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Youth Education and Learning in Twenty-First Century China

Disentangling the Impacts of Migration, Residence, and *Hukou*

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Abstract: *Rural-to-urban migration within China is one of the important drivers of transformation in economic and social conditions in the twetny-first century. This study uses data from a new nationally based sample, the China Family Panel Studies (CFPS), to capture the multidimensionality of migration, household registration, and current residence and examines school pacing and verbal and math achievement among adolescents ages ten to fifteen. The study finds little evidence of significant migration effects after controlling for family structure, socioeconomic status, and county characteristics, except for one select group— urban "left-behind"—who*

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are the most advantaged in both math and language achievement. Girls who are coresident with siblings demonstrate an advantage compared to boys who are coresident with siblings on language skill while it is singleton girls who demonstrate a disadvantage compared to singleton boys on math skills. Both girls and boys coresident with siblings perform lower overall than singleton boys on mathematics achievement. In modern China, male children in singleton families exhibit the gendered mathematics achievement test advantage that is well recognized in the international literature, whereas male children coresident with siblings more closely resemble girls.

Children's development, participation in education and educational learning outcomes are all important predictors of later life course achievements including further academic pursuits and labor market success. Early deprivation can have long-lasting effects, for example, malnutrition in early childhood can result in physical stunting and cognitive impairment in later life (Victora et al. 2008) although positive inputs such as better nutrition and stimulating learning environments can help to mitigate some of the earlier negative influences (Liu et al. 2001).

In recent years increasing attention has focused on the relationship between child development and life course trajectories in lower- and middle-income countries. This focus is contributing new information about previously unexamined populations, and as these lower-income countries contain the largest share of the world's children, the implications for global economic and social development are significant (Bornstein and Putnick 2012; Grigorenko et al. 2007; Walker et al. 2007). Across the world, one common household livelihood strategy to facilitate improvements in nutrition, education, and health care is labor migration (Anton 2010; Graham and Jordan 2011; Mazzucato and Schans 2011). However, debates remain about some of the trade-offs inherent in the labor migrant strategy that creates split households across geographic distance within and across national borders as families reconfigure caregiving arrangements in the absence of routine caregivers (Graham et al. 2012) and there is growing recognition that advantages and disadvantages may not accrue uniformly within and between different countries (Jordan and Graham 2011).

Similar to other middle-income countries, rural-to-urban migration within China is not only an important household and family strategy to improve the life chances of children but also one of the important drivers of transformation in economic and social conditions in the twenty-first century. Recent decades of sustained economic growth have contributed to raising living standards across China. However, the historically uneven development within China continues to exert influence and exacerbate persistent socioeconomic inequalities between rural and urban areas, primarily through the *hukou* mechanism (Chan 2009; Montgomery 2012). On the one hand, the economic reforms set in motion under Deng Xiaoping have resulted in an impressive rising standard of living and widespread poverty reduction; on the other hand, these same transformations are also contributing to embedding sharp economic inequalities and new population subgroups of disadvantage, and

to stymying opportunities for social mobility in modern China (Aizenman, Lee, and Park 2012; Li et al. 2007). Despite a rising standard of living in terms of absolute poverty, many migrants remain disadvantaged and face social exclusion in destinations. Thus, even if migration and associated remittances result in a rising standard of living, structural conditions may continue to impede progress for the children of migrants.

The proportion of Chinese households engaged in livelihood migration has risen steadily since the 1990s and is a significant contributing factor in Chinese modernization. Recent estimates from the 2010 Census illustrate that over 260 million Chinese people are migrants living in an area that is different from their household, or *hukou* registration (Peng 2011). Previous estimates of this migrant population, varyingly referred to as temporary or floating, indicates steady growth across the 1990, 2000, and 2010 censuses from 22.4 million migrants in 1990 to 86.3 million in 2000 to the current estimates of over 200 million (Peng 2011; Sun and Fan 2011) . In contrast, while the total count of the migrant population with *hukou* change, or permanent migrant population, has held steady over the same time period at around 25 million, the proportion of permanent to temporary migrants has decreased from about half in 1990 (24.5 million) to one-third in 2000 (24.4 million) to one-tenth, at approximately 25–27 million (Duan and Huang 2012; Sun and Fan 2011). This indicates that in the context of modern migration within China, *hukou* change is increasingly rare, possibly reflecting the policy strategies aimed at building and sustaining economic growth.

The demography of the migrant population and families of migrants is complex, and there remains a lack of comprehensive understanding about the diversity of family structures within this context. Earlier scholarship often stated that children of migrant parents in China remain in residence in origin communities—in the care of left-behind spouse, or other relatives such as grandparents or older siblings (Biao 2007). While this certainly was true, and continues to be true for some families, the recent 2010 Census illustrates how the relationship between family structure and migration has become more complex and diverse. Approximately 70 million children are estimated to be left-behind with the majority (61 million) in rural areas. However, another significant child population under age eighteen is the estimated 36 million children who migrate with their parents to new destinations (Duan and Huang 2012). These estimates indicate that the role of migration in children's lives is multifaceted, and requires consideration of the diversity in the family changes as well as more structural factors including the impact of *hukou* registration, and current location of child residence simultaneously. The current study using new data from the China Family Panel Study (CFPS) also includes a group of urban *hukou* children with migrant parents, which is a subgroup that has not received much attention in the existing literature, offering the opportunity to address an important research gap, and provides a more panoramic view of migration and the family in contemporary China.

