Intergenerational educational mobility in Nuevo León: assortative mating analysis

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Abstract

This study uses an ordered logit model to examine how the educational assortative mating of parents influences the academic achievement of their children in the state of Nuevo León, Mexico. The results show that, compared to parents with only a primary education or no education, children whose mother has a higher level of education than their father are between 12 and 15 percentage points more likely to attain a professional degree. When the father has a higher level of education, the probability increases by between 5.6 and 10.5 percentage points compared to the same group. These findings highlight the need for policies that focus on households with low educational capital in order to equalize opportunities and promote social mobility.

Keywords: assortative mating; educational mobility; social mobility; human capital; intergenerational transmission.

1. INTRODUCTION

Social mobility implies changes in people's socioeconomic status related to education, employment or income (Grajales and Monroy-Gómez-Franco, 2018). Mobility in terms of education is a good predictor of individual well-being and income in modern societies (Assaad *et al.*, 2019; Cabrera, 2016; Psacharopoulos and Patrinos, 2018). For instance, in Latin America, mobility is higher in countries with more investment in education (Behrman *et al.*, 2001).

Children from households where the parents have low education levels face more obstacles to continuing their studies (Assaad *et al.*, 2019; Székely, 2015), while parents with higher education levels reduce dropout rates and promote university enrollment (Alcaraz, 2020; Cabrera, 2016). The transmission of educational capital may vary by gender, with it mostly being men who impact their children's educational attainment, although there is no consensus in this respect (Corti and Scherer, 2022; Erát, 2021; Skopek and Leopold, 2020).

Specialized literature generally analyzes this transmission by considering the education of the parent with the higher level of education (Erikson, 1984). The correlation of parents' education is analyzed from the perspective of assortative mating, differentiating between homogamy (similar education) and heterogamy (different education), including hypergamy and hypogamy, depending on who has the higher level of education, with hypergamy being when the father has the higher level of education and hypogamy when the mother has the higher level of education (Esteve and McCaa, 2007; Huo and Chen, 2022). This approach delves deeper into the impact of the combination of

the educational backgrounds of both parents on their children's social mobility (Alcaraz, 2020; Mare, 1996; Schneebaum *et al.*, 2015; Torche, 2010).

Assortative mating addresses various questions about intergenerational or intragenerational mobility and, from an economic point of view, partner selection is not random and responds to factors such as educational level, ethnicity, religion, occupation and social class, which directly influence the human capital available in the home (Huo and Chen, 2022; Edwards and Roff, 2016).

Intergenerational educational mobility explains the reproduction of inequality and how structural disadvantages limit human capital development, restrict opportunities and reinforce poverty cycles (De Hoyos *et al.*, 2010). In recent decades, educational mobility in Mexico has been limited and short-lived for lower socioeconomic strata (CEEY, 2019). Progress has been made in primary and secondary education; however, gaps persist at the high school and higher education levels. Only 5% of young people whose parents who have no education go on to attend university, compared to 64% of those whose parents attended university (Fernández and Martínez, 2024).

Mexico's education spending as a percentage of gross domestic product (GDP) is below international recommendations, despite its importance in reducing inequalities and promoting early development (Llanos and Beltrán, 2023). Education policies do not prioritize early childhood (Blanco, 2024), ignoring its benefits in relation to academic performance, productivity, development of skills and reduction of inequalities (BID, 2019; Heckman, 2008). Furthermore, spending on early childhood has accounted for only 0.03% of GDP since 2018 (Llanos and Beltrán, 2023).

Thus, educational mobility in Mexico is limited and unequal given the evidence of unequal educational opportunities and the fact that economic inequalities continue to affect access to and continuity of education. Young people and children will comprise tomorrow's workforce so policies that focus on the most vulnerable are essential to achieving equal opportunities (Blanco, 2021 and 2024), avoiding a return to the poverty trap and mitigating the intergenerational persistence of inequality.

In Latin America, intergenerational educational mobility increased in lower socioeconomic strata, although it has remained stagnant among higher socioeconomic groups (Azevedo and Bouillon, 2011). In Mexico, research on educational assortative mating and mobility among children is limited. In contrast to the region, there is evidence of educational mobility in homogamy (Muñoz, 2024) and a decrease in hypergamy (Esteve and McCaa, 2007).

