Does it Matter if Mom and Dad Are Similarly Educated? Evidence from Chile on the Relationship Between Marital Sorting and Infant Health

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Abstract

This study expands existing scholarship on the relationship between educational assortative mating and children's birth outcomes using rich administrative data from Chile on births that occurred between 1990 and 2014. We assess the applicability of the *homogamy-benefit* hypothesis – whereby parental educational similarity is beneficial for children's outcomes due to enhanced complementarity in parental inputs towards child production, better relationship quality, and reduced conflict – by testing the relationship between educational homogamy and various measures of infant health such as birth weight and gestational age. We show that parents' educational homogamy is associated with reduced probability of low birth weight (LBW). This association is contingent on the level of education of the mother. Relative to their homogamous counterparts, children of hypergamous couples where mothers have primary education or less have a reduced probability of low birth weight. Conversely, homogamy is associated with a reduced probability of LBW among couples where women have secondary and tertiary education. Differently from high-income societies, we further show that hypogamy in Chile is not associated with positive birth outcomes.

Introduction

The quest for understanding the role of parental education on children's health outcomes has been prolific (Case and Paxson 2002; Desai and Alva 1998; Kemptner and Marcus 2013; Lindeboom et al. 2009). Previous studies have documented a positive association between mother's educational attainment and birth-related outcomes as varied as neonatal, post-neonatal, and infant mortality (Chou et al. 2010), birth weight (Chevalier and O'Sullivan 2007; Currie and Moretti 2003; Güneş 2015), antenatal and postnatal care (Hahn et al. 2018), and gestational age (Cantarutti et al. 2017; Ruiz et al. 2015). Although the importance of father's education has been more often neglected in the relevant literature, evidence also suggests that father's education matters for children's health (Chen and Li 2009), yet to a slightly smaller extent (Chevalier 2004; Cochrane et al. 1982).

Scant research has instead examined the role that parents' interacting characteristics generated by the marriage market play in shaping child outcomes. For instance, little is known on whether the relative similarity of maternal and paternal education – i.e. whether the mother has less (*educational hypogamy*), more (*educational hypogamy*) or the same (*educational homogamy*) educational attainment as the father – has implications for children's outcomes. A priori, it would be reasonable to expect parental educational similarity to be beneficial for children's outcomes to the extent that this implies complementarity in parental inputs towards child production, enhanced relationship quality, and reduced conflict – a scenario which is consistent with what we label *homogamy-benefit* hypothesis. In the

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United States (US), scholars have found evidence in support of this hypothesis for school-related outcomes. Specifically, Beck and González-Sancho (2009) found a positive impact of educational homogamy on children's school readiness (socio-emotional development, mainly) at age five, postulating enhanced levels of parental agreement about the organization of family life and symmetry in the allocation of time to child care as explanatory mechanisms. Similarly, Edwards and Roff (2016) found mating on education to be associated with higher math and reading scores for children, yet data limitations prevented the identification of mechanisms underlying the relationship.

A potential mechanism for the link between parental educational similarity and child cognitive and educational outcomes is prenatal context. Parental educational sorting may shape prenatal conditions such as maternal stress, behaviors, or resources for prenatal care (e.g., Schwartz 2013; Zhang et al. 2012), which have implications for several infant health measures (Beijers et al. 2010; Persson and Rossin-Slater 2018; Torche 2011; Torche and Kleinhaus 2011), in turn affecting a whole range of outcomes later in life. Despite this potential connection, to the best of our knowledge only one study (Rauscher 2017) has examined the relationship between educational assortative mating and infant health, providing evidence in support of the *homogamy-benefit* hypothesis – yet again in the US context. The present study seeks to expand the existing scholarship on the relationship between educational assortative mating and children's birth outcomes focusing on Chile, a Latin American country that has experienced rapid economic growth over the past 30 years, accompanied by demographic changes in union formation practices, gender roles, massive educational expansion, and sustained inequality (García and de Oliveira 2011).

To assess the applicability of the *homogamy-benefit* hypothesis to the Chilean context we use rich and high-quality administrative data on births that occurred between 1990 and 2016 to women born between 1960 and 1980. We further explore the heterogeneity of this association over time, across cohorts and among mothers with different educational attainment. This latter exploration allows us to better understand whether and, if so, the conditions under which homogamy and positive birth outcomes move together. Among the 623,000 births we study we find that, on the whole, parents' educational homogamy is associated with a reduced probability of low birth weight (LBW). This association is contingent on the level of education of the mother. Relative to their homogamous counterparts, children of hypergamous couples where mothers have primary education or less have a reduced probability of low birth weight. Conversely, homogamy is associated with a reduced probability of LBW among couples where women have secondary and tertiary education. There is also evidence that patterns strengthened across cohorts. Differently from high-income societies, we further show that hypogamy in Chile is not associated with positive birth outcomes.