Changes in family structure may result in deficits in caregiving, and the inputs

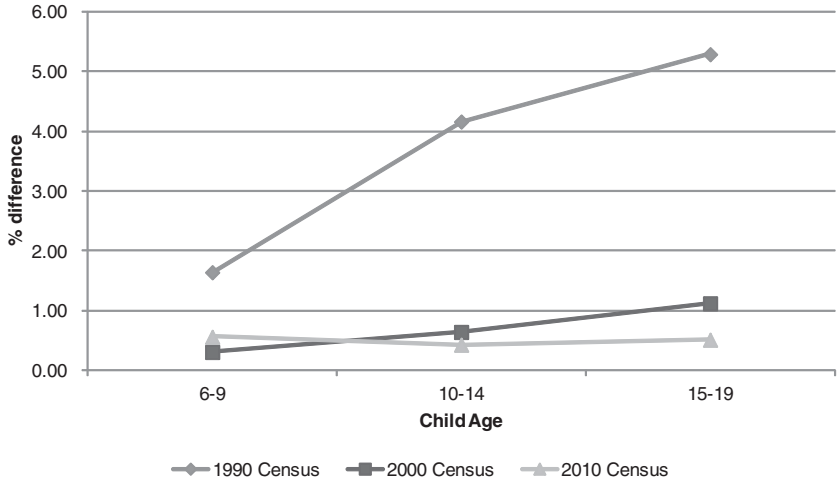
to child development in terms of the quality and quantity of caregiving (Bornstein and Putnick 2012). Later transitions including those occurring during middle childhood and adolescence are also important windows of risk and opportunity where the impacts of earlier deficits may become apparent, but caregiving deficits experienced during this time period also may impact schoolwork, for example, if children lack support for assistance with schoolwork when they remain in the care of the grandparent generation who may have achieved lower levels of education. The impacts of household outmigration have been shown to have gendered effects in locations with strong son preferences, including China. Older children and girls in particular, are at risk of leaving school as the household experiences a substitution effect whereby the young adolescent's contribution to domestic or household chores takes on greater value in the absence of other working-age adults (Meyerhoefer and Chen 2011). Other related literature on sibling composition provides some evidence that within Asian contexts, Blake's (1981) standard resource dilution theory is applicable, with girls being most disadvantaged when child spacing is further apart (Chu, Xie, and Yu 2007). They further articulate that intra-sibling resource transfer rather than intergenerational transfer of resources best describes the mechanisms. Ye and Wu (2011) tested the applicability of these prior findings to the Chinese context finding that agricultural *hukou* girls were most likely to experience educational disadvantage when they had younger siblings or brothers.

This article seeks to contribute to understanding gender and migration inequalities in child education participation and educational learning outcomes, with a particular focus on middle childhood and adolescence (ages ten to fifteen years). The primary aim of the current study is to investigate how parental labor migration status, *hukou* registration and current residence together contribute to explaining variation in three different educational and learning outcomes, namely, school pacing and mathematics and language skill achievement.

Chinese Migration and Children's Education

A number of recently published studies using diverse Chinese data sources provide support for differences based on parental migration status. Among children living in rural areas, parental migration is associated with a grade-level lag in educational attainment for girls that is hypothesized to be associated with a reallocation of girls' time to home production in migrant households based on analysis of the China Living Standards Survey (CLSS) 1995 (Meyerhoefer and Chen 2011). Another study using panel data from the China Health and Nutrition Survey (1997–2006) found that household migration increases time spent on farm and domestic work, especially for elderly women and *girls* (our emphasis) (Chang, Dong, and MacPhail 2011). While not examining educational outcomes specifically, Chang et al. provide evidence of a gendered substitution effect into farm and domestic work of females (both young and elderly), which can be interpreted as an indirect educational effect

Figure 1. **School Enrollment: Difference Between Rural and Urban Enrollment from China Censuses**



for girls. These previous studies reveal evidence of persisting gender inequalities under modernization in China, especially in relation to the allocation of girls' time across activities including education, and particularly in rural areas.

Other studies have focused on comparisons of migrant children who accompany their families into migrant destinations, and provide evidence of differentials in school enrollment, school pacing (grade-for-age), and school performance. Overall, China has made impressive gains in school enrollment over the past three decades. The gap between rural and urban enrollment has narrowed from 5 percent for the oldest age group (fifteen to nineteen years old), and the most recent estimates from the 2010 Census show less than a 1 percent gap (Figure 1). The total enrollment rates for ten- to nineteen-year-olds are 99 percent and the youngest children ages six to nine are gaining ground as well, with 2010 estimates for enrollment at 96.5 percent. The census data do not provide detailed information about differences in school enrollment between migrants and nonmigrants. Research using data from a nine-city survey conducted by the Women and Children's Committee Office of the State Council and Chinese Children's Center in 2003 found delays in school enrollments (Duan and Hong 2006) highlighting significant grade lags and gendered differentials regarding school dropouts among migrant children, with greater incidence of both grade lags and dropouts among migrant girls compared to migrant boys (Fan 2005). However, the body of research is equivocal about gender differences among migrant children based on school performance with some finding that gender effects disadvantage migrant girls (Zhou and Wu 2008) and others finding

that gender effects advantage migrant girls (Zhang, Gong, and Yao 2011). One of the significant explanatory factors confirmed by different studies is the household registration status of migrant children.

Using the 1995 1 percent Population Census for Guangdong Province, researchers found that temporary rural-to-urban migrant children were much less likely to be enrolled in school, whereas formerly migrant children with *hukou* change were the most likely to be enrolled compared to all others (Liang and Chen 2007). Of further note in this study is that rural-to-urban temporary migrant children experienced a major disadvantage in terms of school enrollments compared to rural nonmigrant, or "left-behind" children. Using data from almost twenty years ago, Guangdong province was among the first to experience rural-to-urban employment-based migration during the period of the initial opening up of China. Thus, understanding the dynamics among migrant children subgroups may offer insights into the developmental process of how children are impacted by family migration. In addition, it provides a historical benchmark to examine patterns of change over time. A more recent survey conducted in 2008 confirms the impact of residential status among migrant children on school enrollment and performance, although the impact is partially attributed to the school. Among Beijing residents attending both public and registered migrant children schools, girls' performance is better than boys', but in nonregistered migrant children schools, there is no gender difference (Zhang, Gong, and Yao 2011). The difference in performance is partially attributed to the living standard of a migrant family, in the expected direction, with higher living standard having a positive relationship with the performance of migrant children, although the indication of the importance of school registration, which is internationally recognized as one important indicator of quality, clearly is significant as well (Wößmann 2003).

