LATIN AMERICAN ECONOMIC REVIEW

2026 | Volume 36: Issue 50th Anniversary Division of Economics | Article 4

Children's School Transitions and the Human Capital of Parents and Grandparents: A Multigenerational Perspective

Erika Arenas† Luis N. Rubalcava‡

Submission received: May 30, 2025
Final version received: February 7, 2026
Accepted: February 7, 2026
Published: March 19, 2026

Abstract

This study investigates from a multigenerational perspective how parents' and grandparents' human capital, and children's early endowments are associated with children's educational transitions. Using nationally representative longitudinal data from the Mexican Family Life Survey, we estimate sequential logit models to analyze how multiple dimensions of human capital relate to key educational transitions: from primary to lower secondary school, from lower to upper secondary school, and from upper secondary to graduation. Results show that grandfathers' education is positively associated with the first transition, even after accounting for parents' schooling, children's early endowments, and household assets. Mothers' education is the most consistent correlate of school continuation, whereas fathers' height and cognitive ability display weaker associations once education and wealth are considered. Children's early cognitive ability and height-for-age are strongly associated with educational progression. Our findings underscore the cumulative, multigenerational nature of human capital transmission through various mechanisms that extend beyond the nuclear family.

Keywords: Educational transitions; multigenerational mobility; human capital; educational stratification; Mexico.

JEL codes: I24, J24, J62, D13.

†Corresponding author. University of California Santa Barbara (UCSB), Department of Sociology, and Broom Center for Demography. Social Sciences and Media Building, Room 3123, Santa Barbara, CA 93106, USA. e-mail: earenas@soc.ucsb.edu. Phone (310) 889-4897; Fax: (805) 893-3324.

‡Centro de Análisis y Medición del Bienestar Social, A.C. (CAMBS). Bosques de Duraznos 127-5, Mexico City, 11700, Mexico.

1. Introduction

Educational attainment significantly shapes individuals' life opportunities and broader social outcomes. Schooling is strongly associated with labor market success, higher earnings, better health, partner selection, fertility behavior, children's outcomes, and both intra- and intergenerational social mobility (Behrman et al., 2017; Card, 1999; Maralani, 2023). Although global progress has reduced the share of adults without upper secondary education in OECD countries from 17% to 14% between 2016 and 2023, equitable access to quality education remains elusive. Family background continues to exert a powerful influence on children's educational trajectories, particularly in contexts of persistent inequality, where understanding the intergenerational reproduction of education is essential for designing effective equity policies that promote equal opportunities (OECD, 2024).

Research on educational stratification has shown how parental education and family background strongly condition children's educational progression across the life course (Haveman and Wolfe, 1995; Lucas, 2023; Mare, 1980; McLanahan and Percheski, 2008; Shavit and Blossfeld, 1994). While most of this literature highlights parental education as the core measure of human capital, we argue that this indicator may overlook other mechanisms through which advantages and disadvantages are transmitted across generations. In this paper, we adopt a multidimensional approach to human capital that incorporates parental education, height, and cognitive ability as three distinct but interconnected pathways shaping children's educational progression. Parental education promotes children's schooling through time and financial investments, role modeling, and the transmission of educational aspirations (Guryan et al., 2008; Holmlund et al., 2011; Jere and Hoddinott, 2001; Mare and Chang, 2006; Torche, 2010). Parental height, associated with higher income and socioeconomic status, reflects both genetic and environmental advantages that may shape children's educational progression (LaFave and Thomas, 2017; Perkins et al., 2016; Strauss and Thomas, 1998). Parents' cognitive ability may also contribute to differences in the intellectual environment that influence children's cognitive development and educational progression (Johnson, 2010).

More recently, an extension of this literature has shown how early-life investments and child endowments can also have long-term consequences for children's outcomes (Cabrera-Hernández and Orraca-Romano, 2023; Currie and Goodman, 2020; Torche and Echevarría, 2011). For example, using longitudinal data from the Mexican Family Life Survey (MxFLS), Cabrera-Hernández and Orraca-Romano (2023) show that neonatal weight-by-gestational age and maternal behaviors are associated with children's health and final educational attainment. Building on this insight, we extend the analysis by investigating how these endowments are associated with key educational transitions over the life course, rather than focusing only on final attainment.

Beyond the parent–child relationship, growing evidence highlights the role of multigenerational processes in reproducing educational inequality. Studies from the United States, China, and Europe show that grandparents' socioeconomic resources can influence grandchildren's education through financial transfers, cultural transmission, and caregiving support (Anderson et al., 2018; Arenas, 2017; Chiang and Park, 2015; Hällsten and Pfeffer, 2017; Klokker and Jæger, 2022; Li, 2023; Mare, 2011, 2014; Pong and Chen, 2010; Razzu and Wambile, 2025; Solon, 2018; Song, 2016; Zeng and Xie, 2014). In this paper, we move beyond the traditional two-generation focus to examine how parents' and grandparents' human capital, together with children's early endowments, are associated with patterns of educational progression. Empirical research from developing contexts remains limited due to the scarcity of multigenerational data. This article addresses this gap by examining how grandparents' education, net of parental education, cognitive ability, and household wealth, relates to their grandchildren's school transitions in Mexico. Using longitudinal data from the MxFLS, which collects intergenerational and multidimensional information on households and extended families, we link children, parents, and grandparents to examine how mothers', fathers', and grandparents' human capital correlates with children's progression across three key educational transitions: from primary to lower secondary school, from lower to upper secondary, and from upper secondary to graduation.

We use sequential logit models to describe the cumulative nature of educational attainment associated with predetermined child endowments and family human capital. Our results reveal how various elements of human capital correspond differently with children's school transitions. Parental height and cognitive ability, as measured by Raven scores, are strongly correlated with their children's school transitions. However, when controlling for parental education, these elements of human capital are no longer statistically significant. In line with the literature on intrahousehold allocation, we observe that maternal schooling is significantly associated with early child educational transitions, while this is not the case for paternal schooling. Finally, the multigenerational framework shows that grandparents' formal education correlates positively with their grandchildren's schooling attainment, in particular that grandfathers' education remains statistically significant after controlling for all dimensions of parental human capital and household wealth, regardless of co-residence status with grandchildren.

Our findings emphasize the importance of using a multidimensional and multigenerational approach to understand the transmission of human capital across generations, confirming that early childhood investments and broader family human capital have long-term associations with educational trajectories of younger generations. This study makes two key contributions. First, it integrates a life-course and multidimensional perspective into the study of multigenerational human capital transmission in a developing-country context. Second, it shows that grandparents' education, especially grandfathers' education, may serve as a source of material resources for the educational progress of grandchildren. Together, these contributions deepen our understanding of how educational inequalities are reproduced across generations and underscore the need for early, family-centered interventions to interrupt cycles of disadvantage.

The paper is organized as follows. Section 2 provides a brief overview of the Mexican context. Section 3 outlines the theoretical framework, drawing on prior research to explain the pathways through which children's early-life endowments, and parents' and grandparents' human capital shape children's educational progression. Section 4 details the data and methodological approach. Section 5 presents the main findings, and Section 6 concludes with a discussion of the key results and their implications.

2. Educational system in Mexico

The educational system in Mexico is divided into four levels of schooling: preschool, compulsory basic education (6 years of primary school plus 3 years of lower secondary school), upper secondary school (3 years), and post-secondary school. Primary school was substantially expanded in Mexico between 1959 and 1975—a period in which the Mexican government implemented the 11th Year Plan intended to make primary school available to all children. This plan led to an increase in school enrollment, a greater number of trained teachers, and an expansion in infrastructure (Rocha and Romero, 2003).

During the 1990s, the federal government implemented several policies to increase educational attainment and school enrollment, and to reduce school dropout rates. These policies included a constitutional amendment, in 1993, that extended compulsory schooling to 9 years (Creighton and Park, 2010); and the implementation, in 1997, of the antipoverty program Progresa (later renamed Oportunidades and then Prospera) which conditioned cash transfers to poor families on children's enrollment, regular attendance at school, and health check-ups (Parker et al., 2007). All these policies led to an increase in enrollment rates, a reduction in grade repetition and dropout rates, and to improvements in grade progression (Parker and Todd, 2017). Between 2000 and 2010, average years of schooling increased from 7.5 to 8.6 (INEGI, 2010), and school dropout rates fell from 1.9% to 0.7% in primary education, from 8.3% to 5.6% in lower secondary education, and from 17.5% to 14.9% in upper secondary education (INEGI, 2024).

In 2012, the federal government made upper secondary school compulsory and established a goal to make it universal by 2022 (OECD, 2013). Yet, by 2020, this goal had still not been achieved, given that average years of schooling were 9.7 (INEGI, 2024). From 2010 to 2020, the net enrollment rate in primary schools marginally declined from 98.3% to 95.8%. Conversely, within the same timeframe, it rose from 78% to 82.4% in lower secondary school and from 48.5% to 62.2% in upper secondary school (INEGI, 2010). Despite an overall increase in net school enrollment, the enrollment rate for individuals aged 15–19 years in Mexico was one of the lowest among OECD countries, at 61% compared to 83% in OECD nations. Similarly, in 2020, the percentage of individuals with educational attainment below secondary school was about three times higher in Mexico (58.8%) compared to the average in OECD nations (19.8%) (OECD, 2024).

In Mexico, between 2006 and 2009, the impact of students' socioeconomic background on school performance decreased significantly, reflecting improvements in the distribution of educational opportunities (OECD, 2012, 2013). Nonetheless, the proportion of the population living in poverty had remained unchanged since 2008 at 40% (CONEVAL, 2018). Low social mobility coupled with high income inequality—reflected in a Gini index of 43.5 in 2022 (World Bank, 2025)[1]—suggests that opportunities for economic mobility for Mexicans were almost non-existent.