Background

Educational assortative mating

Despite the limited understanding of the implications of assortative mating for children's well-being, social scientists have had a long-standing interest in whom marries whom as an explanation of the

reproduction of social inequality and group boundaries across generations (Blau and Duncan 1967; Mare 2014; Rosenfeld 2008). Assortative mating – the non-random sorting of individuals into romantic relationships – is viewed as a key determinant of the characteristics of families and the reproduction of populations (Schwartz 2013). Patterns of mating with regard to couples' socio-economic characteristics are vital to understanding a whole range of dynamics in the demographic makeup of households, such as family formation, composition, and dissolution (Schwartz and Han 2014). They also have consequences for outcomes that are directly or indirectly linked to the family, such as longevity, health, fertility preferences, and fertility behavior (Huber and Fieder 2011; Trimarchi, Schnor, and Van Bavel *forthcoming*). A proper understanding of mating patterns thus ultimately permits to shed light on fundamental changes underlying the demography of the population and the characteristics of the social stratification system.

Studies in the area have exploited regional and temporal variations to understand what triggers shifts in educational assortative mating and, foremost, how these processes are related to processes of inequality. Research from high-income countries with rising inequality trends such as the US (Breen and Salazar 2011), Great Britain (Breen and Salazar 2010) and Denmark (Breen and Andersen 2012) has provided mixed findings. In the case of the U.S, even though educational assortative mating has risen over the last decades, there seems to be no positive relationship between these trends and income inequality (Breen and Salazar 2011; Western et al. 2008). In contrast, Breen and Andersen (2012) do find a positive effect for the case of Denmark between 1986 and 2006.

Gradually, research examining trends and variation in educational assortative mating has expanded to other societies across Latin America (Esteve and McCaa 2007; Esteve et al. 2013; Ganguli, Hausmann, and Viarengo 2014; Gullickson and Torche 2014), East Asia (Hu and Qian 2015; Park and Smits 2005; Smits and Park 2009), South Asia (Borkotoky and Gupta 2016; Prakash and Singh 2014), and sub-Saharan Africa (Pesando 2018), adopting a more large-scale comparative perspective (Esteve et al. 2016; Esteve et al. 2012; Raymo and Xie 2000; Smits 2003; Smits et al. 1998, 2000; etc.). To the best of our knowledge, only few studies have examined patterns and implications of educational assortative mating in Chile. Among these, Torche (2010) showed that Chile features very strong barriers at the top of the educational distribution, combined with more fluid intermarriage at the lower end, while Bucca and Urbina Julio (2017) found that educational homogamy had decreased between 1990 and 2013 and the combination of college expansion and higher labor participation of women had favored the formation of highly educated-high earners couples. Therefore, besides assessing implications of educational assortative mating for children's outcomes, describing trends and variation in mating for the case of Chile is likely to add to the relevant literature on mating in Latin America.

Context

Dramatic socioeconomic and demographic transformations along with sustained levels of inequality are likely to play a role in the applicability of the *homogamy-benefit* hypothesis. Latin American countries experienced a large increase in educational attainment during the second half of the twentieth century.

The mean years of schooling went from 2.9 in 1950 to 4.3 in 1975, and to 7.1 by the end of the century (Barro & Jong-Wha, 2018). These gains in years of schooling were driven by the almost universal coverage of primary and secondary schooling. Increasing years of schooling above secondary level concentrated among upper classes. This polarized growth along with sustained levels of homogamy have prevented education from playing a major role in advancing social class mobility (Esteve et al., 2016; Torche, 2014). Meanwhile, total fertility rates dropped from 6 to approximately 3 children per woman with relatively small changes in the timing of childbearing (Esteve & Florez-Paredes, 2018). A "bimodal" pattern started to characterized transition to first births where women with high educational attainment delayed childbearing and women with low educational attainment accelerated this transition (Lima, Zeman, Sobotka, Nathan, & Castro, 2018).