In this context, the state of Nuevo León is of particular interest. Despite its high level of schooling, educational gaps based on household socioeconomic level persist (Solís, 2022) and are exacerbated by adverse experiences such as child labor or teenage pregnancy. Research has shown that intergenerational educational mobility in the state continues to depend on social origin (Solís, 2022). Additionally, the Monterrey metropolitan area has historically attracted migration and educational expansion, however, it also exhibits high territorial inequalities and persistent gaps in access to higher education (Solís *et al.*, 2007). This situation of high educational attainment and internal structural barriers makes Nuevo León an interesting region in which to analyze how the educational mating of parents influences the educational opportunities of their children.

This study analyzes the educational attainment of children based on assortative mating, using data from the 2021 Social Mobility Survey in Nuevo León (CEEY, 2022). The empirical analysis shows the effects of combining the education of both parents, rather than analyzing their isolated contribution using predictive models. The main interest lies in observing whether homogamy in basic education remains predominant in the state and to what extent these

family structures limit educational mobility. The study also examines whether hypogamy and hypergamy are associated with an increased probability of children achieving higher levels of education. This approach enables us to identify differential patterns of human capital transmission based on the educational structure of the household.

To evaluate these hypotheses, an ordered logit model was used with educational assortative mating as the explanatory variable. The results indicate that children with at least one parent who has completed upper secondary or higher education are more likely to pursue professional studies than children with parents who only completed basic education, especially if the mother has a higher level of education. Additionally, conditions such as child labor or teenage motherhood negatively affect educational attainment.

The article is structured as follows: the second section presents a literature review; the third section presents the data and methodology; the fourth section presents the results; and, finally, the fifth section discusses the conclusions.

2. LITERATURE REVIEW

Social mobility shows how a person's socioeconomic variables change in relation to their parents or throughout their life (Maralani, 2023). Intergenerational mobility represents observable changes of an individual in relation to their specific origin, while intragenerational mobility reflects changes throughout an individual's life (Vélez *et al.*, 2012).

Various studies indicate that differences in educational attainment between parents and children may be associated with factors such as occupation, family size, social status, inherited wealth and, more recently, educational mating (Ermisch *et al.*, 2006; Mare, 2000). Thus, mobility is analyzed as a reflection of the structural conditions that each social group faces in order to access better opportunities (Torche, 2010).

Most studies on intergenerational effects use longitudinal data, mostly with two-generation models, though some incorporate grandparents to detect effects not apparent in the first generational leap (Ferrie *et al.*, 2021; Mare, 1996; Mare and Song, 2023). The most commonly used variables in the analysis of social mobility are income, education, occupation and wealth. However, there is also literature that includes perceived or subjective mobility (Vélez *et al.*, 2012).

Education is a key factor in promoting social mobility, but access is not equal for all and depends on household conditions. Families with fewer resources face greater restrictions when it comes to investing in education, which can perpetuate their situation of poverty (Barham *et al.*, 1995; Berti, 2001; De Hoyos *et al.*, 2010). Therefore, poverty traps can be explained by low human capital accumulation from childhood.

While the literature focuses on individual returns to education (Card, 1999), it also examines how parental education influences their children's educational path (Mare, 1996; Torche, 2010). According to the principle of dominance, studies typically consider the educational level of the parent with the highest level of education (Erikson, 1984), while some examine the influence of the father or mother separately and consider the sex of the child (Alcaraz, 2020; Schneebaum *et al.*, 2015). Intergenerational educational social mobility occurs when children achieve higher educational levels than their parents (Maralani, 2023).

The increase in women's education has transformed generations, impacting birth rates, the number of children, children's health, the age at which women become mothers, household income, human capital and children's education (Becker and Lewis, 1973; Currie and Moretti, 2003; Maralani, 2023; Mare and Maralani, 2006). The

traditional formula of Becker and Tomes (1979) is challenged by female labor participation, educational expansion and reduced gender differences in education.

Based on the foregoing, the concept of assortative mating in education becomes relevant. This is defined as homogamy when the parents have similar levels of education. hypergamy when the father has a higher level of education and hypogamy if the mother has the higher level of education. While factors such as ethnic origin, cultural identity and location also influence couple formation (McPherson *et al.*, 2001; Robles, 2024), studying them in relation to the transmission of human capital to children is also important (Kremer, 1997; Mare, 2000; Schwartz, 2010).

Educational mating is not random. Couples tend to have similar characteristics, with education being one of the most stable factors (Huo and Chen, 2022). In various contexts, it has been observed that women with higher levels of education have been observed to pair with equally or more educated men (Currie and Moretti, 2003). These dynamics influence the opportunities passed on to children and can reinforce or weaken patterns of social inequality (Davia and Legazpe, 2017; Fernández *et al.*, 2005).