Opportunities for upward social mobility are closely linked to processes of human capital formation, which are likely to reflect, on the one hand, existing inequities in the availability and quality of educational infrastructure and, on the other hand, differences in socioeconomic background and family resources across individuals. In Mexico, educational opportunities continue to be shaped by children's socioeconomic origin. An analysis of educational transitions among Mexican cohorts born between 1928 and 1984 showed that father's education and occupation, rural origin, and ethnic background influenced individuals' educational trajectories (Creighton and Park, 2010). Another study of children born in the 1980s highlighted the importance of family structure for school continuation: households with one parent absent due to migration, divorce, or separation showed higher odds of dropping out between secondary school and high school (Creighton et al., 2009).

More recently, with the accelerated growth of the elderly population in Mexico (i.e., the share of adults 60 years and older will triple from 6.3% of total population in 2010 to almost 23% by 2050 (Angel et al., 2017)), some empirical evidence based on longitudinal data from the MxFLS revealed how the presence of grandparents in households where the father was absent due to separation, divorce, or migration, was associated with better educational outcomes for grandchildren (Arenas, 2017). This finding underscores the continuing importance of extended family networks as buffers against economic instability and parental absence in shaping children's educational trajectories.

Building on this line of research, using sibling data from the MxFLS, complementary evidence from Mexico shows that inequalities in educational outcomes also emerge from early-life health conditions and differential parental responses to them. Specifically, children born with poorer neonatal health experience lasting disadvantages in health, height, and schooling through early adulthood. These disparities are particularly pronounced among low-income households, where parents tend to reinforce early disadvantage by allocating fewer resources to less healthy children, whereas more educated or affluent families are better able to compensate through targeted investments (Cabrera-Hernández and Orraca-Romano, 2023). These findings highlight how early-life health and parental behavior contribute to the intergenerational reproduction of inequality in Mexico, emphasizing the family's dual role as both a protective institution and a mechanism of stratification in contexts of persistent economic inequality.

[1] For comparison, the Gini index in 2025 was 41.3 for the United States, 25.7 for the Netherlands, 54.8 for Colombia, and 63 for South Africa (World Bank, 2025).

3. Theoretical background and previous research

Foundational economic and sociological theories frame the family as a production unit where parents transmit endowments and make investments that influence children's human capital (Becker and Tomes, 1986; Fleischhauer, 2007; Flouri and Buchanan, 2004; Haveman and Wolfe, 1995; Kalmijn, 1994a; Korupp et al., 2002). These theories emphasize three broad determinants of children's educational outcomes: (1) children's endowments, (2) family investments in children, which refers to the quantity and quality of resources families devote to them, and (3) social investment in children, reflecting public expenditures on schools and childhood infrastructure (Haveman and Wolfe, 1995). This paper focuses on the first and second determinants.

3.1. Children's endowments and their influence on educational outcomes

Children's own endowments, such as physical health and cognitive ability, provide a crucial link between early development and later educational outcomes, offering a foundation for the multidimensional and multigenerational approach adopted in this paper. Prior research shows that children's height and cognitive ability capture both biological and environmental mechanisms of intergenerational transmission outcomes (Behrman, 1996; Glewwe and King, 2001; Strauss and Thomas, 2007). Height, shaped by parental health and socioeconomic background, is not only a measure of children's nutritional status but also a correlate of educational and cognitive outcomes (Behrman, 1996; Glewwe and King, 2001; Strauss and Thomas, 2007). Similarly, cognitive ability, shaped by genetic inheritance and early parental investments, significantly affects educational progression, even after controlling for socioeconomic background (Korenman and Winship, 2000; Marks, 2022), suggesting it may work as an innate trait in the process of educational progression (Bowles and Gintis, 2002; Fischer et al., 2020).

Empirical evidence underscores the importance of early parental investments in children (Almond et al., 2018; Cabrera-Hernández and Orraca-Romano, 2023; Currie and Goodman, 2020). Adverse prenatal and early childhood conditions, such as undernutrition and low birth weight, have lasting effects on cognitive and educational outcomes (Almond, 2006; Currie and Goodman, 2020). Height-for-age in early childhood has been strongly linked to later schooling success, serving as a marker of early investment and developmental conditions (Alderman et al., 2001; Victora et al., 2008). In Latin America, Torche and Echevarría (2011) provide causal evidence from Chile that intrauterine growth restrictions have lasting effects on children's cognitive development, particularly among socioeconomically disadvantaged families. In Mexico, Cabrera-Hernández and Orraca-Romano (2023) show that neonatal health and parental responses have enduring consequences for children's health and schooling, with wealthier parents better able to compensate for early disadvantages. These findings suggest that early health disparities generate long-term educational inequalities.

3.2. Parents' human capital influence on children's education

Parental education is a well-established determinant of children's educational achievement (Chacón-Montoya and Aguayo-Téllez, 2023; Haveman and Wolfe, 1995; Strauss and Thomas, 1995). Highly educated parents are better positioned to promote their children's educational success through role modeling, resource allocation, stronger educational aspirations, greater resilience to economic shocks, and time investments (Guryan et al., 2008; Holmlund et al., 2011; Jere and Hoddinott, 2001; Mare and Chang, 2006; Torche, 2010). Furthermore, compared with lower-educated parents, higher-educated parents spend more time with their children (Guryan et al., 2008), which has been associated with higher self-esteem, fewer behavioral problems, stronger mathematical performance, and greater educational achievement among children (Gould et al., 2020; Lam et al., 2012; Milkie et al., 2015; Wikle and Cullen, 2023).

Furthermore, mothers' and fathers' education is likely to shape children's educational progress through different pathways. On the one hand, empirical evidence has consistently shown that maternal education has a strong positive impact on children's outcomes, particularly in early childhood, where it influences nutrition, cognitive development, and school enrollment (Currie and Goodman, 2020; Pilishvili et al., 2021; Schultz, 2002). On the other hand, paternal education has proven to be increasingly influential during adolescence, pointing to distinct developmental roles played by mothers and fathers (Behrman, 1996; Lankes, 2022). These effects are partially mediated by parental time investments, which are unequally distributed by gender and educational level. Evidence suggests an educational gradient in parental time, with more educated parents, especially mothers, spending more quality time with their children during childhood (Åman-Back and Björkqvist, 2004; Lankes, 2022). Time spent by highly educated mothers is strongly associated with improvements in children's cognitive, verbal, emotional, and problem-solving skills (Parke, 2013). During adolescence, fathers' time becomes particularly impactful; time spent with more educated fathers supports emotional regulation, social acceptance, adaptability, and psychosocial development (Lam et al., 2012; Parke, 2013), ultimately fostering social competence, self-worth, and long-term educational success (Flouri and Buchanan, 2004). These findings highlight the importance of considering both parents' educational backgrounds across different stages of child development. Other dimensions of parents' human capital (i.e., height and cognitive ability) also matter for children's educational progression. Taller adults tend to earn higher incomes, attain higher economic productivity, have a higher probability of being employed, and achieve higher educational attainment (LaFave and Thomas, 2017; Perkins et al., 2016; Strauss and Thomas, 1998). Since height is intergenerationally transmitted, it serves as both a genetic and an environmental factor shaping children's educational progression (LaFave and Thomas, 2017; Perkins et al., 2016). Maternal height, specifically, is associated with children's survival and development in low- and middle-income countries (Martorell and González-Cossío, 1987; Thomas et al., 1990; Victora et al., 2008). Additionally, parents with higher cognitive abilities are more likely to engage in stimulating interactions that promote children's intellectual development (Johnson, 2010).

3.3. Grandparents' influence on grandchildren's education

A growing body of research demonstrates that grandparents influence their grandchildren's educational outcomes through multiple, interacting mechanisms that extend beyond parental transmission of human capital (Chan and Boliver, 2013; Connelly and Zheng, 2003; Jæger, 2012; Mare, 2011, 2014; Pong and Chen, 2010; Song, 2016; Zeng and Xie, 2014).

The literature highlights three main pathways through which grandparents can shape children's educational opportunities. First, they may transmit economic resources through income, savings, property, or pensions (Anderson et al., 2018; Hällsten and Pfeffer, 2017; Razzu and Wambile, 2025; Zeng and Xie, 2014). Evidence from Sweden and the United States shows that grandparental wealth independently predicts grandchildren's grades and academic track placement, even after accounting for parental resources, reflecting both direct transfers and insurance effects during periods of financial instability. In addition, grandfathers' economic role may be stronger than grandmothers' because grandfathers are more likely to have been employed in formal sectors, accumulated pensions, or retained ownership of productive assets (Li, 2023; Razzu and Wambile, 2025; Zanasi and Sieben, 2022).

Second, through the transmission of cultural and social capital. Evidence from Denmark and China shows that grandparents' education and cultural engagement influence grandchildren's aspirations, study habits, and exposure to cognitively stimulating environments (Chiang and Park, 2015; Klokker and Jæger, 2022; Zeng and Xie, 2014). Cross-national studies reveal consistent gender differences: grandfathers' education and occupational status often signal social prestige and academic expectations (Li, 2023), whereas grandmothers' influence tends to be rooted in cultural and emotional socialization, such as promoting discipline, persistence, and family cohesion (Zanasi and Sieben, 2022). In Mexico's extended family networks, grandmothers often transmit family norms, religious values, and respect for education through daily interactions, thereby reinforcing the cultural foundations of schooling success (Planillo, 2004).