Together the above studies indicate a hierarchy of privilege and disadvantage based on a complex combination of household registration, migration, and location of current residence as well as gendered effects of disadvantage for left-behind girls in rural areas with household outmigrants, and equivocal gendered advantages among migrant children, at least in one urban area. One of the weaknesses of the current studies is the focus on restricted geographical areas within a single study, for example, in Guangdong or Beijing only, or the lack of comparison across multiple categories of migration, current residence, and household registration status. Our study offers an advancement on these designs with a nationally based sample, the China Family Panel Studies (CFPS), which allows us to capture a wider range of migration and household registration statuses including children separated from their migrant parents in both rural and urban areas, children who accompany parents into migrant destinations, as well as children who are long-term registered urban and rural residents living with both parents and a range of educational and learning outcomes. We draw on the previous scholarship to construct the following hypotheses.

H1. Household registration, current residence, and family migration status will result in differences across the following subgroups of children on the three key measures:
1.1. In the absence of parental migration, urban nonmigrant children will have the highest levels of on-pace schooling and language and math achievement, while rural nonmigrant children will have the lowest levels across the three outcomes.
1.2. Children in migrant families will have lower levels of on-pace schooling and language and math achievement compared to urban resident and *hukou* children.
1.3. There will be differences between the left-behind rural children and those in migrant families, but the direction of these differences is not clear across the outcomes.
H2. There will be gender differences based on sibling composition and *hukou*-residence-migration status
2.1. Gender differences in school pacing (grade-for-age) based on parental migration status, with boys in multichild families relatively advantaged in rural areas
2.2. Gender differences in school performance (language and math achievement) based on migration status and household registration in migrant destinations, but the direction is unclear.

Data and Methods

Data and Measures

This study uses data from the first wave of the China Family Panel Studies (CFPS) collected in 2010 to examine the relationship between parental labor migration, child residence, and educational outcomes for youth (for detailed information about the CFPS, see the article by Xie and Hu in this issue, pp. 3–29). The CFPS is a new panel study in China conducted by the Institute of Social Science Survey (ISSS), Peking University, which examines a range of topics relevant to the current study including economics, education, learning achievement, family dynamics, migration, and health.[1] The CFPS has a self-report youth module for children in sample households age ten to fifteen (inclusive) years of age at Wave 1. Importantly for the current study, the CFPS also includes detailed information about child development including early developmental milestones, learning, educational progression, and social and behavioral development. Sixty-one percent of all CFPS households (N = 14,960) have children younger than age sixteen 16 (n = 8,990). The final sample selected for this study is restricted to households with youth age ten to fifteen who completed the self-report module (n = 3,269).

Of central importance to the research hypotheses, we create a measure that

Table 1

Categorization for Current Residence, *Hukou,* and Parent/Family Migration Status

	Local registration	Residence	Parent(s) migration
1. Rural residence and *hukou* with no migrant parents (rural nonmigrant)	Yes	Rural	No
2. Urban residence and *hukou* with no migrant parents (urban nonmigrant)	Yes	Urban	No
3. Rural residence and *hukou* with migrant parent(s) (rural left-behind)	Yes	Rural	Yes
4. Urban residence and *hukou* with migrant parent(s) (urban left-behind)	Yes	Urban	Yes
5. Urban residence with nonlocal *hukou* migrant families including child (migrant family)	No	Urban	Yes
6. Others	Varies	Varies	Varies

Notes: The category "Others" includes those urban children who live in rural areas without local registration, those whose father or mother or both have died, or there is no information on whether they are alive.

combines information about current family migration status, residence (urban or rural), and household registration (*hukou* is urban, rural, unregistered). There are two primary types of migrants captured in the CFPS, the migrant population (*qian yin ren kou*), which refers to those migrants with a change of *hukou* and the floating population (*liu dong ren kou*) without formal change of *hukou*. In our study, "migrants" refers to the floating population—those living across county boundaries who have not resided at home within three months. Table 1 highlights how the different characteristics from the CFPS were combined to create the included measure. The migrant population with *hukou* change are included with the urban or rural nonmigrant groups because the timing of *hukou* change is not specified in the CFPS, thus the lack of specificity in measurement renders it a poor comparison group for the migrant population. A measure of whether or not the index child has a migrant parent was created by combining information from the household membership questionnaire and questions about current adult migration. An indicator about current residence was created from child questionnaire. Finally, a measure of current *hukou* registration was created as follows: (1) distinguish whether a child lives in an urban area or rural area; (2) confirm whether the child's father or mother or both live in the household; (3) identify whether the child has local *hukou* registration. The final included measure is a six-category variable of residential-migration status: Rural

residence and *hukou* with no migrant parents (rural nonmigrant); urban residence and *hukou* with no migrant parents (urban nonmigrant); rural residence and *hukou* with migrant parent(s) (left-behind rural); urban residence and *hukou* with migrant parent(s) (left-behind urban); urban residence with nonlocal *hukou* migrant families including child (migrant family); and others. The category "others" includes those urban children who live in rural areas without local registration, those whose father or mother or both have died or there is no information on whether they are alive. We drop this category as it is not our concern in this study.[2]

The measures of educational achievement and learning were created from self-report information collected from the children and adolescents, although missing data about completed school attendance was supplemented from information reported by adult household members, when available. Educational achievement is captured by a continuous measure of school pacing, or grade-for-age, following Kuhn (2006) and Asis and Marave (2013). School pacing indicates whether in relation to his/her age, a child is behind, at pace (expected progress in grade level), or advanced in school grade level. We adopted the same procedure in the construction of school pacing as Kuhn and others whereby age in completed years was subtracted from years of completed schooling plus 6 to account for average age starting first grade. In the Chinese school system, compulsory education begins at primary or first grade, when children are, on average, age six, and continues for nine years through completion of lower secondary or middle school. Because regional variation in the Chinese school system may imply differential entry age into elementary school, we regard age six or age seven as the age of starting school.