The literature consulted also suggests that couples with homogamy at low levels of education tend to perpetuate limited human capital conditions, whereas those with at least one parent who has completed secondary or higher education can generate a more favorable environment for their children's educational development (Corti and Scherer, 2022; Erát, 2021; Esteve *et al.*, 2016). In contexts with higher levels of education among females, hypogamy can also open up opportunities for mobility.

In developed countries, homogamy is more prevalent among those with higher levels of education. In contrast, in Latin America it predominates among those with lower levels of education, which limits social mobility (De Hauw *et al.*, 2017; Esteve *et al.*, 2016). While educational mobility has improved in families with low levels of education (Azevedo and Bouillon, 2011), public policies do not always reduce inequalities. These inequalities are often maintained or reinforced by labor segmentation or social exclusion (Muñoz, 2024; Neidhöfer *et al.*, 2018 and 2021). Güell *et al.* (2015) find that a high educational correlation between parents reduces social mobility< however, homogamy shows intergenerational mobility in Latin America.

Studies on assortative mating in Mexico focus on the characteristics of couples, without linking them to the educational attainment of their children (Mier and Terán, 2009; Quilodrán and Sosa, 2004 and 2011). Mexico’s probability of positive educational mobility compared to other Latin American countries is 60%, placing it behind countries such as Chile, Uruguay, Costa Rica and Jamaica (Muñoz, 2024). Mexico has greater educational homogamy and less educational hypergamy due to women's increased enrollment in school and their greater persistence in education (Esteve and McCaa, 2007).

According to Moreno (2017) and Muñoz (2024), educational mobility is higher in northern Mexico and Mexico City, while the center and south of Mexico show lower mobility. In the absence of national or regional studies on assortative mating in conjunction with intergenerational educational mobility in children, the literature provides only a partial perspective, by studying either the origin of mating or the educational attainment of children based on the principle of dominance.

In the state of Nuevo León, Solís *et al.* (2007) analyze variations in assortative mating based on couples’ education and migration, from a mobility perspective, without considering its effects on their children’s education. In the mid-20th century, educational homogamy in Monterrey shifted from occurring mostly at the lowest educational levels to

occurring largely at the secondary level. Migration and increased job opportunities led to mating between individuals with different levels of education.

Meanwhile, Solís (2022) shows that children in Nuevo León achieve higher levels of education than their parents after taking into account socioeconomic status. However, this intergenerational increase contrasts with the fact that approximately two-thirds of children are unable to access higher education, highlighting limitations in educational mobility in the region.

This analysis provides a comprehensive approach by integrating the ideas of Solís *et al.* (2007) and Solís (2022). The authors particularly emphasize the fact that the increase in homogamy is not solely due to educational causes but may also be linked to spatial isolation and social segregation resulting from a lack of public services and housing (Pozas, 1990; Solís *et al.*, 2007; Solís, 2022).

Intergenerational educational mobility is a phenomenon that helps us understand the mechanisms that reproduce inequality in contexts such as Mexico. Since children's educational attainment is influenced by their parents' level of education, structural disadvantages persist, limiting human capital development and restricting equal opportunity, while strengthening cycles of poverty (De Hoyos *et al.*, 2010). Studying these patterns is important for designing policies that can break this intergenerational transmission of inequality (Barham *et al.*, 1995; Berti, 2001).

3. DATA AND METHODOLOGY

This study uses the database from the 2021 ESRU Social Mobility Survey in Nuevo León, referred to in the document as 2021 ESRU-EMOVI Nuevo León (CEEY, 2022). The survey was conducted in 2021 and is representative of men and women between the ages of 25 and 64 in the region, including the metropolitan area, suburbs and other areas. The survey collects data on the education of the respondents and their parents, which allows for the analysis of intergenerational educational mobility. The survey also contains information about the sociodemographic characteristics of the current household and the household in which the respondents lived at age 14.

The original 2021 ESRU-EMOVI Nuevo León sample included 3,767 individuals. For this study, a subsample of 2,668 individuals was used. This subsample included data on the educational level of both parents, which was necessary to create the educational mating categories. While the reduction itself does not imply less representativeness; however, as it is a selection based on available information, the subsample may differ from the original sample in certain aspects. It is assumed that the subsample retains the demographic and educational characteristics of the target population, at least in general terms. Although non-response bias cannot be formally assessed, the results should be interpreted with caution.