In Chile, educational expansion in the last 30 years has been dramatic. In 1990, the proportion of women age 15 to 59 with zero to five, six to nine and ten to twelve years of schooling were 22, 30 and 30 per cent, respectively. These proportions changed to 7, 19, and 44% by 2014 (CEPAL, 2018). Educational homogamy has remained the norm among Chilean couples, being higher among the highly educated. The Chilean context resembles the conditions of Latin America as a whole, i.e., a context of educational expansion and sustained socio-economic inequality. In terms of income inequality, during this period the Gini Index fluctuated between 0.55 and 0.56, always above the overall regional average of 0.5 (CEPAL, 2018). Figure 1 displays the time trends in mother's educational attainment and couples' educational composition in Chile from 1990 to 2014.

Figure 1 – time trends in educational attainment among mothers and couples' educational composition 1990 - 2014



Hypotheses

In our analysis we test three hypotheses:

- *H1:* Overall, educational homogamy is associated with a reduced probability of LBW given enhanced complementarity in parental inputs towards child production, higher relationship quality, and less conflicting decision-making processes among partners with similar educational background;
- *H2:* Due to sustained inequality and uneven educational expansion, this overall association is contingent on the educational attainment of the partners;
- *H3:* Across cohorts, the polarized nature of educational expansion contributes to maintaining birth outcome-gaps across educational groups.

Data and methods

Administrative records on births 1990 - 2014

We use data from the Chilean birth registry database from the Chilean Ministry of Health (MINSAL). The data contains all the births that were registered in Chile from 1990 to 2014. We focus on first births to mothers between 25 and 40 years old. We restrict the analysis to cases where we have information on the father. This analytical sample gives us an appropriate set of births to test our hypotheses. As the literature suggests that births among teenage mothers are often associated with negative birth outcomes, including these births would bias our results (Chen et al. 2007). Moreover, by age 25 most women have completed secondary school, and those who continue education beyond secondary have already started. Thus, this selection of the data permits us to appropriately compare women with different educational attainment. Finally, first births after age 40 are rather uncommon.

	Father pres	sent at birth	Father absent at birth			
-	15 to 25	25 to 40	15 to 25	25 to 40		
Total number of births	626,024	623,013	151,804	75,930		
Mean birth weight	3266.5	3287.45	3216.69	3243.73		
Proportion below 2,500 grams (LBW)	0.05	0.06	0.06	0.07		

Table 1 – Distribution of first births by father's presence and age of the mother, mean levels on two birth outcomes: birthweight and proportion of low birth weight (<2,500 grams)

Note: Mothers over 40 are 0.5% with fathers present and 0.5% without father present.

Table 1 presents the distribution of first births by age-group of the mother and by presence of the father. The last two rows show the mean birthweight and the proportion of births below 2,500 grams – which we take as threshold for LBW. In this paper we focus on the latter. The Table shows that among births where the father is present at birth the mean birth weight is only marginally different by age group, hence excluding births to women age 15 to 25 is not likely to bias our results. Conversely,

children of couples where the father is absent at birth – or not listed – have slightly lower birth weight, a limitation to keep in mind when interpreting the results.

Methods

We estimate a series of linear probability models predicting the probability of low birth weight (LBW). In our first specification we include the educational composition of the couple with the category homogamy as the reference. This bivariate model allows us to asses the overall validity of the homogamy-benefit hypothesis for the entire period (Hypothesis 1). Further, we stratify our sample by educational attainment of the mother (Hypothesis 2) and birth cohort (Hypothesis 3). This strategy leads us to estimate six models (three educational attainment groups and two ten-year birth cohorts). The two birth cohort groups are defined as women born between 1960 and 1969, and women born between 1970 and 1980. We present results for our models without control variables as well as controlling for age of the mother, sex of the child, area of occurrence (urban- rural and region) and marital status at birth (married, not married)

Preliminary Results

Preliminary results from the pooled models by cohorts are shown in Table 1. These models explore the bivariate association between educational similary of the couple and low birth weight of the child (columns 1 and 2) and the same association adjusting for family charactetistics at birth (columns 3 and 4). This first set of models partially confirms hypothesis 1 as educational homogamy is associated with a reduced probability of low birth weight compared to hypogamy in both cohorts, however not compared to hypergamy, where the coefficient is not significant in the adjusted models. As expected, married couples have lower probability of having children with low birth weight, maternal age is positively associated with low birth weight, and boys face lower probability of being low birth weight.