The CFPS 2010 also included language and math tests for the ten- to fifteen-year-olds. The language achievement test is composed of Chinese characters arranged from easy to difficult. The question number of the most difficult character answered correctly is taken as the final result. The starting point of the test is based on the education level of the subject: those with a level of primary school or under, start from the first character; those with a level of lower secondary school, start from the ninth character; those with a level of secondary school or under, start from the twenty-first character. The questions for the math achievement test are designed based on the content of primary/secondary school math textbooks. Similar to the language test, the questions are arranged from easy to difficult, and the final score is the question number of the most difficult question the subject answered correctly as the final result. The starting point of the test is based on the education level: primary school or under, start from the first question; lower secondary school, start from the thirteenth question; secondary school or under, start from the nineteenth question. For both the math and language tests if the child continuously gives three wrong answers, then the test ends. If the respondent does not answer any question correctly, then they will take the question number of the character before the starting point as the final result. For example, a child who has completed the lower secondary level who is unable to answer any questions correctly will receive a final score of 12.

Other measures of child characteristics are child age in years, child gender, and a continuous measure of early developmental achievement, speak (age in months of child's first spoken language) are included. This early developmental marker is included to capture a priori individual child characteristics likely to influence learning achievement, as well as school progression. Recent research suggests that parent/guardian recall of standard early developmental markers is a relatively robust measure, especially for general population (nonclinical population) children (Russell et al. 2014). The study includes the following measures of family structure: a continuous measure of the number of members currently residing in the family household; series of five binary indicators to capture resident siblings following Chu, Xie, and Yu (2007) to test Hypothesis 2, *no sibling, older sister, younger sister, older brother, younger brother;* an additional four-category measure of resident grandparent (*grandfather, grandmother, both grandfather and grandmother, no grandparents*).

Measures of socioeconomic status (SES) include family income and mother's education. Family income combines information from data across the 2010 CFPS. This measure is adopted from Xu et al. (2012) and includes five sources of income: salary, business, asset, transfers, and other. Mother's education is a continuous measure of years of completed education. Recent research indicates that in modern China, mother's education is a significant determinant of children's educational progress, especially for daughters (Zhao 2000) as well as a significant determinant of completing a greater number of years of education (Li and Qi 2011). In addition, in international literature, mother's education is considered a good explanatory measure of a range of children's well-being and learning outcomes (Jordan and Graham 2012). There was further evidence of a strong correlation between mother's and father's education raising the challenges of multicollinearity. The final deciding factor for mother's education over father's education was pragmatic: there was a slightly higher level of missing data for our subsample population (ages ten to fifteen) (2.5 percent) in father's education in the CFPS.

To capture place-based social and economic variation likely to influence inequalities in education attainment and learning outcomes, we include three county-level indicators from the 2010 China Census, average education (in years), gross domestic product per capita (log transformation), industrialization (ratio of urban to rural population). An additional measure of historical outmigration at the province level was calculated from the 2000 China Census to account for unobserved factors likely to influence selectivity into migration. Information about the number of migrants from each province was obtained from Census long-form table T7-2 and was combined with data on the total population with household registration in the local province (T7-2) to create the proportion of outmigrants (NBS 2012). The multiple category measure of *hukou*-residence-migration status precludes standard selection correction estimation techniques, (i.e., Heckman selection correction) and examination of the association between the historical proportion of outmigrants and different categories of the *hukou*-residence-migration subgroups provided evidence that obtaining first equation measures to use as selection variables would

prove challenging precisely because of the complexity of the measure. The gains in capturing the multidimensionality may result in some sacrifices. Generally, the concern is that standard errors may be biased downward in the absence of standard selection correction procedures (Greene 2000), and that significant results may be erroneously detected, and thus, we consider this in our interpretation of the results. An indicator for province is a six-category measure created by the CFPS team accounting for the five subpopulations: Shanghai (reference), Liaoning, Henan, Guangdong, Gansu, and other which includes the remaining twenty provinces (Xie, Qiu, and Lü 2012) is also included.

Methods

The analytical method includes the following steps. In Step 1, bivariate comparisons are computed using chi-square and pairwise mean comparisons (adjusting for multiple comparisons) between each of the measures and the five-category residential-migration status measure (Table 3). In Step 2, an identical series of hierarchical regression models for each of the three dependent variables, school pacing, verbal achievement and math achievement are computed including the individual, family, and county characteristics. The first model for each dependent variable includes only the child characteristics and *hukou*-residence-migration status while the second is the full model for each and includes family structure, SES, and province characteristics including the historical proportion of outmigration to partially address issues of migrant selectivity. All of the analyses were conducted using Stata/SE 12.1. To account for the sampling strategy, the multivariate analyses are weighted using the "post-stratification adjustment weights" for the child sample, which take account of the differential sampling rates implied by the sample design, a correction for differential nonresponse rates, and a final adjustment to replicate the age-by-sex distribution of the 2010 census. Further information about the construction of the weights is available from Lü and Xie (2012).

Findings

The full sample descriptive statistics are presented in Table 2, along with significant results for the bivariate comparisons across categories of *hukou*-residence-migration status. All of the measures, with the exception of child age, have some significant associations with the *hukou*-residence-migration status indicator. Highlighted here in the text are a few of the notable characteristics and results.