Description of variables

The dependent variable used is the respondent’s educational attainment, measured on four levels: primary or no education, secondary, high school and professional. For the three highest levels, completed levels of education are considered. Assortative mating indicates that parental education is highly correlated (Assaad *et al.*, 2019). Therefore, this approach is used in the present study to categorize the parental education as a whole.

Based on the terms homogamy, hypergamy and hypogamy, there are seven categories: *1)* primary homogamy (both parents have a primary education or no education); *2)* secondary homogamy (both parents have a secondary education); *3)* high school/professional homogamy (both parents have a high school or professional education); *4)* secondary hypogamy (the mother has a high school education and the father has a primary education or no education); *5)* high school/professional hypogamy (the mother has a high school or professional education and the father has a lower level of education); *6)* secondary hypergamy (the father has a secondary education and mother has a primary education or no education); and 7) high school/professional hypergamy (the father has a high school or professional education and the mother has a lower educational level).

Additionally, demographic characteristics and situations experienced by individuals that influence educational attainment are added as control variables. Two major challenges that adolescents may face and that can influence their educational attainment are having a child or participating in child labor. For example, having a child as a teenager negatively impacts educational attainment (Binstock and Näslund-Hadley, 2013). Child labor has also been found to negatively impact educational attainment (Delprato and Akyeampong, 2019; Edmonds, 2007; Lee *et al.*, 2021).

The 2021 ESRU-EMOVI Nuevo León study was not designed to identify child labor; however, a proxy was created to indicate the age at which respondents obtained their first job. For the purposes of this article, an individual is considered to have participated in child labor if they obtained their first job before the age of 14[1] or if they obtained their first job between the ages of 14 and 17 without health insurance.[2] Additionally, a dichotomous variable was incorporated that takes the value of 1 if the respondent had their first child as a teenager.

Woodruff and Binder (1999) mention that the number of siblings influences educational attainment, as the greater the number of siblings, the fewer resources each child will have. For this reason, the number of siblings is included as an explanatory variable. Additionally, four age group categories are included due to possible differences between the different generations that are not included in the analysis.

Solís (2022) indicates that there is greater access to education in the Monterrey metropolitan area municipalities and less access in the rest of the state. This is why fixed effects are added by area. Due to the strong relationship between the socioeconomic status of the family of origin and educational attainment, household resources are incorporated in quintiles by socioeconomic status when the respondent was 14 years old. This allows for an indirect approximation of wealth.[3]

Descriptive analysis

Table 1 shows that 44.1% of respondents have completed secondary school as their highest level of education achieved, followed by 27.4% who have completed primary school or have no education, 20.2% who have completed high school and only 8.3% who have completed professional studies. This distribution shows that although most of the sample has completed basic education, barriers to accessing higher education still persist. Regarding the educational assortative mating of parents, 60.3% correspond to homogamy at the primary school level or no education, while 4.2% present homogamy at the high school/professional levels. Cases of secondary school and high school/professional hypogamy represent 3.4% and 2.8%, respectively. Meanwhile, secondary and professional hypergamy total 7.4% and 8.3% respectively. These results confirm that homogamy at low levels continues to be the dominant pattern, with significant implications for the reproduction of inequality.

Table 1. Descriptive statistics

Variable		*Obs.*	*Average*	*Std. Dev.*	*Mín.*	*Max.*
Education of the respondent						
Primary		3 767	0.2737	0.4459	0	1
Secondary		3 767	0.4412	0.4966	0	1
High school		3 767	0.2018	0.4014	0	1
Professional		3 767	0.0834	0.2765	0	1
Parental mating						
Primary homogamy		3 398	0.6030	0.4893	0	1
Secondary homogamy		3 398	0.1357	0.3425	0	1
High school/professional homogamy		3 398	0.0415	0.1995	0	1
Secondary hypogamy		3 398	0.0338	0.1809	0	1
High school/professional hypogamy		3 398	0.0283	0.1657	0	1
Secondary hypergamy		3 398	0.0745	0.2625	0	1
High school/professional hypergamy		3 398	0.0833	0.2764	0	1
Gender (male=1)		3 765	0.3798	0.4854	0	1
First child as a teenager		3 517	0.2172	0.4124	0	1
Child labor		3 767	0.2036	0.4027	0	1
Number of siblings		3 763	3.3484	2.5185	0	22
Age groups						
Age 25 to 34		3 767	0.2787	0.4484	0	1
Age 35 to 44		3 767	0.2763	0.4473	0	1
Age 45 to 54		3 767	0.1784	0.3829	0	1
Age over 54		3 767	0.2665	0.4422	0	1
Working mother		3 658	0.3562	0.4789	0	1
Household resources (quintiles)						
	1	3 239	0.2430	0.4289	0	1
	2	3 239	0.2269	0.4189	0	1
	3	3 239	0.2136	0.4099	0	1
	4	3 239	0.1883	0.3910	0	1
	5	3 239	0.1281	0.3343	0	1
Area						
Metropolitan area		3 767	0.3109	0.4629	0	1
Suburbs		3 767	0.3050	0.4605	0	1
Rest of the state		3 767	0.3841	0.4865	0	1