Third, through caregiving and exposure to grandparents in terms of co-residence, proximity, and time spent together. Studies from China and England demonstrate that children who co-reside with grandparents tend to achieve higher grades and benefit from greater emotional and academic support, particularly in lower-income or single-parent households (Zanasi and Sieben, 2022; Zeng and Xie, 2014; Zhang and Wu, 2021). Co-residence can also serve as a buffering mechanism during periods of economic strain or parental migration, ensuring continuity in caregiving and supervision (Arenas, 2017; Pong and Chen, 2010; Zeng and Xie, 2014). These effects are often strongest among grandmothers who assume primary caregiving responsibilities, although grandfathers' presence in co-resident households can further stabilize family resources. Yet, grandparents' presence may also generate resource competition, particularly in families with scarce economic means, reducing the financial and time investments available for children's education. Cross-national evidence from 32 OECD countries shows that co-residing grandparents are associated with lower academic performance among grandchildren (Marks, 2007).

This study adopts a multidimensional and multigenerational approach to human capital, linking children, parents, and grandparents to analyze how children's key educational transitions, over the life course, are associated with children's endowments (i.e., height and cognitive ability) before the first transition, parents' human capital (i.e., education, height, and cognitive ability), and grandparents' education. Our study situates early-life mechanisms of inequality within a broader life-course and multigenerational context, offering new evidence on how various dimensions of human capital interact to reproduce or mitigate educational disparities in a Latin American country like Mexico.

4. Data and Methods

4.1. Data

Data come from three waves of the Mexican Family Life Survey: the 2002 (MxFLS-1), 2005 (MxFLS-2), and 2009–2012 (MxFLS-3) waves. The MxFLS is a multidimensional, longitudinal survey that is representative of the national, urban/rural, and regional populations of Mexico in 2002. About 35,000 people, 8,400 households, and 150 communities were included in the initial sample. The survey's second and third waves had response rates of almost 90% for households and 80% for individuals. The MxFLS offers several advantages for this study. First, the data allow conducting a multigenerational analysis given that it collected socioeconomic and health characteristics of parents and grandparents, even if they did not reside in the home. Second, the MxFLS gathers data regarding many dimensions of human capital including education, height, and cognitive ability. Third, its longitudinal nature allows controlling for children's cognitive ability and height before the analyzed educational transitions occurred. Fourth, the MxFLS collects information about parents' and grandparents' co-residence status, which was used as controls.

4.2. Sample

Our eligible sample comprised children aged 11 years in 2002, anticipated to be in primary school at the baseline survey, expected to have completed upper secondary school (ages 18 to 19) by MxFLS-3, and residing in Mexico during the MxFLS-3 ($N = 1{,}011$). We chose this sample because this was the population "at risk" of having completed the transitions examined in this study between MxFLS-1 and MxFLS-3. Next, we dropped cases with missing values on the outcome variables ($N = 69$), leading to a final analytical sample of 942 observations.

To address possible misrepresentation of the sample, we conducted a logistic regression using the 1,011 children, with a binary outcome variable indicating whether the observation was included in the analytical sample (or not) as a function of sociodemographic characteristics measured in 2002, such as gender, age, household head's gender, education, indigenous background, household size, whether the household was located in a rural area, and if the dwelling had no drainage. We found that none of these characteristics were significant except for rural location and household head's education. Specifically, we found that children of rural origin had 2.9 times higher odds of being retained in the analytical sample ($p < .001$), and that one additional year of education of the household head decreased the odds of children being in the analytical sample by 10%.

4.3. Methods

Educational trajectories were examined as a sequential process, based on the traditional Model of School Continuation ("MSC") (Lucas, 2023; Mare, 1980) to examine the partial association between children's endowments, parents' and grandparents' human capital, and children's school continuation. This model provides a useful analytical framework to understand how educational inequality is shaped by social origins in key educational transitions through the life course.

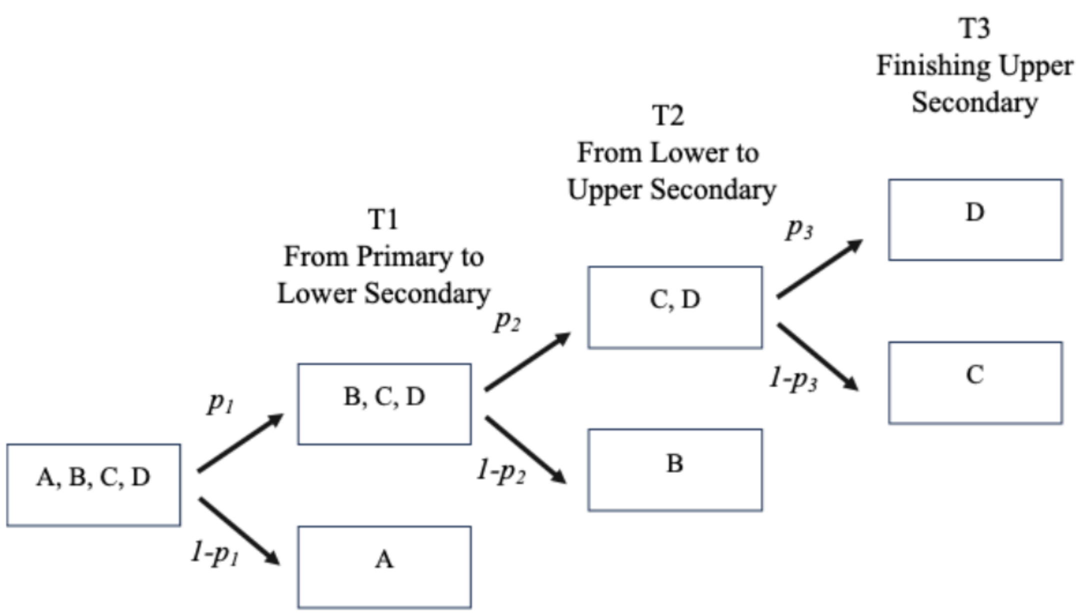

Figure 1: *Sequential logit model of educational transitions.*

We estimated a traditional sequential logit model using the *seqlogit* command in Stata 14 (see Figure 1), where the process of educational attainment is conceived as a chain of transitions. Children who finish upper secondary school (Group D) are required to have successfully completed lower secondary school and primary school, whereas those who transition from lower to upper secondary school (Groups C and D) are required to have successfully completed primary school. Group A includes children who did not complete primary school, Group B includes those who transitioned from primary to lower secondary school but not to upper secondary school, and Group C includes those who transitioned from lower to upper secondary school but did not graduate from upper secondary school.

The estimated conditional probability at each transition (p_1 for the transition from primary to lower secondary school, p_2 for the transition from lower to upper secondary school, and p_3 for the transition from upper secondary to graduation) was derived from the population at risk of making that transition. Following Buis (2011), the transitions were formalized in three different equations.

$$p_1 = \Pr(y \in \{B, C, D\} \mid \mathbf{x}) = F(\mathbf{x}\boldsymbol{\beta}_1) \tag{1}$$

$$p_2 = \Pr(y \in \{C, D\} \mid y \in \{B, C, D\}, \mathbf{x}) = F(\mathbf{x}\boldsymbol{\beta}_2) \tag{2}$$

$$p_3 = \Pr(y \in \{D\} \mid y \in \{C, D\}, \mathbf{x}) = F(\mathbf{x}\boldsymbol{\beta}_3) \tag{3}$$

where F is defined as follows:

$$F(u) = \frac{\exp(u)}{1 + \exp(u)} \tag{4}$$

The dependent variable in the analysis indicates whether a child underwent a given transition. We focused on three transitions: (1) whether the respondent transitioned from primary to lower secondary school (first transition – T1), (2) whether the respondent transitioned from lower to upper secondary school (second transition – T2), and (3) whether the respondent graduated from upper secondary school (third transition – T3). The right-hand side variables included child's characteristics (gender, age, height-for-age, and cognitive ability), parents' human capital (formal schooling, height, and cognitive ability), grandparents' education, and controls for household assets.

Children's demographic characteristics included sex at birth, which was an indicator equal to one if the respondent was male and zero otherwise, and age at baseline (2002) in years. We also included indicators of child health (height-for-age) and cognitive ability. Standing height was collected (in centimeters) for all household members using stadiometers. Cognitive test scores were estimated from short-form Raven's Progressive Matrices tests to assess abstract reasoning (Raven, 2000). This test exposed the respondent to a sequence of patterns known as matrices, each of which has a missing component. The respondent chose the missing component for each matrix from a pool of eight potential options. In the MxFLS, children between the ages of 5 and 12 answered the children's Raven test, which consisted of 18 matrices. We calculated the percentage of correct answers from the relevant instrument to obtain a composite measure of test performance and then calculated a z-score for the Raven test. In our empirical strategy, both children's height-for-age and Raven scores were treated as predetermined variables since these measures were collected prior to the first schooling transition. Using predetermined measures helps mitigate the problem of reverse causality. Because the Raven test was administered before children entered the educational transitions analyzed, schooling attainment could not have affected the test results. Thus, any observed relationship reflects how early-life characteristics are partially correlated with later educational transitions, not the reverse. However, while this temporal ordering rules out reverse causality, it does not establish causality. Our models estimate partial associations, not causal effects, since unobserved confounders, such as parental motivation, school quality, or local opportunities, may simultaneously influence both early cognitive ability and educational progression.