Among the child characteristics, girls are more likely to remain in the rural origin while boys are more likely to accompany their migrant parent(s) to the migration destination. The family structure measures illustrate some characteristics of note. Rural nonmigrant children are much more likely to live in multiple sibling households, and also much more likely to live with both grandparents in the household. Regarding the SES measures, mother's education is highest among

Table 2

Sample Descriptive Statistics (proportions and means)

			Hukou-residence-migration status									
			Rural nonmigrant (reference)		Urban nonmigrant		Rural left-behind		Urban left-behind		Migrant family	
	Whole sample		41.3		28.14		16.76		5.75		8.05	
Variables												
School pacing	–0.55	(1.04)	–0.68	(1.03)	–0.36	(0.98)	–0.74	(1.05)	–0.42	(1.35)	–0.40	(.882)***
Language achievement	21.76	(7.11)	20.73	(7.39)	22.77	(6.65)	20.33	(7.49)	23.72	(5.86)	23.25	(6.59)***
Math achievement	10.99	(4.35)	10.55	(4.55)	11.32	(4.27)	10.41	(4.21)	11.96	(3.58)	11.79	(4.21)***
Child is girl	49.34		50.67		48.59		52.37		46.28		41.06	*
Child age	12.20	(1.69)	12.23	(1.72)	12.13	(1.68)	12.19	(1.71)	12.19	(1.47)	12.40	(1.71)
Age speak	20.29	(8.51)	20.75	(8.47)	19.55	(7.64)	22.44	(9.70)	17.87	(8.49)	19.54	(8.83)***
No siblings	31.94		16.67		48.8		28.65		62.23		36.5	***
Older sister	19.82		23.33		15.43		22.63		10.11		18.25	***
Younger sister	12.08		14.67		8.8		12.41		7.98		12.55	***
Older brother	12.66		16.89		9.35		10.77		8.51		9.51	***
Younger brother	15.97		18.96		13.59		13.69		9.04		18.63	***
Resident grandparent												***
None	64.06		60.74		68.59		59.49		65.96		73.38	
Grandfather	5.11		6.89		4.35		2.92		3.72		4.18	
Grandmother	11.81		14.00		10.87		8.58		12.23		10.27	
Both	19.03		18.37		16.2		29.01		18.09		18.09	

Number resident family	4.20	(1.29)	4.42	(1.23)	3.87	(1.13)	4.66	(1.66)	3.84	(1.32)	4.00	(1.09)***
Mother's education	6.63	(4.39)	5.23	(4.13)	8.40	(4.16)	4.90	(3.64)	7.97	(4.17)	7.86	(4.39)***
Family log income	8.22	(1.69)	7.97	(1.52)	8.47	(1.87)	7.99	(1.55)	8.54	(1.42)	8.43	(1.91)***
Average education, county	7.90	(1.69)	7.55	(0.98)	8.27	(1.35)	7.54	(0.81)	8.18	(1.18)	8.41	(1.07)
Industrialization, county	3.07	(14.46)	0.82	(2.51)	5.53	(18.81)	0.63	(1.72)	4.31	(16.14)	6.68	–28.15***
GDP per capita, county	19,817	(19,328)	13,545	(12,767)	28,985	(23,493)	11,561	(10,348)	22,816	(21,764)	24,146	(19,149)***
Historical proportion out-migrant, province	29.02	(16.76)	29.31	(16.81)	26.03	(15.92)	34.69	(16.37)	31.97	(16.89)	27.39	(17.42)***
Province												***
Shanghai	3.12		1.11		6.74		0.18		6.91		4.18	
Liaoning	6.52		6.22		7.39		3.65		8.51		9.51	
Henan	12.7		10.96		12.93		17.34		11.17		12.17	
Guangdong	14.19		10.3		18.59		13.14		13.3		21.67	
Gansu	14.99		21.26		4.13		26.28		3.19		5.7	
Other	48.49		50.15		50.22		39.42		56.91		46.77	
N	3,269		1,350		920		548		188		263	

Notes: "Age speak" means age in months of child's first spoken language. Chi-square tests and pair-wise mean comparisons depending on type of variable. ***$p < .001$; **$p < .01$; *$p < .05$; ^$p < .1$.

urban nonmigrant households, urban resident, and *hukou* households and lowest among left-behind rural households, while the family log income confirms an urban economic advantage. There are significant bivariate differences for the county-level measures as well, but they are not discussed here. The population distribution for the provinces reflects particular local demographic characteristics—for example, there is a smaller relative proportion of households with children in Shanghai, as expected, based on fertility patterns. There are significant bivariate associations with all three dependent variables, with all highlighting an urban advantage, children with urban *hukou*—urban nonmigrant and urban left-behind—and migrant family children all have better educational and learning outcomes than their rural resident and *hukou* counterparts—again the rural disadvantage holds for children both with and without migrant parents in the bivariate pair-wise mean comparisons. These bivariate comparisons provide a strong motivation to explore the multivariate dynamics and to better understand the overlapping domains of influence that may offer an explanation for these differences.

Turning to the multivariate results in Table 3, first we consider school pacing (Models 1 and 2). School pacing is considered a more sensitive measure of educational and future achievement compared to school enrollment as it reflects whether a child is falling behind in schooling, which is a cumulative loss, and, if uncorrected, can result in long-term consequences in future lifetime labor market achievement and financial security. Informed by prior literature, migration is a potential determinant of differential school pacing, although the directionality of the impact has been shown to vary based on family sibling gender composition and whether children migrate with their parents, or remain left behind in rural areas. When controlling only for child age, gender, and early childhood development, there is evidence of a strong urban residence effect for the two groups, urban nonmigrant children, and, perhaps surprisingly, migrant family children: both groups are more likely to demonstrate higher levels of grade progression compared to rural nonmigrant children (Table 3, Model 1). One concern about migrant family children and educational progression is that there may be some loss in standard educational progression due to instability in education within the migrant destination areas (Duan and Hong 2006). In the full model (Model 2), after fully accounting for family and county, there is no further evidence of any *hukou*, residence or migration explanation of variation in school pacing. Rather it is the mother's education and average county levels of education that contribute most significantly to explaining the observed differences in school pacing, in the expected direction: higher levels of both are associated with improved school pacing. Finally, the proportion of historical outmigrants has a negative and statistically significant relationship with school pacing, suggesting that children residing in counties with a higher proportion of outmigrants are relatively disadvantaged in their school pacing in comparison to children living in areas with a lower proportion of historical outmigration.