Source: prepared by the authors with data from the 2021 ESRU-EMOVI Nuevo León (CEEY, 2022).

Table 2 shows the educational level attained by children according to their parents educational mating type. In households with primary homogamy, 8.9% of children access professional education compared to 59.3% in households with upper secondary homogamy. This contrast suggests the transmission of educational capital between generations.

In cases of secondary hypogamy, 29.8% of children pursue professional studies, whereas in secondary hypergamy, only 15.6% do so. This indicates a possible differential effect of maternal education. For mating at higher levels, the differences between hypogamy (40.5%) and hypergamy (43.7%) are smaller. This could reflect the fact that, at higher educational levels, the influence of the level of education of the parents is less significant.

Table 2. Educational level of the respondent by type of parental educational mating

	Educational level of the respondent				
	Primary	*Secondary*	*High school*	*Professional*	*Total*
Primary homogamy	28.75	44.76	17.59	8.9	100
Secondary homogamy	2.77	48.99	33.13	15.12	100
High school/professional homogamy	0.25	7.33	33.11	59.32	100
Secondary hypogamy	19.01	35.53	15.66	29.81	100
High school/professional hypogamy	3.97	31.36	24.17	40.5	100
Secondary hypergamy	4.75	50.31	29.34	15.59	100
High school/professional hypergamy	1.53	29.2	25.57	43.7	100

Source: prepared by the authors with data from the 2021 ESRU-EMOVI Nuevo León (CEEY, 2022).

Meanwhile, table 3 breaks down educational attainment by gender and reveals some interesting differences. Among women, the highest proportion of professional studies (52.8%) is found in households with homogamy at the high school/professional level while, among men, this percentage is even higher (70.2%). In both cases, the cumulative education of parents is associated with higher levels achieved by their children, regardless of sex.

Table 3. Educational level of respondent by type of parental educational mating broken down by gender

Parental Mating	*Educational level of the respondent*				
	Primary	*Secondary*	*High School*	*Professional*	*Total*
Women					
Primary homogamy	28.97	46.73	14.85	9.44	100
Secondary homogamy	4.48	44.74	26.34	24.43	100
High school/professional homogamy	0.15	8.62	38.45	52.78	100
Secondary hypogamy	14.24	45.7	21.11	18.95	100
High school/professional hypogamy	6.3	42.75	26.32	24.63	100
Secondary hypergamy	7.57	54.65	23.14	14.64	100
High school/professional hypergamy	1.28	22.26	27.89	48.56	100
Men					
Primary homogamy	28.49	42.71	20.45	8.34	100
Secondary homogamy	1.55	51.71	38.25	8.49	100
High school/professional homogamy	0.41	5.16	24.2	70.23	100
Secondary hypogamy	22.13	28.85	12.08	36.94	100
High school/professional hypogamy	0	11.96	20.52	67.53	100
Secondary hypergamy	0.87	44.35	37.88	16.91	100
High school/professional hypergamy	1.77	35.82	23.34	39.06	100

Source: prepared by the authors with data from the 2021 ESRU-EMOVI Nuevo León (CEEY, 2022).

In secondary homogamy, 24.4% of women achieve professional studies, compared to 8.5% of men. In secondary hypogamy, women outperform men in secondary school and high school; however, men are more likely to advance to the professional level (36.9% compared to 18.9%). In high school/professional hypogamy, 67.5% of men and 24.6% of women reach the professional level. In high school/professional hypergamy, 48.5% of women and 39% of men reach this level.

Finally, in households with primary education homogamy, both genders show similar results: around 29% remain at that level, while only 8%-9% go on to higher education. This pattern reinforces the idea that low educational capital shared by parents is a common structural barrier that limits educational attainment in children, regardless of gender.