Parents' human capital included mothers' and fathers' formal education as categorical variables with three categories: incomplete primary school or less, completed primary school but not lower secondary school, and completed lower secondary school or more. In the MxFLS, the Raven test for respondents aged 13 or older consisted of 12 matrices. To obtain a composite measure of test performance, we calculated the percentage of correct answers for each individual and then estimated separate z-scores for mothers and fathers. We also used parental Raven scores at baseline (in 2002), before children's educational transitions occurred, as well as mothers' and fathers' height z-scores. A key feature of the MxFLS is that it provides information on grandparents' formal schooling independently of co-residence status. We generated an overall measure of grandfathers' education by calculating the average years of schooling completed by the two grandfathers, regardless of co-residence status or whether they were alive. In the same way, we generated an overall measure of grandmothers' education. Our main interest is in grandparents' education as a proxy for multigenerational resources that operate beyond direct caregiving channels. Accordingly, we include grandparental co-residence as a control variable[2]. Finally, we incorporated household wealth assessed at baseline (2002) as the logarithm of the total value of household assets, together with a binary variable indicating motor vehicle ownership. Additional controls included indicators for whether the mother was absent in all three waves, whether the father was absent in all three waves, and whether any grandparent was not co-residing in all three waves. We also included indicators for whether the mother was present in all three waves, whether the father was present in all three waves, and whether any grandparent was co-residing in all three waves.

5. Results

5.1. Descriptive Statistics

Table 1 presents descriptive statistics for a sample of children who were 11 years old in 2002 and participated in MxFLS-3. Among this cohort, 86% experienced T1, 51% completed T2, and only 10% reached T3. Conditional probabilities show that 59% of those who experienced T1 also completed T2, while only 20% of those who completed T2 advanced to T3 (see Table 1). The proportion of male children declined slightly along the educational trajectory, from 48% at T1 to 44% at T2. As expected, height-for-age and cognitive ability both increased as children progressed through their educational trajectories. In terms of parental human capital, children with taller, more educated, and cognitively stronger parents were more likely to reach higher educational stages. Similarly, children with better-educated grandparents also showed higher rates of educational progression.

5.2. Sequential Logit Estimates

Table 2 reports odds ratios for the three educational transitions T1, T2, and T3 under increasingly comprehensive models. All regressors in the sequential logit models are measured at baseline in 2002, prior to T1. Model 1 includes the child's characteristics and parents' Raven test scores, Model 2 adds parents' height, Model 3 incorporates parents' formal education, Model 4 adds grandparents' schooling, and Model 5, the most comprehensive specification, adds household wealth.

Our findings demonstrate that a child's predetermined T1 characteristics are highly correlated with educational advancement. Boys had approximately 30–35% lower odds than girls of transitioning from lower to upper secondary school. Age displayed a progressively positive correlation in T2 and T3, indicating the inherent pattern of educational progression across time.

Early childhood cognitive ability, evaluated through Raven scores before T1, exhibits a substantial positive correlation. In Models 1 and 2, a one-standard deviation increase in children's Raven score was associated with significant increases in the odds of completing each educational transition: the corresponding odds ratios

[2] In the Mexican context, grandparental co-residence is relatively uncommon. Evidence from comparable cohorts indicates that approximately 16% of children co-reside with at least one grandparent (Arenas, 2017) and co-residence with grandmothers is substantially more frequent than with grandfathers (Reynolds and Torres, 2023). Disaggregating co-residence by grandmother and grandfather therefore generates small cell sizes and reduces statistical power, particularly for grandfather-specific estimates. For this reason, our specifications include a single indicator for any grandparents' co-residence.

Table 1: *Descriptive statistics for children's schooling transitions, predetermined characteristics, parents' human capital, and grandparents' formal education.*

	All sample		**Conditional on T1**		**Conditional on T2**	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Child transitions						
From elementary to lower secondary school	0.86	0.35	–	–	–	–
From lower to upper secondary school	0.51	0.50	0.59	0.49	–	–
From upper secondary school to graduation	0.10	0.30	0.12	0.32	0.20	0.40
Child predetermined characteristics before T1						
Male	0.48	0.50	0.47	0.50	0.44	0.50
Age 2002	10.45	0.93	10.42	0.93	10.49	0.86
Height-for-age z-score 2002	27.75	3.50	28.02	3.33	28.28	3.11
Raven z-score 2002	0.01	1.01	0.14	0.96	0.30	0.88
Parents' and grandparents' human capital						
Raven scores						
Mother's Raven z-score	−0.06	0.91	0.01	0.93	0.20	0.96
Father's Raven z-score	0.04	0.95	0.10	0.98	0.23	1.05
Height						
Mother's height z-score	−0.04	1.01	0.02	0.94	0.11	0.96
Father's height z-score	−0.07	0.83	−0.05	0.83	−0.02	0.80
Mother's education						
No instruction and some elementary	0.34	0.48	0.27	0.44	0.18	0.39
Elementary-less than secondary	0.31	0.46	0.34	0.47	0.31	0.46
Secondary or more	0.34	0.47	0.39	0.49	0.51	0.50
Father's education						
No instruction and some elementary	0.30	0.46	0.22	0.42	0.15	0.36
Elementary-less than secondary	0.33	0.47	0.36	0.48	0.31	0.46
Secondary or more	0.38	0.48	0.41	0.49	0.55	0.50
Grandparents' education						
Grandmothers' average years of schooling	2.09	2.45	2.25	2.52	2.69	2.75
Grandfathers' average years of schooling	2.32	2.86	2.56	2.95	3.00	3.23
Household assets in 2002						
Ln household assets	11.05	1.80	11.19	1.73	11.38	1.71
= 1 if household owns a vehicle	0.30	0.46	0.34	0.47	0.44	0.50
N	942		821		485	

Source: Mexican Family Life Survey 2002, 2005, 2009.

Note: The sample included children who were: 11 years old in 2002 and interviewed in 2009 (50%), 10 or 11 in 2002 and interviewed in 2010 (39%), 9 to 11 in 2002 and interviewed in 2011 (7%), 8 to 10 in 2002 and interviewed in 2012 (1%), and 7 to 9 in 2002 and interviewed in 2013 (3%). These children were identified at baseline as being at risk of experiencing three school transitions yet had not undergone any of them. By MxFLS-3, these adolescents were expected to have completed the three educational transitions according to the years of schooling corresponding to their age.

Table 2: *Sequential logit odds ratios of school transitions* [1] *(N = 942)*

	Model 1			Model 2			Model 3		
	T1	T2	T3	T1	T2	T3	T1	T2	T3
Child's predetermined characteristics									
Male	0.69	0.67*	0.59**	0.69	0.67*	0.65	0.65	0.65*	0.63
	(0.15)	(0.11)	(0.15)	(0.15)	(0.11)	(0.16)	(0.15)	(0.11)	(0.16)
Age 2002	0.80	1.16	1.48**	0.81	1.17	1.52*	0.88	1.22*	1.57*
	(0.09)	(0.11)	(0.23)	(0.10)	(0.11)	(0.24)	(0.10)	(0.12)	(0.26)
Height-for-age z-score 2002	1.11*	1.08**	1.12**	1.09*	1.07*	1.10*	1.08	1.07*	1.10*
	(0.04)	(0.03)	(0.05)	(0.05)	(0.03)	(0.05)	(0.05)	(0.03)	(0.05)
Raven z-score 2002	1.95**	1.49**	1.74**	1.95**	1.49**	1.79**	1.70**	1.39**	1.75**
	(0.22)	(0.13)	(0.28)	(0.22)	(0.13)	(0.29)	(0.20)	(0.13)	(0.30)
Parents' and grandparents' human capital									
Raven scores									
Mother's Raven z-score	1.29	1.51**	1.09**	1.23	1.49**	1.03	1.01	1.28*	0.93
	(0.17)	(0.14)	(0.15)	(0.16)	(0.14)	(0.14)	(0.14)	(0.13)	(0.13)
Father's Raven z-score	1.18	1.16	0.97**	1.19	1.14	0.96	1.13	1.03	0.91
	(0.16)	(0.10)	(0.12)	(0.16)	(0.10)	(0.13)	(0.16)	(0.10)	(0.12)
Height									
Mother's height z-score	—	—	—	1.18	1.08	1.01	1.07	0.99	0.96
				(0.18)	(0.10)	(0.12)	(0.16)	(0.09)	(0.12)
Father's height z-score	—	—	—	1.01	1.11	1.28	0.91	1.06	1.28
				(0.15)	(0.11)	(0.19)	(0.14)	(0.11)	(0.20)
Mother's education (ref. some elementary or less)									
Elementary-less than secondary	—	—	—	—	—	—	2.03*	1.24	1.07
							(0.58)	(0.27)	(0.41)
Secondary or more	—	—	—	—	—	—	9.11**	2.15**	1.93
							(5.03)	(0.55)	(0.79)
Father's education (ref. some elementary or less)									
Elementary-less than secondary	—	—	—	—	—	—	2.40**	1.21	1.16
							(0.75)	(0.27)	(0.47)
Secondary or more	—	—	—	—	—	—	1.46	2.38**	1.45
							(0.59)	(0.60)	(0.56)

[1] See Table 1 for the analytical sample. T1 denotes the transition from elementary to lower secondary school, T2 the transition from lower to upper secondary school, and T3 the transition from upper secondary school to graduation. Corresponding standard errors are reported in parentheses. All standard errors account for robust heterogeneity and family-level cluster correlations. All models include controls for parents' co-residence.