While school pacing does provide a more nuanced indication of the education trajectory than school enrollment alone, educational attendance in itself does not

provide information about the achievement of learning. A closer examination of language and math achievement based on children's performance on standardized testing procedure (Models 3–6, Table 3) offers a deeper examination of current educational inequalities among adolescents. Models 3 and 5 (language and math achievement, respectively), demonstrate patterns of urban advantage that are similar to each other. After controlling for child characteristics and family *hukou*-residence-migration status, the urban advantage is universal for all urban children, regardless of *hukou* registration or migrant status, and exhibits advantaged achievement based on both language and math testing. The pattern is similar with one particular group, left-behind urban, showing the greatest advantage, followed by a similar magnitude advantage for children in migrant families and children in urban nonmigrant families (all compared to children currently residing in rural areas, with rural *hukou* and no migrant parents). Girls are more likely to achieve higher language scores, while lower achievement in both language and math is more likely when observing early child development delays in speech.

The full models for language and math achievement (Models 4 and 6) add in family characteristics, SES, and the county-level characteristics and province of residence. There is no longer any evidence of the advantage for urban nonmigrant—the group that is generally considered the most advantaged. Migrant family children no longer display an advantage either, although the estimate is just outside significance for language achievement. It is only the left-behind urban group that maintains a significant association with both measures of learning achievement. Both measures of socioeconomic status—mother's education and family income—are also important sources for explaining variation in the language and math achievement of the children, in expected directions. Higher levels of maternal education and family income are associated with greater achievement. Children in larger families exhibit lower language achievement. Sibling structure is also important in explaining variation in the outcome with singleton children and those with sisters and brothers—both older and younger—demonstrating better language achievement, a point to which we will return shortly.

Level of industrialization (ratio of urban to rural) is associated with better achievement in language, albeit of a small magnitude. On the other hand, the historical proportion of outmigrants has a negative marginally significant role in explaining variation in math achievement. In both instances children living in Guangdong Province are particularly disadvantaged (in comparison to those living in Shanghai). The group of left-behind urban children stands out as a special group, with a particular advantage that is not explained adequately by the currently estimated models.

Hypothesis 1 addressed the expected hierarchy of advantage and disadvantage based on prior research using data spanning the past fifteen years. While the bivariate and partially adjusted models offer evidence to support a more universal urban advantage, and including children in migrant families, these differences do not hold after accounting for other factors. In the fully adjusted models, it is only

Table 3

Hierarchical Ordinary Least Squares (OLS) Regression Models Estimating School Pacing and Language and Math Achievement ($N = 3,269$)

	School pacing				Language achievement				Math achievement			
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
Variables	B	RSE	B	RSE	B	RSE	B	RSE	B	RSE	B	RSE
Residence-Migration (Rural residence and *hukou*)												
Urban residence and *hukou*	0.31	0.09***	0.01	0.07	2.12	0.47***	0.35	0.44	0.91	0.26**	0.10	0.23
Rural residence, *hukou,* migrant parent(s)	–0.04	0.08	0.02	0.07	–0.21	0.52	0.02	0.50	0.01	0.22	0.12	0.22
Urban residence, *hukou,* migrant parent(s)	0.23	0.16	–0.03	0.17	2.77	0.54***	1.22	0.56*	1.43	0.28***	0.76	0.26***
Urban residence, rural *hukou,* migrant family	0.29	0.09**	0.05	0.09	2.19	0.55***	0.83	0.55	0.92	0.31**	0.31	0.30
Child is girl	0.13	0.07*	0.12	0.07+	1.23	0.36**	1.20	0.37**	0.02	0.20	–0.04	0.20
Age speak	–0.01	0.00+	–0.01	0.00	–0.07	0.02***	–0.04	0.02*	–0.04	0.01***	–0.02	0.01
No siblings			0.21	0.15			1.91	0.83*			0.61	0.43

Older sister	0.09	0.13	1.55	0.78*	0.29	0.42
Younger sister	0.10	0.14	1.00	0.84*	0.18	0.43
Older brother	0.18	0.13	1.80	0.81*	0.42	0.42
Younger brother	0.09	0.13	2.04	0.80*	0.61	0.41
Resident grandparent						
None						
Grandfather	0.03	0.10	−0.19	0.58	−0.28	0.34
Grandmother	0.04	0.08	−0.03	0.46	−0.36	0.27
Both	−0.03	0.08	0.88	0.50	0.05	0.26
Number resident family	−0.02	0.03	−0.32	0.15*	−0.10	0.08
Mother's education	0.05	0.01***	0.25	0.05***	0.16	0.02***
Family log income	0.02	0.02	0.27	0.08**	0.11	0.05*
Average education, county	0.13	0.04***	0.26	0.23	0.03	0.12
Industrialization, county	0.00	0.00	0.02	0.01*	0.00	0.00
GDP per capita, county	−0.06	0.05	0.55	0.29+	0.07	0.14
Historical proportion out-migrant, province	−0.01	0.00***	0.02	0.01	−0.01	0.01+

(*continues*)

Table 3 (*continued*)

	School pacing				Language achievement				Math achievement			
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
Variables	B	RSE	B	RSE	B	RSE	B	RSE	B	RSE	B	RSE
Province												
(Shanghai)												
Liaoning			−0.16	0.16			−1.67	1.23			−0.87	0.61
Henan			−0.05	0.17			−0.10	1.14			−0.60	0.63
Guangdong			−0.33	0.18+			−4.24	1.16***			−1.66	0.65*
Gansu			−0.13	0.21			0.37	1.29			−1.01	0.71
Other 20 provinces			0.06	0.18			−0.86	1.12			−0.78	0.64
Constant	0.55	0.11***	−1.38	0.64*	16.60	0.62***	6.43	3.58+	7.58	0.30***	5.84	1.98***
R2	0.04		0.16		0.26		0.34		0.50		0.54	

Notes: "Age speak" means age in months of child's first spoken language. All models control for child age. ***$p < .001$; **$p < .01$; *$p < .05$; ^$p < .1$.

a select group of left-behind urban children who maintain an advantaged position in the fully adjusted models, and only for language and math achievement. Family structure and SES as well as county characteristics stand out as important determinants of differences in education and learning outcomes.