Methodology

The dependent variable in this study is the educational level attained by the respondent and is classified into four ordered categories: 1) primary or no education, 2) secondary education, 3) high school education, and 4)

professional education. Given its ordinal nature, the appropriate econometric model is the ordered logit. Following Cameron and Trivedi (2005), the probability of observing outcome *i* corresponds to the probability that the estimated linear function, plus the random error, falls within the range of the estimated cut-off points for the outcome:

$$\Pr(y_i = j) = \Pr\left(k_{j-1} < X_i^T \beta + u_i \leq k_j\right) \quad (1)$$

Where u_i is logistically distributed. In this model, the parameter vector β and the cut-off points *k1, k2, ..., k_{J-1}* are estimated, where *J* is the total number of ordered categories of the dependent variable $k_0 = -\infty$ and $k_J = +\infty$ are defined. This formulation is a direct extension of the binary logit model to situations involving ordinal variables (Cameron and Trivedi, 2005).

This model is based on the assumption of proportional odds (the parallel lines assumption), which states that the relationship between each explanatory variable and the probability of being in a higher educational category remains constant across the different transitions (Long and Freese, 2014). To evaluate this assumption, the Wald test[4] was applied, where H_0 complies with the parallel lines assumption. The test result was $\chi^2(24) = 23.07$, with a *p-value* of 0.5159. Since the null hypothesis was not rejected, using the ordered logit model in this research is justified.

The marginal effects of the ordered logit model represent the change in the probability that an individual will be placed in a specific category of the dependent variable, given a unit change in an explanatory variable, while holding the other variables constant. Formally, for a general category *j* of educational level, the marginal effect of an explanatory variable x_r on the probability that the respondent will be placed in that category is expressed as:

$$\frac{\partial \Pr(y_i = j)}{\partial x_{ir}} = \beta_r \cdot \left[\lambda\left(k_{j-1} - X_i^T\beta\right) - \lambda\left(k_j - X_i^T\beta\right)\right] \quad (2)$$

Where λ(·) is the logistic density function. This methodology permits direct interpretation of the impact of each variable on the probability of achieving a specific educational level (Cameron and Trivedi, 2005; Long and Freese, 2014).

The following section shows and analyzes the results of the estimated marginal effects for this model at the midpoint of the covariates. It should be noted that the analysis in this study is based on a cross-sectional design, which has inherent limitations in terms of causal inference. With this design, data is collected at a single point in time, making it impossible to determine the temporal relationship between the explanatory variables and the observed outcome with certainty.

While parental educational mating logically precedes their children's educational attainment, the cross-sectional design does not allow for empirical verification of this sequence or complete control of unobserved factors influencing both variables. Consequently, the obtained estimates reflect statistical associations and should not be interpreted as causal effects (Björklund and Salvanes, 2011).

Future research could benefit from methods that address these limitations, such as multilevel hierarchical models, which capture effects at the individual and family levels (Goldstein, 2011) or propensity score matching strategies, which compare cases with similar observable characteristics (Caliendo and Kopeinig, 2008). Likewise, when longitudinal or panel data is available, dynamic models that allow for the analysis of educational attainment over time

and better control for unobserved factors influencing intergenerational mobility should be explored (Wooldridge, 2010).

4. RESULTS

Table 4 shows the marginal effects of the explanatory variables based on the category of assortative mating of parents. Categories with similar characteristics include primary homogamy, secondary education homogamy and high school/professional education homogamy. Categories with different characteristics (heterogamy) include a group of parents with secondary hypogamy, high school/professional hypogamy, secondary hypergamy and high school/professional hypergamy. Primary hypogamy is used as a reference in the model estimates.

When analyzing the probability of an individual finishing at primary school level or having no education, it is generally found that for any combination of parental education, the probability of finishing at this level is lower than that of the reference group. Specifically, children whose parents both have a secondary education are 7.3 percentage points (pp) less likely to finish at primary school level or have no education than children whose parents finished primary school or have no education. This probability increases if both parents have a high school or professional education, in which case the probability is 13.2 pp lower.

Regarding children with parents in educational heterogamy, the magnitude of the difference with respect to the base group is greater when the mother has a higher level of education than the father. For instance, if the mother has a secondary education and the father has a primary education or no education, the probability is 13.7 pp lower than that of respondents whose parents have the lowest level of education. Meanwhile, when the father has a secondary education and the mother has a lower level of education, the probability is 5.1 percentage points lower. The same trend applies to the secondary education level.