Table 2. *Sequential logit odds ratios of school transitions* [(1)] *(N = 942), continued*

	Model 4			Model 5		
	T1	T2	T3	T1	T2	T3
Child's predetermined characteristics						
Male	0.64	0.65*	0.64	0.64	0.64*	0.62
	(0.15)	(0.11)	(0.17)	(0.15)	(0.11)	(0.17)
Age 2002	0.87	1.22*	1.58*	0.86	1.20	1.52*
	(0.10)	(0.12)	(0.27)	(0.10)	(0.12)	(0.25)
Height-for-age z-score 2002	1.09*	1.06*	1.10*	1.08*	1.06*	1.10
	(0.04)	(0.03)	(0.05)	(0.04)	(0.03)	(0.05)
Raven z-score 2002	1.70**	1.40**	1.72**	1.68**	1.38**	1.72**
	(0.21)	(0.13)	(0.29)	(0.21)	(0.13)	(0.30)
Parents' and grandparents' human capital						
Raven scores						
Mother's Raven z-score	1.00	1.28*	0.91	1.01	1.22	0.83
	(0.14)	(0.13)	(0.13)	(0.15)	(0.13)	(0.12)
Father's Raven z-score	1.12	1.03	0.90	1.09	1.01	0.88
	(0.17)	(0.10)	(0.12)	(0.17)	(0.10)	(0.12)
Height						
Mother's height z-score	1.05	0.98	0.95	1.04	0.96	0.91
	(0.16)	(0.09)	(0.12)	(0.15)	(0.09)	(0.12)
Father's height z-score	0.90	1.05	1.28	0.90	1.04	1.25
	(0.13)	(0.11)	(0.20)	(0.14)	(0.11)	(0.20)
Mother's education (ref. some elementary or less)						
Elementary-less than secondary	1.77	1.22	1.02	1.76	1.20	0.88
	(0.52)	(0.27)	(0.41)	(0.52)	(0.27)	(0.35)
Secondary or more	6.98**	2.14**	1.82	6.65**	2.00*	1.55
	(3.80)	(0.57)	(0.77)	(3.66)	(0.54)	(0.66)
Father's education (ref. some elementary or less)						
Elementary-less than secondary	2.31*	1.21	1.19	2.23*	1.15	1.15
	(0.73)	(0.27)	(0.50)	(0.71)	(0.26)	(0.49)
Secondary or more	1.33	2.35**	1.28	1.25	2.11**	1.19
	(0.57)	(0.60)	(0.53)	(0.54)	(0.55)	(0.50)
Grandmothers' average years of schooling	0.99	1.03	1.01	0.98	1.02	0.99
	(0.07)	(0.04)	(0.07)	(0.07)	(0.04)	(0.07)
Grandfathers' average years of schooling	1.20*	0.98	1.09	1.21*	0.99	1.09
	(0.09)	(0.04)	(0.06)	(0.09)	(0.04)	(0.06)
Household assets						
Ln household assets	—	—	—	1.05	1.07	1.13
				(0.08)	(0.06)	(0.10)
= 1 if household owns a vehicle	—	—	—	1.43	1.71*	1.89*
				(0.49)	(0.34)	(0.53)

** $p < .005$, * $p < .05$

[(1)] See Table 1 for the analytical sample. T1 denotes the transition from elementary to lower secondary school, T2 the transition from lower to upper secondary school, and T3 the transition from upper secondary school to graduation. Corresponding standard errors are reported in parentheses. All standard errors account for robust heterogeneity and family-level cluster correlations. All models include controls for parents' co-residence, and Models 4 and 5 additionally include controls for grandparents' co-residence. Models with the full set of grandparents' co-residence controls are reported in Table A1 in the appendix.

were about 1.95 for T1 (a nearly twofold increase), about 1.5 for T2, and 1.7 for T3. The persistent significance of the association between children's Raven scores and T3 completion indicates that what appears to be merit-based sorting at the final educational stage is rooted in cognitive advantages established early in life, which are themselves closely linked to family background and early investments. At the same time, individuals who reach the risk set for T3 are already highly positively selected on parental education, grandparental education, and early cognitive ability, resulting in restricted variance in family background measures.

Similarly, higher height-for-age (at baseline before T1) showed consistent positive associations. These relationships remain robust, even after adjusting for parental and grandparental human capital, as well as household wealth, underscoring the long-term association of early cognitive and physical development documented in prior research on intergenerational transmission of human capital (Behrman, 1996; Currie and Goodman, 2020; Torche and Echevarría, 2011).

We noted a positive partial association between parents' Raven scores and children's school transitions, with the mother's cognitive ability exhibiting a consistently stronger correlation with children's schooling transitions than the father's Raven scores. However, when adjusting for parental height, only the mother's Raven score retained significance in T2 across all model settings. A one-standard deviation increase in a mother's Raven score was correlated with a 49% increase in the odds of T2 prior to controlling for parental and grandparental education, and a 22% increase, though only marginally significant ($p < .1$), in the fully controlled model.

Parental education was the most important marker of children's educational advancement. Children whose mothers attained at least lower secondary school level had 6 to 9 times higher odds of advancing from primary to lower secondary schooling. The positive association with maternal education prevailed in the early stages, consistent with the literature that connects maternal education to nutritional status and early cognitive stimulation (Parke, 2013); whereas fathers' education gained relative significance in T2, reflecting perhaps the gendered pattern of parental involvement during adolescence (Behrman, 1996; Lam et al., 2012; Parke, 2013). When formal schooling was included, parental cognitive ability and height no longer had significant correlations, suggesting that the associations of these parental attributes with children's transitions are largely accounted for by parental formal education. It is worth noting that by including formal parental education in Models 3 to 5, parents' height and Raven odds ratios decreased in magnitude while maintaining comparable standard errors. This suggests that multicollinearity is not responsible for the loss of statistical significance of parental height and Raven when parental education is included in the model.

Extending the analysis to grandparents, Models 4 and 5 revealed enduring multigenerational associations concentrated at the earliest educational transition. Each additional year of grandfathers' average schooling was associated with approximately 20% higher odds of completing T1, even after controlling for parental human capital and household wealth. This association persists even when accounting for co-residence or survival, implying that multigenerational advantages may operate through channels that do not require physical proximity, such as financial transfers, cultural transmission, or social capital (Hällsten and Pfeffer, 2017; Li, 2023). This result indicates that grandfathers' education functions as an early gatekeeping resource, facilitating children's entry into continued schooling rather than influencing later transitions directly. Grandmothers' education, in contrast, showed no statistically significant association once parental human capital variables were included. This reinforces the idea that grandfathers' economic role could be stronger than grandmothers' as they are more likely to have been employed in formal sectors, accumulated pensions, or retained ownership of productive assets (Li, 2023; Razzu and Wambile, 2025; Zanasi and Sieben, 2022).

6. Discussion

This study examined how children's early endowments, parental human capital, and grandparental education jointly shape educational transitions in a Latin American country marked by deep inequality and limited social mobility: Mexico. By adopting a multigenerational and multidimensional perspective and using nationally representative longitudinal data, we sought to move beyond the traditional two-generation approach and to integrate measures of physical, cognitive, and educational human capital within a life-course framework. Our findings largely corroborate previous research on intergenerational transmission of human capital while extending it in several important ways that highlight the persistent influence of early-life endowments and extended kin networks in shaping educational mobility.

Consistent with previous research (Behrman, 1996; Currie and Goodman, 2020; Torche and Echevarría, 2011), our results show that children's early cognitive ability and height-for-age, measured before schooling transitions occurred, are strongly associated with educational progression across all stages, even after controlling for household assets and multigenerational human capital background. This highlights the persistent influence of early childhood development on long-term educational outcomes, reaffirming the critical role of early interventions in cognitive and physical development. Our research complements findings from Mexico (Cabrera-Hernández and Orraca-Romano, 2023), suggesting that early endowments relate not only to long-term educational outcomes but also to the probability of advancement through intermediate transitions. This underscores the cumulative nature of advantage and the potential long-term benefits of early interventions in nutrition and cognitive stimulation for reducing dropout and increasing secondary school completion in developing countries like Mexico.

Our findings reaffirm the central role of parental education in shaping children's educational trajectories (Haveman and Wolfe, 1995; Holmlund et al., 2011), with important nuances. Maternal education emerges as especially influential during the transition from primary to lower secondary school. This association appears stronger than that of paternal education, consistent with prior evidence on mothers' greater involvement, during early childhood, in nutrition, cognitive stimulation, and school engagement (Currie and Goodman, 2020; Parke, 2013). However, as children advance through the educational system, the relative importance of parental education, particularly maternal, diminishes, suggesting that household economic conditions and children's own attributes become increasingly salient (Wikle and Cullen, 2023). Paternal education becomes more relevant in later transitions, aligning with studies indicating fathers' greater involvement during adolescence (Behrman, 1996; Lam et al., 2012).

A central contribution of this study is the integration of a multigenerational lens in the study of educational stratification in a developing country in Latin America. Our findings indicate a consistent association between grandparental education, particularly that of grandfathers, and children's likelihood of advancing through early educational transitions. However, that this association is strongest at T1 should not be interpreted as evidence that multigenerational influences dissipate over time. Instead, it reflects the cumulative and selective nature of educational trajectories: children who survive to later transitions are already positively selected on both parental and grandparental characteristics, leaving limited variation in grandparental education among those at risk of T2 and T3.

Our results corroborate the "grand advantage" hypothesis (Hällsten and Pfeffer, 2017; Mare, 2011), which posits that resources and values from earlier generations continue to shape descendants' opportunities. The robustness of this association, even when accounting for grandparental co-residence or survival, suggests that multigenerational benefits are passed on through other means rather than merely through direct caregiving (Hällsten and Pfeffer, 2017; Li, 2023). In addition, these results support the notion that grandfathers' contributions may surpass those of grandmothers', predominantly through financial assistance rather than caregiving, due to their greater probability of having been formally employed, having received pensions, or having accumulated productive assets (Li, 2023; Razzu and Wambile, 2025; Zanasi and Sieben, 2022).