In order to investigate the relationship between sibling composition and gender more fully, and to formally test Hypotheses 2, which addresses the relationship between parental migration, gender, and sibling structure, we next estimated a series of interaction models (Table 4) between child gender and each of the sibling dummy variables (no siblings, younger brother/sister, older brother/sister) for the three outcomes. None of the interactions were significant for school pacing (models not shown), thus the discussion focuses on learning achievement only. Estimation of these models highlighted a significant interaction between gender and sibling composition, in particular for children in single-child families. When considering language achievement, girls in multiple sibling families do better than boys in multiple sibling families (significant slope). The pattern is different again for math achievement with girls in multiple sibling families performing about the same as boys (significant slope), while girls in singleton families perform worse than boys in singleton families (significant slope).

There was no evidence of systematic gendered differences in school pacing and *hukou*-residence-migration after controlling for family composition, SES, and county characteristics, suggesting that previous research using data with older cohorts of children may not accurately reflect the current dynamics. The second part of Hypothesis 2 addressed gender difference in school achievement, although the direction of differences was unclear. Figures 2a and 2b provide a visual illustration of the gendered patterns of difference based on whether the child is from a singleton or multiple-child family for language and math achievement, holding constant the other included variables. The relationship differs based on whether it is language or math achievement with girls performing better than boys on language tests if they have siblings, and girls performing worse on math tests if they are singletons.

Discussion

Since the 1980s the increasing trend of labor migration in China is contributing to social and economic transformation. The pace and magnitude of transformation across China is significant, and indeed, substantial gains in poverty reduction and modernization are taking place. However, questions remain about the distribution of these transformations across different social strata, for example, whether or not migrants and their families are able to advance across social strata, whether those families who do not participate in the mobility circuits are being left out of modernization, and whether the choices families make about bringing children to migration destinations or leaving them behind in rural areas under the care of kin have preferential outcomes for the next generation. The current study contributes

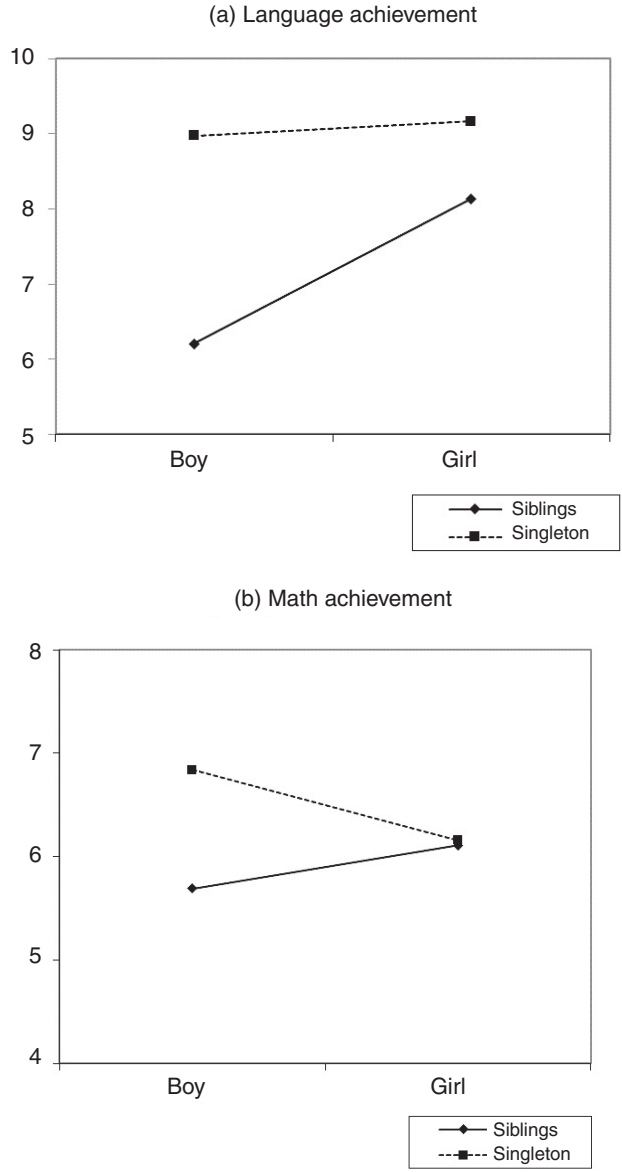
Table 4

Interaction Models Child Gender and Resident Siblings (*N* = 3,269)

	Language		Math	
Variables	B	RSE	B	RSE
Hukou-Residence-Migration				
(Rural nonmigrant)				
Urban nonmigrant	0.42	0.42	0.14	0.22
Rural left-behind	0.03	0.50	0.12	0.22
Urban left-behind	1.25	0.56*	0.78	0.26**
Migrant family	0.91	0.55+	0.36	0.30
Child is girl	1.93	0.36***	0.42	0.18*
Age speak	–0.04	0.02*	–0.02	0.01
No siblings	2.77	0.92**	1.15	0.47*
Girl * no siblings	–1.74	0.83*	–1.10	0.46*
Older sister	1.59	0.78*	0.31	0.42
Younger sister	1.14	0.83	0.27	0.43
Older brother	1.88	0.80*	0.47	0.42
Younger brother	2.18	0.80**	0.70	0.42+
Resident grandparent				
None				
Grandfather	–0.22	0.57	–0.30	0.33
Grandmother	–0.04	0.46	–0.37	0.27
Both	0.84	0.49+	–0.37	0.26
Number resident family	–0.30	0.15*	–0.09	0.08
Mother's education	0.26	0.05***	0.16	0.02***
Family log income	0.28	0.08**	0.12	0.05
Average education, county	0.25	0.22	0.02	0.12
Industrialization, county	0.02	0.01*	0.00	0.00
GDP per capita, county	0.53	0.29+	0.06	0.14
Historical proportion outmigrant, province	–0.02	0.01	–0.01	0.01+
Province				
(Shanghai)				
Liaoning	–1.89	1.26	–1.00	0.61
Henan	–0.25	1.16	–0.69	0.62
Guangdong	–4.44	1.19***	–1.78	0.65*
Gansu	0.16	1.31	–1.15	0.71
Other 20 provinces	–1.08	1.15	–0.92	0.65
Constant	6.21	3.44+	5.69	1.88**
R^2	0.35		0.54	

Notes: "Age speak" means age in months of child's first spoken language. All models control for child age. ***$p < .001$; **$p < .01$; *$p < .05$; ^$p < .1$.