For those with high school as their highest level of education, all combinations of parental education have a marginal positive effect compared to the base group (primary homogamy) with increases ranging from 6.7 to 17.9 percentage points depending on the type of mating (see Table 4).

Table 4. Marginal effects on educational attainment

	Primary	*Secondary*	*High School*	*Professional*
Parental education	**Base both primary or no education**			
Secondary hypogamy	-0.137***	-0.192**	0.179***	0.150**
	[0.052]	[0.076]	[0.068]	[0.060]
High school/professional hypogamy	-0.110**	-0.154**	0.144**	0.120**
	[0.053]	[0.076]	[0.071]	[0.059]
Secondary hypergamy	-0.051*	-0.072*	0.067*	0.056*
	[0.031]	[0.042]	[0.039]	[0.033]
High school/professional hypergamy	-0.096***	-0.135***	0.126***	0.105***
	[0.034]	[0.048]	[0.045]	[0.037]
Secondary homogamy	-0.073***	-0.103***	0.096***	0.080***
	[0.024]	[0.033]	[0.032]	[0.026]
High school/professional homogamy	-0.132***	-0.185***	0.172***	0.145***
	[0.041]	[0.054]	[0.052]	[0.044]
Gender (male=1)	-0.0002	-0.0003	0.0002	0.0002
	[0.017]	[0.024]	[0.023]	[0.019]
First child as a teenager	0.065***	0.091***	-0.085***	-0.071***
	[0.018]	[0.028]	[0.024]	[0.022]
Child labor	0.039**	0.054**	-0.051**	-0.043**
	[0.018]	[0.027]	[0.025]	[0.020]
Number of siblings	0.001	0.001	-0.001	-0.001
	[0.005]	[0.007]	[0.006]	[0.005]
Age groups	**Base 25 to 34 years old**			
Age 35 to 44	0.037**	0.075**	-0.053**	-0.059**
	[0.016]	[0.033]	[0.023]	[0.027]
Age 45 to 54 years old	0.031	0.065	-0.044	-0.051
	[0.021]	[0.042]	[0.031]	[0.033]
Age over 54 years old	0.167***	0.136***	-0.172***	-0.131***
	[0.038]	[0.030]	[0.030]	[0.028]
Age groups	**Base 25 to 34 years old**			
Occupied mother	-0.039**	-0.055**	0.051**	0.043**
	[0.018]	[0.027]	[0.025]	[0.020]
Home resources origin	Sí	Sí	Sí	Sí

Zone	Sí	Sí	Sí	Sí
	Primary	*Secondary*	*High School*	*Professional*
Observations	2 668			
Log pseudolikelihood	-2 877.58			
Wald chi^2	257.2			
Pseudo R^2	0.1542			

Note: Standard errors in brackets. * p<.1; ** p<.05; *** p<.01.

Source: Prepared by the authors with data from the 2021 ESRU-EMOVI Nuevo León (CEEY, 2022).

At the professional level, when the mother has a higher level of education than the father (hypomgyamy), the probability of reaching this level increases by 15 pp if she attains a secondary education and by 12 pp if she attains a high school or professional education. In the case of hypergamy (the father has a higher education), the effects are 5.6 pp and 10.5 pp, respectively. When both parents have the same level of education, the probability increases by 8.0 pp with a secondary education and by 14.5 pp with a high school/professional homogamy. These results suggest that the higher the parents' educational level, especially when they both have the same level, the greater the chances their children will reach the professional level.

Regarding control variables, no significant effects were found with respect to gender or number of siblings. However, certain adverse conditions show negative effects. Having their first child as a teenager reduces the probability of pursuing professional studies by 7.1 percentage points, while having participated in child labor reduces it by 4.3 percentage points.

Controls were included for age group, mother employed as a teenager and household resources, as well as fixed effects by geographical area, to control for contextual factors that could influence educational attainment.

5. DISCUSSION AND CONCLUSIONS

This research contributes to the literature on social mobility by analyzing intergenerational educational mobility. Although this topic has been widely studied, few studies have considered the interaction between the educational levels of both parents. Typically, the parent with the higher level of education is used as a reference or each parent is analyzed separately, under the assumption of independent effects. However, the combination of both parents' educational capital significantly influences their children's outcomes (Edwards and Roff, 2016). Thus, this study employs the concepts of homogamy, hypergamy and hypogamy to categorize educational mating.