In contexts such as Mexico, where formal welfare systems are limited and family networks often serve as informal safety nets, these financial transfers can play a compensatory role, supporting school enrollment and progression during times of parental unemployment, illness, or temporary absence (Arenas, 2017). This pattern may reflect enduring gendered labor divisions in Latin America, where men's higher access to paid employment and retirement income allows them to contribute more materially to grandchildren's schooling. These results are consistent with findings from China and Europe (Chiang and Park, 2015; Li, 2023) showing that grandfathers' education contributes to grandchildren's schooling through material transfers, social prestige, and normative influence, rather than direct co-residence alone. In contrast, we find that grandmothers' education shows no statistically significant association once parental characteristics are included. This diverges from European studies highlighting grandmothers' emotional and cultural roles (Klokker and Jæger, 2022; Zanasi and Sieben, 2022), but aligns with Latin American evidence showing women's limited historical access to paid labor and consequently a reduced capacity to transmit economic resources (INEGI, 2025). These gendered multigenerational patterns underscore how structural inequalities in earlier cohorts continue to shape the reproduction of advantage.

Taken together, these results affirm the importance of analyzing educational mobility through both multidimensional and multigenerational extended family lenses. Early-life endowments, parental human capital, and grandparental education interact to reproduce advantage across generations. By incorporating grandparents into the analytic framework, we extend prior two-generation models (Björklund and Salvanes, 2011; Brown, 2006; Holmlund et al., 2011; Kalmijn, 1994b) and show that children's educational transitions are shaped by cumulative processes operating across three generations.

It is important to highlight that the limited role of parental and grandparental characteristics at the transition to upper secondary graduation should not be interpreted as evidence of a meritocratic educational system at higher levels. Rather, it reflects the cumulative and selective nature of educational trajectories in Mexico. By the time students reach the risk set for completing upper secondary school, they represent a highly advantaged subgroup that has already benefited from favorable family backgrounds and early-life endowments. Consequently, family resources operate primarily through early selection into and survival across prior transitions, leaving little residual variation to explain outcomes at the final stage. Apparent meritocratic patterns at higher levels thus mask deeply stratified processes that unfold earlier in the life course. Moreover, the persistence of early endowment associations even after accounting for parental and grandparental education underscores the need to integrate biological, cognitive, and socioeconomic factors in theories of social stratification.

Finally, we acknowledge the limitations of this study. First, while sequential logit models capture associations between family characteristics and educational transitions, they cannot fully establish causality. Second, measures of cognitive ability and height capture only partial aspects of early endowments; other unmeasured dimensions, such as emotional development or exposure to early childhood programs, may also play critical roles. Expanding these indicators in future surveys would strengthen the multidimensional framework. Third, although sequential logit models offer a robust framework for examining schooling transitions, the odds ratios across transitions are not directly comparable (Buis, 2011). Overall, these limitations do not diminish the main contributions of the study but rather point to promising directions for deepening the understanding of how multidimensional and multigenerational processes sustain educational inequality in Mexico and similar contexts. By leveraging high-quality longitudinal data with detailed measures of human capital across generations, this study provides strong empirical evidence for the complex interplay between multigenerational familial background and educational trajectories.

References

Alderman, H., J. R. Behrman, V. Lavy, and R. Menon (2001), "Child Health and School Enrollment: A Longitudinal Analysis." *The Journal of Human Resources*, 36, 185.

Almond, D. (2006), "Is the 1918 Influenza Pandemic Over? Long-Term Effects of In Utero Influenza Exposure in the Post-1940 U.S. Population." *Journal of Political Economy*, 114, 672–712.

Almond, D., J. Currie, and V. Duque (2018), "Childhood Circumstances and Adult Outcomes: Act II." *Journal of Economic Literature*, 56, 1360–1446.

Åman-Back, S. and K. Björkqvist (2004), "Parents' Assessments of How Much Time They Spend with Their Children at Different Ages." *Psychological Reports*, 94, 1025–1030.

Anderson, L. R., P. Sheppard, and C. W. S. Monden (2018), "Grandparent Effects on Educational Outcomes: A Systematic Review." *Sociological Science*, 5, 114–142.

Angel, J. L., W. Vega, and M. López-Ortega (2017), "Aging in Mexico: Population Trends and Emerging Issues." *The Gerontologist*, 57, 153–162.

Arenas, E. (2017), "Abuelos at home: Differential impact on children's education by family structure." *Research in Social Stratification and Mobility*, 52, 36–48.

Becker, G. S. and N. Tomes (1986), "Human Capital and the Rise and Fall of Families." *Journal of Labor Economics*, 4, S1–S39.

Behrman, J. R. (1996), "THE IMPACT OF HEALTH AND NUTRITION ON EDUCATION." *The World Bank Research Observer*, 11, 23–37.

Behrman, J. R., W. Schott, S. Mani, B. T. Crookston, K. Dearden, L. T. Duc, L. C. H. Fernald, A. D. Stein, Y. L. D. Team, and C. of C. G. P. (2017), "Intergenerational Transmission of Poverty and Inequality: Parental Resources and Schooling Attainment and Children's Human Capital in Ethiopia, India, Peru, and Vietnam." *Economic Development and Cultural Change*, 65, 657–697.

Björklund, A. and K. G. Salvanes (2011), "Chapter 3 — Education and Family Background: Mechanisms and Policies." In *Handbook of the Economics of Education*, volume 3, 201–247.

Bowles, S. and H. Gintis (2002), "The Inheritance of Inequality." *Journal of Economic Perspectives*, 16, 3–30.

Brown, P. H. (2006), "Parental Education and Investment in Children's Human Capital in Rural China." *Economic Development and Cultural Change*, 54, 759–789.

Buis, M. L. (2011), "The consequences of unobserved heterogeneity in a sequential logit model." *Research in Social Stratification and Mobility*, 29, 247–262.

Cabrera-Hernández, F. J. and P. P. Orraca-Romano (2023), "Inequality in the Household: How Parental Income Matters for the Long-Term Treatment of Healthy and Unhealthy Siblings." *Journal of Family and Economic Issues*, 44, 674–692.

Card, D. (1999), "Chapter 30 — The Causal Effect of Education on Earnings." In *Handbook of Labor Economics*, volume 3, 1801–1863.

Chacón-Montoya, B. N. and E. Aguayo-Téllez (2023), "Effect of maternal education and employment on children's educational attainment in Mexico." *SN Social Sciences*, 3, 171.

Chan, T. W. and V. Boliver (2013), "The Grandparents Effect in Social Mobility." *American Sociological Review*, 78, 662–678.

Chiang, Y.-L. and H. Park (2015), "Do grandparents matter? A multigenerational perspective on educational attainment in Taiwan." *Social Science Research*, 51, 163–173.

CONEVAL (2018), "Medición de Pobreza 2008–2018." URL https://www.coneval.org.mx/Medicion/PublishingImages/Pobreza_2018/Serie_2008-2018.jpg.

Connelly, R. and Z. Zheng (2003), "Determinants of school enrollment and completion of 10 to 18 year olds in China." *Economics of Education Review*, 22, 379–388.

Creighton, M. J. and H. Park (2010), "Closing the Gender Gap: Six Decades of Reform in Mexican Education." *Comparative Education Review*, 54, 513–537.

Creighton, M. J., H. Park, and G. M. Teruel (2009), "The Role of Migration and Single Motherhood in Upper Secondary Education in Mexico." *Journal of Marriage and Family*, 71, 1325–1339.

Currie, J. and J. Goodman (2020), "The Economics of Education." In *Journal of the American Medical Association 290 2003*, 239–248.

Fischer, C. S., M. Hout, M. S. Jankowski, S. R. Lucas, A. Swidler, and K. Voss (2020), *Inequality by Design: Cracking the Bell Curve Myth*. Princeton University Press.

Fleischhauer, K.-J. (2007), "A Review of Human Capital Theory: Microeconomics." *SSRN Electronic Journal*.

Flouri, E. and A. Buchanan (2004), "Early father's and mother's involvement and child's later educational outcomes." *British Journal of Educational Psychology*, 74, 141–153.

Glewwe, P. and E. M. King (2001), "The Impact of Early Childhood Nutritional Status on Cognitive Development: Does the Timing of Malnutrition Matter?" *The World Bank Economic Review*, 15, 81–113.

Gould, G. S., A. Havard, L. L. Lim, T. P. S. in P. E. Group, and R. Kumar (2020), "Exposure to Tobacco, Environmental Tobacco Smoke and Nicotine in Pregnancy: A Pragmatic Overview of Reviews of Maternal and Child Outcomes, Effectiveness of Interventions and Barriers and Facilitators to Quitting." *International Journal of Environmental Research and Public Health*, 17, 2034.

Guryan, J., E. Hurst, and M. Kearney (2008), "Parental Education and Parental Time with Children." *Journal of Economic Perspectives*, 22, 23–46.

Hällsten, M. and F. T. Pfeffer (2017), "Grand Advantage." *American Sociological Review*, 82, 328–360.

Haveman, R. and B. Wolfe (1995), "The Determinants of Children's Attainments: A Review of Methods and Findings." *Journal of Economic Literature*, 33, 1829–1878.

Holmlund, H., M. Lindahl, and E. Plug (2011), "The Causal Effect of Parents' Schooling on Children's Schooling: A Comparison of Estimation Methods." *Journal of Economic Literature*, 49, 615–651.

