	0.057	0.002.	0.027	0.002

Note: Measures of Self-Esteem and Depression are only available in 2000 wave. Standard errors in brackets are clustered at the individual level. Significant at *10% **5%, and ***1%.

Table A5: Father's migration Status and Child Cognitive Skills

	Chinese Score				Maths Score			
	OLS (1)	2SLS (2)	FE (3)	FE+IV (4)	OLS (5)	2SLS (6)	FE (7)	FE+IV (8)
Father Migration	-0.021 (0.013)	0.009 (0.019)	0.016 (0.015)	0.020 (0.018)	-0.019 (0.013)	-0.022 (0.028)	-0.037* (0.019)	0.016 (0.017)
County dummies	Yes	Yes	No	No	Yes	Yes	No	No
F test		15.11		32.24		15.11		32.23
Over-identification test		0.17		0.48		0.17		0.49
Observations	2547	2547	2547	2547	2507	2507	2507	2507
R ²	0.089	0.069	0.006	0.003	0.079	0.079	0.023	0.003

Note: Chinese and Math scores are available only for about half of sample in the 2000 wave. Standard errors in brackets are clustered at the individual level. Significant at *10% **5%, and ***1%.

Table A6: Parenting Style and Parent Health by Father's Migration Status

	Total	Non-migrant	Intra-provincial Migrant	Inter-provincial Migrant
Beat the Child (Mother)	0.89 (0.55)	0.87 (0.56)	0.90 (0.55)	0.96 (0.54)
Beat the Child (Child)	0.83 (0.62)	0.81 (0.62)	0.87 (0.62)	0.86 (0.59)
Father Poor Health	0.27 (0.44)	0.26 (0.44)	0.28 (0.45)	0.33 (0.47)
Mother Poor Health	0.33 (0.47)	0.33 (0.47)	0.34 (0.48)	0.35 (0.48)

Note: Parenting style is measured as whether the parents beat the children when children misbehave. Both the mother and the target child have answered these questions. The father's and mother's health conditions are self-reported.

Table A7: Mechanisms: Parenting Style and Parent Health Condition (FE+IV)

	Harsh Parenting		Health Condition	
	Mother	Child	Father	Mother
Father Migration	-0.388 (0.332)	0.071 (0.370)	0.079 (0.244)	-0.200 (0.257)
F test	69.22	69.71	68.68	69.65
Over-identification test	0.00	0.00	0.00	0.00
Observations	3504	3556	3504	3542
RMSE	0.535	0.607	0.395	0.421

Note: Parenting style is measured as whether the parents beat the children when children misbehave. Both the mother and the target child have answered these questions. The father's and mother's health conditions are self-reported. Standard errors in brackets are clustered at individual level. Significant at *10% **5%, and ***1%.