Understanding the educational level at which mating occurs is essential for grasping intergenerational mobility since the impact varies depending on which parent has the higher level of education. The results reinforce the importance of considering the combined educational level and highlight significant differences between types of mating. A pattern consistent with the literature on the transmission of educational capital (Maralani, 2023) was found, which identifies a positive effect of assortative mating on educational mobility in Nuevo León, as also suggested by Kremer (1997).

Children whose parents have a higher level of education have an advantage over their peers whose parents are less educated (Assaad *et al.*, 2019). Nevertheless, when analyzing the results in terms of hypogamy and hypergamy, these differ from the findings of Corti and Scherer (2022). Here, we found that, at any level, hypogamy has a greater influence than hypergamy. In contrast, Corti and Scherer (2022) demonstrate that there is a reward associated with hypergamy.

Based on the descriptive analysis, homogamy behavior in Nuevo León focuses on low levels of education, which is consistent with the findings of Esteve *et al.* (2016) for undeveloped countries. This result supports the first reasoned hypothesis. Meanwhile, hypergamy is more prevalent at higher levels of education, with a predominance of couples in which the man has a higher level of education than the woman.

Regardless of the overall educational level of the parents, it is important to note that the probability of the child remaining at the primary school level or below is negative; i.e., it is increasingly unlikely that new generations will have low levels of education. Regarding the mother's participation, in agreement with Maralani (2023) and Mare and Maralani (2006), hypogamy increases the likelihood of higher educational attainment in children more than hypergamy does. This result supports the second hypothesis regarding hypogamy, as it indicates greater intergenerational educational mobility. However, data on hypergamy in Nuevo León does not corroborate this relationship.

Probability results in terms of educational attainment show short-range upward mobility in secondary education levels, as defined by Solís (2022) and CEEY (2019), i.e., children are more likely to achieve the same educational level as their parents than a higher one. Therefore, to reduce the intergenerational persistence of inequalities in higher education, Solis (2022) suggests reorganizing the education budget, improving education management and strengthening the teaching profession.

Due to the close link between education and various government policies, budgetary suggestions and changes to the education system should be considered. For example, a 2 pp increase in the GDP in the national education budget, which is distributed more equally between educational levels, greater investment in and implementation of comprehensive early childhood care systems, early warning projects to encourage students to stay in school and projects to address shortcomings in school infrastructure, among other improvements specific to the Mexican education system (CEEY, 2024; Solís, 2022).

However, if the results show a positive incentive for the inclusion of women in their children's educational attainment, the focus should not shift to a gender-focused policy, but rather to how to strengthen the future of the state's human capital to alleviate poverty traps (Barham *et al.*, 1995; Berti, 2001; De Hoyos *et al.*, 2010). In this regard, the importance of focusing on early childhood is paramount, as this is when the first learning inequalities arise (Heckman, 2008). Furthermore, it is essential to support the liberation of women from caregiving tasks by rethinking the daycare program based on the direct transfer program (Solís, 2022).

Special attention should also be given to individuals whose education is at risk due to circumstances such as having a child while still a teenager or being involved in child labor. Public policies should focus on helping these vulnerable groups to increase their chances of educational success, enabling them to achieve a better quality of life and break the pattern of inequality so it is not passed on from generation to generation.

It should be noted that the findings should be interpreted with caution since the analyzed population is from the state of Nuevo León, Mexico. Nuevo León is one of the most developed states and has a higher average level of

education than other states in the country. However, some individuals face difficulties achieving high levels of education, which suggests that this type of survey should be conducted in regions with below average schooling in order to identify relevant factors and eliminate regional differences throughout the country. Additionally, it is important to verify which policies have been implemented and worked, as well as follow up on unsuccessful policies to guide them toward a satisfactory final result.

Finally, one of the limitations of the article was that the results show a direct relationship between the education of parents and that of their children, but the effect is not necessarily causal. According to Björklund and Salvanes (2011), there may be other confusing factors, such as genetic or prenatal effects, which may influence the cross-sectional relationship between parents and children.

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[1] The age of 14 is taken as a reference since when the respondents were this age, it was the legal minimum age for working in Mexico.

[2] If they did not have health insurance through their job, the conditions established in the Federal Labor Law for minors were probably not being followed.

[3] For the detailed construction of this variable, see the calculation program provided by the 2021ESRU-EMOVI Nuevo León .

[4] The gologit2 command from Williams (2006) was used in STATA.