INEGI (2010), "Mujeres y hombres en México 2010." URL https://www.inegi.org.mx/contenidos/productos/prod_serv/contenidos/espanol/bvinegi/productos/integracion/sociodemografico/mujeresyhombres/2010/702825494193.pdf.

INEGI (2024), "Tasa de abandono escolar por entidad federativa según nivel educativo, ciclos escolares seleccionados de 2000/2001 a 2023/2024." URL https://www.inegi.org.mx/app/tabulados/interactivos/?pxq=9171df60-8e9e-4417-932e-9b80593216ee.

INEGI (2025), "Estadísticas a Propósito del Día Internacional de las Trabajadoras del Hogar." URL https://www.inegi.org.mx/app/saladeprensa/noticia/8950.

Jæger, M. M. (2012), "The Extended Family and Children's Educational Success." *American Sociological Review*, 77, 903–922.

Jere, B. and J. Hoddinott (2001), "Program Evaluation with Unobserved Heterogeneity and Selective Implementation: The Mexican Progresa Impact on Child Nutrition." *SSRN Electronic Journal*.

Johnson, W. (2010), "Understanding the Genetics of Intelligence." *Current Directions in Psychological Science*, 19, 177–182.

Kalmijn, M. (1994a), "Assortative Mating by Cultural and Economic Occupational Status." *American Journal of Sociology*, 100, 422–452.

Kalmijn, M. (1994b), "Mother's Occupational Status and Children's Schooling." *American Sociological Review*, 59, 257.

Klokker, R. H. and M. M. Jæger (2022), "Family background and cultural lifestyles: Multigenerational associations." *Poetics*, 92, 101662.

Korenman, S. and C. Winship (2000), "Meritocracy and Economic Inequality." In *Meritocracy and Economic Inequality*, 137–178.

Korupp, S. E., H. B. G. Ganzeboom, and T. van der Lippe (2002), "Do Mothers Matter? A Comparison of Models of the Influence of Mothers' and Fathers' Educational and Occupational Status on Children's Educational Attainment." *Quality and Quantity*, 36, 17–42.

LaFave, D. and D. Thomas (2017), "Height and cognition at work: Labor market productivity in a low income setting." *Economics & Human Biology*, 25, 52–64.

Lam, C. B., S. M. McHale, and A. C. Crouter (2012), "Parent–Child Shared Time From Middle Childhood to Late Adolescence: Developmental Course and Adjustment Correlates." *Child Development*, 83, 2089–2103.

Lankes, J. (2022), "Negotiating "Impossible" Ideals: Latent Classes of Intensive Mothering in the United States." *Gender & Society*, 36, 677–703.

Li, A. (2023), "Which Grandparents? Multigenerational Education Associations by Grandparent Gender and Paternal versus Maternal Side." *Socius: Sociological Research for a Dynamic World*, 9, 23780231231184221.

Lucas, S. R. (2023), "Mare's model of education transitions: Reflections on a powerful continuing resource for understanding." *Research in Social Stratification and Mobility*, 88, 100807.

Maralani, V. (2023), "Rob Mare's legacy: The demography of inequality and social mobility." *Research in Social Stratification and Mobility*, 88, 100808.

Mare, R. D. (1980), "Social Background and School Continuation Decisions." *Journal of the American Statistical Association*, 75, 295–305.

Mare, R. D. (2011), "A Multigenerational View of Inequality." *Demography*, 48, 1–23.

Mare, R. D. (2014), "Multigenerational aspects of social stratification: Issues for further research." *Research in Social Stratification and Mobility*, 35, 121–128.

Mare, R. D. and H.-C. Chang (2006), “Mobility and Inequality.” In *Mobility and Inequality*, 195–231.

Marks, G. N. (2007), “Detrimental Effects of Living with a Grandparent: Cross-National Evidence.” *Journal of Comparative Family Studies*, 38, 169–178.

Marks, G. N. (2022), “Cognitive ability has powerful, widespread and robust effects on social stratification: Evidence from the 1979 and 1997 US National Longitudinal Surveys of Youth.” *Intelligence*, 94, 101686.

Martorell, R. and T. González-Cossío (1987), “Maternal nutrition and birth weight.” *American Journal of Physical Anthropology*, 30, 195–220.

McLanahan, S. and C. Percheski (2008), “Family Structure and the Reproduction of Inequalities.” *Annual Review of Sociology*, 34, 257–276.

Milkie, M. A., K. M. Nomaguchi, and K. E. Denny (2015), “Does the Amount of Time Mothers Spend With Children or Adolescents Matter?” *Journal of Marriage and Family*, 77, 355–372.

OECD (2012), “México – Nota País – Resultados de PISA 2012.” URL https://www.oecd.org/content/dam/oecd/en/about/programmes/edu/pisa/publications/national-reports/pisa-2012/country-specific-overviews/PISA-2012-results-mexico-ESP.pdf.

OECD (2013), “Education Policy Outlook: Mexico.” URL http://www.oecd.org/mexico/EDUCATION%20POLICY%20OUTLOOK%20MEXICO_EN.pdf.

OECD (2024), “Education at a Glance 2024.”

Parke, R. D. (2013), “Gender Differences and Similarities in Parental Behavior.” In *Gender and Parenthood: Biological and Social Scientific Perspectives* (W. B. Wilcox and K. K. Kline, eds.), 120–163, Columbia University Press.

Parker, S. W., L. Rubalcava, and G. Teruel (2007), “Chapter 62 — Evaluating Conditional Schooling and Health Programs.” In *Handbook of Development Economics*, volume 4, 3963–4035.

Parker, S. W. and P. E. Todd (2017), “Conditional Cash Transfers: The Case of Progresa/Oportunidades.” *Journal of Economic Literature*, 55, 866–915.

Perkins, J. M., S. V. Subramanian, G. D. Smith, and E. Özaltin (2016), “Adult height, nutrition, and population health.” *Nutrition Reviews*, 74, 149–165.

Pilishvili, T., R. Gierke, K. E. Fleming-Dutra, J. L. Farrar, N. M. Mohr, D. A. Talan, A. Krishnadasan, K. K. Harland, H. A. Smithline, P. C. Hou, L. C. Lee, S. C. Lim, G. J. Moran, E. Krebs, M. T. Steele, D. G. Beiser, B. Faine, J. P. Haran, U. Nandi, and V. E. among H. P. S. Team (2021), “Effectiveness of mRNA Covid-19 Vaccine among U.S. Health Care Personnel.” *The New England Journal of Medicine*, 385, NEJMoa2106599.

Planillo, A. H. (2004), “Abuelos, abuelas, nietos y nietas. El punto de vista infantil.” *Indivisa, Boletín de Estudios e Investigación*, 5, 35–42.

Pong, S. and V. W. Chen (2010), “Co-resident Grandparents and Grandchildren’s Academic Performance in Taiwan.” *Journal of Comparative Family Studies*, 41, 111–129.

Raven, J. (2000), “The Raven’s Progressive Matrices: Change and Stability over Culture and Time.” *Cognitive Psychology*, 41, 1–48.

Razzu, G. and A. Wambile (2025), “Three-generation educational mobility in six African countries: The role of grandparents.” *World Development*, 195, 107114.

Reynolds, S. and J. Torres (2023), "Grandchild Coresidence: Prevalence and Trends among Older Adults in Mexico." *SSRN Electronic Journal*.

Rocha, M. M. and C. R. Romero (2003), "Inequalities in Mexican Children's Schooling*." *Journal of Comparative Family Studies*, 34, 435–454.

Schultz, T. P. (2002), "Why Governments Should Invest More to Educate Girls." *World Development*, 30, 207–225.

Shavit, Y. and H. P. Blossfeld (1994), "Persistent Inequality: Changing Educational Attainment in Thirteen Countries." *British Journal of Educational Studies*, 42, 413.

Solon, G. (2018), "What Do We Know So Far about Multigenerational Mobility?" *The Economic Journal*, 128, F340–F352.

Song, X. (2016), "Diverging Mobility Trajectories: Grandparent Effects on Educational Attainment in One- and Two-Parent Families in the United States." *Demography*, 53, 1905–1932.

Strauss, J. and D. Thomas (1995), "Chapter 34 — Human resources: Empirical modeling of household and family decisions." In *Handbook of Development Economics*, volume 3, 1883–2023.

Strauss, J. and D. Thomas (1998), "Health, Nutrition, and Economic Development." *Journal of Economic Literature*, 36, 766–817.

Strauss, J. and D. Thomas (2007), "Chapter 54 — Health over the Life Course." In *Handbook of Development Economics*, volume 4, 3375–3474.

Thomas, D., J. Strauss, and M.-H. Henriques (1990), "Child survival, height for age and household characteristics in Brazil." *Journal of Development Economics*, 33, 197–234.

Torche, F. (2010), "Economic Crisis and Inequality of Educational Opportunity in Latin America." *Sociology of Education*, 83, 85–110.

Torche, F. and G. Echevarría (2011), "The effect of birthweight on childhood cognitive development in a middle-income country." *International Journal of Epidemiology*, 40, 1008–1018.

Victora, C. G., L. Adair, C. Fall, P. C. Hallal, R. Martorell, L. Richter, H. S. Sachdev, for the M. Group, and C. U. S. (2008), "Maternal and child undernutrition: consequences for adult health and human capital." *The Lancet*, 371, 340–357.

Wikle, J. and C. Cullen (2023), "The Developmental Course of Parental Time Investments in Children from Infancy to Late Adolescence." *Social Sciences*, 12, 92.

World Bank (2025), "Worldbank Gini Index." URL https://data.worldbank.org/indicator/SI.POV.GINI.