Figure 2. **Gender and Sibling Composition**



new understanding to these dynamics, and points the way forward for the future attention of policymakers and scholars.

The analysis brings together the dynamic components that distinguish China's migration regime from other middle-income countries taking into account the *hukou*

system, residential location, and parental migration simultaneously to examine three different educational and learning outcomes using new data from the China Family Panel Studies. To guide the analysis, two primary hypotheses were set forth based on the preexisting literature. An additional unique contribution of this study is the inclusion of school progression and language and math achievement using a nationally based sample. The findings are thus able to contribute to the state of knowledge about the children of second generation labor migrants in modern China.

While there is evidence of a continuing urban advantage reflecting the historically uneven development between urban and rural areas within China, there is little evidence of a universal urban advantage across all three of the outcomes after controlling for family structure, SES, and county characteristics. The different outcome measures offer insight into changing dynamics in modern China. In particular, the lack of systematic differences in school pacing suggests that children and adolescents across China are keeping pace relative to one another. This likely reflects the growing convergence of educational enrollment in recent years, and may also reflect more recent changes in the inclusion of migrant children in destination educational institutions. Of note is the negative association between the historical proportion of outmigration and school pacing, which suggests that those families who are able to leave the countryside do, and that increasingly, they are taking their children with them. This measure is included to capture elements of migrant selectivity that may differentiate those who migrate from those who stay behind. Future analysis incorporating longitudinal data will help to give a better understanding of these dynamics, and offer more options to better control for migrant selectivity—one of the limitations of the current study. Given that this study finds few significant differences related to migration after controlling for household socioeconomic factors, the earlier concern regarding possible downward bias of standard errors is not likely to present a compelling concern in this instance.

The study findings on learning achievement offer greater insight into how the dynamics of population demography and modernization are shaping child and adolescent educational achievements. There is evidence of a more universal urban advantage for both math and language achievement with all urban residents regardless of *hukou* or migration status scoring better than their rural counterparts. Accounting for family structure and SES as well as county characteristics levels this advantage, except for one select group—the urban left-behind. This group may represent an emerging (or extension of traditional) elite subpopulation of greatest advantage not captured by the current determinants. Future research is needed to better explore what differentiates this group.

The gender differences in math and language achievement mirror international research to a large extent. Chinese girls are outperforming boys in language achievement, similar to girls across the world who generally often outperform boys in language skills (Bouchard et al. 2009; Van De Gaer et al. 2006). There was no direct effect of gender on math achievement, which is contrary to the international literature, which generally confirms a growing gender gap with males outperforming

females as they progress through the school years (Kenney-Benson et al. 2011). The interaction models between sibling structure and gender, however, offer a more nuanced understanding about the relationship between the demography of China and gendered achievement in math and language. Girls who are coresident with siblings demonstrate an advantage to boys who are coresident with siblings on language skill while it is singleton girls who demonstrate a disadvantage compared to singleton boys on math skills. Of further significance is that both girls and boys who are coresident with siblings perform lower overall than the singleton boys on mathematics achievement. This suggests that in modern China, male children in singleton families' exhibit the gendered mathematics achievement test advantage that is well recognized in the international literature, whereas male children with siblings more closely resemble girls. This may indicate an emergent phenomenon of traditional male gendered advantage among singleton households, although future studies will have to elaborate the mechanisms in greater detail. There are many possible explanations, for example, how it may be related to changing population dynamics as a result of the one-child policy, and how one impact of the policy, especially in urban areas may be the perpetuation of gendered disadvantage within singleton families. This trend merits further study to gain a better understanding of the determinants of the gender gap in math achievement in modern China, how it is similar to or different from other cultural contexts, and the ways in which it may impact future labor market participation and achievements.

This study further contributes to global literature on family migration and children's education (e.g., Alcaraz, Chiquiar, and Salcedo 2012; Cox and Ureta 2003; Mendola 2012) as well as national debates on educational inequality and migration within China (e.g., Golley and Kong 2013; Hannum and Wang 2006; Wu 2011). In the international literature on migration, parents often state that furthering their children's life chances is a primary motivation for participating in global circuits of migration (e.g., Asis and Marave 2013; Graham and Jordan 2011). In terms of school progression, this study found a minimal role of migration, household registration and location of residence net other factors. In terms of learning achievement, a select group of children, left-behind urban children, are the most advantaged after accounting for other characteristics. These children may mirror international trends of educational migration, "parachute" or "astronaut" children (Tsong and Liu 2008) who are able to migrate to pursue educational opportunities based on family SES and social capital networks. Even while state policy and demographic change are reflected in a declining proportion of youth population in China relative to older cohorts, rising participation in higher levels of education and uncertainty about how China will avoid the middle income trap (Adams and Page 2005) may result in a "race to the top," similar to what is already observed among youth populations in the greater China region, for example, in Hong Kong, where the process for preschool admission begins a sustained period of competition for a small number of elite professional jobs. Future research should focus closer examination on the transition from school to the labor market in order to better inform policymakers

about how to maximize the benefits of education and migration for youth, their families, and the wider society. Failure to do so may result in future challenges to social and economic transformation.

Notes

1. Tibet, Qinghai, Xinjiang, Ningxia, Inner Mongolia, and Hainan were excluded from the sample to reduce costs, but together they make up only 5 percent of the population (Xie 2012: 14)

2. Only seventy-six cases were dropped as they were not our concern in this article.

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