Table 2 shows results for the same models stratified by maternal education. The results show that births to low-educated women are less likely to benefit from homogamous context when compared to hypergamy. Births to women with tertiary education, instead, are more likely to benefit from homogamous context compared to hypogamy. And the group with secondary education shows the homogamous-benefit compared to hypogamy and the detrimental association compared to hypergamy. Despite hypothesis 2 is not fully confirmed, these preliminary results show some interesting features about the heterogeneity in the homogamy-benefit by maternal education, as it decreases in magnitude and weakens in significance with mother's education. Further analyses are needed to untangle these findings and identify mechanisms.

Examining the changes over time (hypothesis 3), results show that across cohorts the association between education similarity and low birth weight deepens for the primary and tertiary groups, however not for the mother with secondary education, where the results are unaltered.

Next steps

- Incorporate more birth outcomes, such as birth weight in levels and gestational age (probability of being premature);
- Conduct sensitivity analyses using different classification of the education variable, possibly disaggregating in more categories.
- Higher birth orders controlling for parity;
- Expand the cohort analysis, disaggregating in 5-year cohorts, so to have four maternal birth cohorts;
- Get at the causal nature of the relationship by using more sophisticated techniques such as IV (e.g., cohort-state measures of labor force participation) or propensity score matching in a spirit similar to Rauscher (2017).

	Low Birth Weight							
	1960)-1969	1970)-1980				
	(1)	(2)	(3)	(4)				
Hypogamy (ref. homogamy)	0.005***	0.003**	0.007***	0.007***				
	(0.001)	(0.001)	(0.001)	(0.001)				
Hypergamy (ref. homogamy)	0.003**	0.002	-0.001	0.000				
	(0.001)	(0.001)	(0.001)	(0.001)				
Married		-0.005***		-0.003***				
		(0.001)		(0.001)				
Mother Age		0.003***		0.002***				
		(0.000)		(0.000)				
Sex child: Boy (ref. Girl)		-0.006***		-0.003***				
		(0.001)		(0.001)				
Urban		-0.004**		-0.004**				
		(0.002)		(0.002)				
Constant	0.053***	-0.019***	0.055***	-0.012**				
	(0.001)	(0.006)	(0.000)	(0.005)				
Observations	256,514	256,504	357,972	357,957				
R-squared	0.000	0.003	0.000	0.002				

Table 1: Pooled models on the association between parental educational similarity and LBW, by maternal cohort

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

	1960-1969				1970-1980							
	Primary		Secondary		Tertiary		Primary		Secondary		Tertiary	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Hypogamy (ref. homogamy)			0.008***	0.008***	0.008***	0.007***			0.010***	0.011***	0.007***	0.008***
			(0.002)	(0.002)	(0.002)	(0.002)			(0.002)	(0.002)	(0.001)	(0.001)
Hypergamy (ref. homogamy)	-0.010***	-0.011***	-0.001	-0.003*			-0.011***	-0.011***	-0.004**	-0.006***		
	(0.003)	(0.003)	(0.002)	(0.002)			(0.003)	(0.003)	(0.001)	(0.001)		
Married		-0.004		-0.002		-0.005**		0.004		-0.000		-0.003**
		(0.003)		(0.001)		(0.002)		(0.003)		(0.001)		(0.001)
Mother Age		0.002***		0.003***		0.003***		0.003***		0.003***		0.002***
		(0.000)		(0.000)		(0.000)		(0.001)		(0.000)		(0.000)
Sex child: Boy (ref. Girl)		-0.006**		-0.006***		-0.005***		-0.005		-0.000		-0.004***
		(0.003)		(0.001)		(0.002)		(0.003)		(0.001)		(0.001)
Urban		0.005		0.003		0.004		-0.004		0.001		0.005*
		(0.003)		(0.003)		(0.005)		(0.004)		(0.003)		(0.003)
Constant	0.071***	0.001	0.053***	-0.030***	0.047***	-0.047***	0.071***	-0.022	0.056***	-0.028***	0.053***	-0.028***
	(0.002)	(0.019)	(0.001)	(0.008)	(0.001)	(0.011)	(0.002)	(0.022)	(0.001)	(0.008)	(0.001)	(0.007)
Observations	37,961	37,961	139,500	139,493	79,053	79,050	23,414	23,414	148,940	148,936	185,618	185,607
R-squared	0.000	0.002	0.000	0.003	0.000	0.004	0.000	0.003	0.000	0.002	0.000	0.002

Table 2: Stratified models on the association between parental education similarity and LBW, by maternal cohort and maternal education

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

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