Zanasi, F. and I. Sieben (2022), "Income and educational differences in grandparental childcare: evidence from English grandmothers and grandfathers." *Community, Work & Family*, 27, 188–207.

Zeng, Z. and Y. Xie (2014), "The Effects of Grandparents on Children's Schooling: Evidence From Rural China." *Demography*, 51, 599–617.

Zhang, F. and Y. Wu (2021), "Living with grandparents: Multi-generational families and the academic performance of grandchildren in China." *Chinese Journal of Sociology*, 7, 413–443.

A. Appendix Tables

Table A1: *Full models showing odds ratios of school transitions from elementary to lower secondary school, lower to upper secondary school, and upper secondary school to graduation (N = 942)*

	Model 4			**Model 4a**		
	T1	T2	T3	T1	T2	T3
Child's characteristics at baseline						
Male	0.64	0.65*	0.64	0.64	0.65*	0.61
	(0.15)	(0.11)	(0.17)	(0.15)	(0.11)	(0.16)
Age	0.87	1.22*	1.58*	0.87	1.23*	1.59*
	(0.10)	(0.12)	(0.27)	(0.11)	(0.12)	(0.28)
Z-score height for age	1.09*	1.06*	1.10*	1.09*	1.07*	1.11*
	(0.04)	(0.03)	(0.05)	(0.04)	(0.03)	(0.05)
Z-score Raven	1.70**	1.40**	1.72**	1.71**	1.40**	1.66**
	(0.21)	(0.13)	(0.29)	(0.21)	(0.13)	(0.28)
Parents' and grandparents' human capital						
Mother's Raven z-score	1.00	1.28*	0.91	0.99	1.28*	0.92
	(0.14)	(0.13)	(0.13)	(0.14)	(0.13)	(0.14)
Father's Raven z-score	1.12	1.03	0.90	1.12	1.03	0.88
	(0.17)	(0.10)	(0.12)	(0.17)	(0.10)	(0.12)
Mother's height z-score	1.05	0.98	0.95	1.05	0.99	0.94
	(0.16)	(0.09)	(0.12)	(0.16)	(0.09)	(0.12)
Father's height z-score	0.90	1.05	1.28	0.89	1.04	1.31*
	(0.13)	(0.11)	(0.20)	(0.13)	(0.11)	(0.20)

Table A1 continues on the next page.

Table A1. *Continued: Models 4 and 4a*

	Model 4			Model 4a		
	T1	T2	T3	T1	T2	T3
Mother's education (ref. some elementary or less)						
Elementary-less than secondary	1.77	1.22	1.02	1.78	1.21	1.10
	(0.52)	(0.27)	(0.41)	(0.53)	(0.27)	(0.44)
Secondary or more	6.98**	2.14**	1.82	7.20**	2.15**	1.91
	(3.80)	(0.57)	(0.77)	(3.88)	(0.57)	(0.81)
Father's education (ref. some elementary or less)						
Elementary-less than secondary	2.31*	1.21	1.19	2.30*	1.20	1.28
	(0.73)	(0.27)	(0.50)	(0.72)	(0.27)	(0.54)
Secondary or more	1.33	2.35**	1.28	1.32	2.31**	1.39
	(0.57)	(0.60)	(0.53)	(0.56)	(0.59)	(0.57)
Grandmothers' average years of schooling	0.99	1.03	1.01	0.99	1.02	1.00
	(0.07)	(0.04)	(0.07)	(0.07)	(0.04)	(0.07)
Grandfathers' average years of schooling	1.20*	0.98	1.09	1.20*	0.99	1.09
	(0.09)	(0.04)	(0.06)	(0.09)	(0.04)	(0.06)
Grandparents co-resident in 3 waves	1.23	1.25	1.05	—	—	—
	(0.79)	(0.47)	(0.75)			
Grandparents not co-resident in 3 waves	0.84	1.28	2.60	—	—	—
	(0.35)	(0.36)	(1.44)			
Grandfathers co-resident in 3 waves	—	—	—	1.07	1.45	0.72
				(1.24)	(0.75)	(0.67)
Grandfathers not co-resident in 3 waves	—	—	—	1.31	1.36	1.36
				(0.56)	(0.37)	(0.62)
Grandmothers co-resident in 3 waves	—	—	—	1.90	0.77	2.78
				(2.08)	(0.34)	(1.98)
Grandmothers not co-resident in 3 waves	—	—	—	0.87	0.96	3.06*
				(0.39)	(0.26)	(0.38)

Source: Mexican Family Life Survey 2002, 2005, 2009.

Note: The sample included children who were 11 years old in 2002 and interviewed in 2009 (50%); 10 or 11 in 2002 and interviewed in 2010 (39%); 9 to 11 in 2002 and interviewed in 2011 (7%); 8 to 10 in 2002 and interviewed in 2012 (1%); and 7 to 9 in 2002 and interviewed in 2013 (3%). These children were identified at baseline as being at risk of experiencing three school transitions and had not yet undergone any of them. By MxFLS-3, these adolescents were expected to have completed the three educational transitions according to the years of schooling corresponding to their age. Corresponding standard errors are reported in parentheses. All standard errors account for robust heterogeneity and family-level cluster correlations. All models include controls for parents' co-residence.

Table A1. *Continued: Models 5 and 5a*

	Model 5			Model 5a		
	T1	T2	T3	T1	T2	T3
Child's characteristics at baseline						
Male	0.64	0.64*	0.62	0.65	0.64*	0.59
	(0.15)	(0.11)	(0.17)	(0.15)	(0.11)	(0.16)
Age	0.86	1.20	1.52*	0.86	1.20	1.53*
	(0.10)	(0.12)	(0.25)	(0.10)	(0.12)	(0.26)
Z-score height for age	1.08*	1.06*	1.10	1.08*	1.06*	1.11*
	(0.04)	(0.03)	(0.05)	(0.04)	(0.03)	(0.06)
Z-score Raven	1.68**	1.38**	1.72**	1.68**	1.38**	1.67**
	(0.21)	(0.13)	(0.30)	(0.21)	(0.13)	(0.29)
Parents' and grandparents' human capital						
Mother's Raven z-score	1.01	1.22	0.83	1.00	1.23*	0.85
	(0.15)	(0.13)	(0.12)	(0.15)	(0.13)	(0.13)
Father's Raven z-score	1.09	1.01	0.88	1.09	1.01	0.86
	(0.17)	(0.10)	(0.12)	(0.16)	(0.10)	(0.12)
Mother's height z-score	1.04	0.96	0.91	1.04	0.96	0.90
	(0.15)	(0.09)	(0.12)	(0.15)	(0.09)	(0.12)
Father's height z-score	0.90	1.04	1.25	0.90	1.03	1.27
	(0.14)	(0.11)	(0.20)	(0.14)	(0.11)	(0.20)

Table A1 continues on the next page.

Table A1. *Continued: Models 5 and 5a (concluded)*

	Model 5			Model 5a		
	T1	T2	T3	T1	T2	T3
Mother's education (ref. some elementary or less)						
Elementary-less than secondary	1.76	1.20	0.88	1.76	1.18	0.94
	(0.52)	(0.27)	(0.35)	(0.53)	(0.27)	(0.38)
Secondary or more	6.65**	2.00*	1.55	6.89**	2.00*	1.63
	(3.66)	(0.54)	(0.66)	(3.75)	(0.54)	(0.70)
Father's education (ref. some elementary or less)						
Elementary-less than secondary	2.23*	1.15	1.15	2.24*	1.14	1.22
	(0.71)	(0.26)	(0.49)	(0.70)	(0.26)	(0.52)
Secondary or more	1.25	2.11**	1.19	1.23	2.07**	1.31
	(0.54)	(0.55)	(0.50)	(0.53)	(0.54)	(0.54)
Grandmothers' average years of schooling	0.98	1.02	0.99	0.98	1.01	0.99
	(0.07)	(0.04)	(0.07)	(0.07)	(0.04)	(0.07)
Grandfathers' average years of schooling	1.21*	0.99	1.09	1.21*	0.99	1.09
	(0.09)	(0.04)	(0.06)	(0.09)	(0.04)	(0.06)
Grandparents co-resident in 3 waves	1.26	1.16	0.92	—	—	—
	(0.81)	(0.44)	(0.66)			
Grandparents not co-resident in 3 waves	0.91	1.27	2.53	—	—	—
	(0.38)	(0.37)	(1.45)			
Grandfathers co-resident in 3 waves	—	—	—	1.01	1.57	0.77
				(1.15)	(0.81)	(0.71)
Grandfathers not co-resident in 3 waves	—	—	—	1.36	1.31	1.30
				(0.58)	(0.35)	(0.63)
Grandmothers co-resident in 3 waves	—	—	—	2.00	0.67	2.40
				(2.19)	(0.30)	(1.81)
Grandmothers not co-resident in 3 waves	—	—	—	0.85	0.96	3.08*
				(0.38)	(0.25)	(0.38)
Household assets						
Ln household assets	1.05	1.07	1.13	1.05	1.07	1.10
	(0.08)	(0.06)	(0.10)	(0.07)	(0.06)	(0.10)
= 1 if household owns a vehicle	1.43	1.71*	1.89*	1.48	1.72*	1.93*
	(0.49)	(0.34)	(0.53)	(0.51)	(0.34)	(0.55)

** $p < .005$, * $p < .05$

(1) See Note in Table A1 for the analytical sample and definitions of T1, T2, and T3. Corresponding standard errors are reported in parentheses. All standard errors account for robust heterogeneity and family-level cluster correlations. All models include controls for parents' co-residence.