Educational Assortative Marriage and Its Consequence for Children's Academic Achievement: Evidence from PISA 2012

Yifan Bai and Soo-yong Byun

Introduction

Literature suggests that both education expansion and women's participation in labor market have reshaped people's choice of partners in modern societies (Sweeney and Cancian 2004). Specifically, education has become a central variable for people's preference in finding partners because of its role in labor market and subsequent cultural resources (Blossfeld 2009). As a result, in recent decades, the question of who marries whom has attracted scholarly attention (Blossfeld and Timm 2003).

Researchers further discussed a potential impact of educational assortative marriage on social reproduction. For example, Mare (1991) noted that growing educational homogamy among people may increase inequality in educational outcomes of their offspring. Yet, few studies have examined consequences of educational assortative marriage for children's educational achievement. This paper addresses this lack of research by investigating the association between educational assortative marriage and children's academic achievement using data from 2012 Programme for International Student Assessment (PISA).

Literature Review

Educational Assortative Marriage

There are three major theoretical perspectives on why education becomes a central variable in marital sorting and timing: (1) modernization and industrialization, (2) educational expansion, and (3) women's participation in labor market.

First, modern societies have been exemplified as individualized and open societies with a less influence from social boundaries and structures on individuals' marital choices (Blossfeld 2009). According to the social institutional theory, the influence of social norms and pressures should be reduced in modern societies (Smits and Park 1998).

Second, the formal educational structure has also changed over time as a result of modernization and industrialization. Blossfeld and Timm (2003) have pointed out that nowadays an educational system works as a marriage market since it has increased a chance of meeting potential partners in the same education level at the same age.

Third, another change in modern societies is women's participation in labor market, which changes women's role not only in the labor market but also in the family. With modernization, more women have gained access to school and to the labor market, which transforms women's role in the family from housewives to breadwinners. Thus, it is not surprising to see men's increased preference for well-educated women since education is a useful proxy for income (McClendon et al. 2014). Yet research has offered mixed evidences about the trend of educational homogamy marriage across different societies.

Parents' Level of Education and Children's Achievement

A large body of literature has shown that parents' level of education has a predictive power on children's educational achievement (Davis-Kean 2005; Desforges and Abouchaar 2003). While the association between parental education and children's achievement has been long explored, identified mechanisms behind this relationship include parental expectations (Yamamoto and Holloway 2010),

parental involvement (Jeynes 2007), and transmission of cultural capital (Roksa and Potter 2011). Research also has tried to understand that maternal education may have a different influence on children's achievement (Magnuson 2007).

Yet, few studies have examined the association between the degree of similarity between two parents' education and children's educational achievement (Schwartz 2013). Accordingly, this paper aims to answer the following question: what is the relationship between parents' educational assortative marriage and children's math achievement?

Data and Methods

Data

The data source for this study is the 2012 Programme for International Student Assessment (PISA) survey, which tests the skills and knowledge of 15-year-old students in 65 countries and economies. While PISA has been conducted every three years since 2000, PISA 2012 has the largest number of participating countries. PISA data includes rich information about students and their parents, which allows for international comparison among individuals across societies.

Measures

The dependent variable is children's math achievement. The key independent variable is the type of parents' educational assortative marriage and includes three types: homogamy, hypergamy, and hypogamy. Educational homogamy is defined as father and mother who have the exactly same level of education. Educational hypergamy refers to cases where father's education is higher than mother's education, whereas educational hypogamy refers to the cases where father's education is lower than mother's education.

To better estimate the relationship between educational assortative marriage and children's academic achievement, we control for several demographic variables, including the highest level of parental education, gender and grade of children. By including the highest level of parental education into our analysis, we can compare the educational homogamy, hypergamy, and hypogamy among children who have at least one parent sharing the same highest level of education.

Analytic strategies

Descriptive statistics and multivariate regression were employed. Student weights were used to make results generalizable to the population of 15-year-old students for each country.

Preliminary Results

Descriptive Results

On average, across 64 societies, approximately 68 percentage of 15-year-old children had parents with same educational level. Russian Federation had the highest percentage of educational homogamy marriage: almost nine out of ten children in Russian had parents with same level of education. By country, Uruguay was the country with the lowest level of educational homogamy marriage: that is, about the half of children living with parents having same level of education.

In addition, the average percentage of children whose father had higher educational attainment than their mother is approximately15.3 among 64 societies. Denmark had the highest percentage of hypergamy marriage, where nearly a quarter of children whose father had a higher level of education than their mother.

Finally, the average percentage for hypogamy marriage is about 17.1 percent. Turkey had the highest proportion of hypogamy marriage with three out of 10 children whose mother had higher education than their father.

Table 1. Descriptive Statistics for Types of Educational Assortative Marriages

	Country	Hypergamy Marriage (%)	Homogamy Marriage (%)	Hypogamy Marriage (%)
1	Albania	12.86	70.52	16.61
2	United Arab Emirates	7.85	67.73	24.42
3	Argentina	22.16	63.03	14.81
4	Australia	19.92	59.09	20.99
5	Austria	17.14	58.75	24.11
6	Belgium	15.19	70.12	14.70
7	Bulgaria	14.74	74.24	11.02
8	Brazil	23.23	58.37	18.40
9	Canada	14.72	71.63	13.64
10	Switzerland	12.37	69.50	18.13
11	Chile	16.40	65.05	18.55
12	Colombia	19.85	60.51	19.64
13	Costa Rica	13.10	72.53	14.37
14	Czech Republic	17.15	63.10	19.75
15	Germany	12.63	64.46	22.91
16	Denmark	24.50	62.94	12.56
17	Spain	19.83	62.07	18.11
18	Estonia	14.30	75.85	9.85
19	Finland	18.46	68.87	12.67
20	France	19.72	60.98	19.30
21	United Kingdom	18.18	68.82	13.00
22	Greece	18.21	60.76	21.03
23	Hong Kong	18.36	61.70	19.93
24	Croatia	15.86	64.69	19.45
25	Hungary	18.32	68.63	13.05
26	Indonesia	14.70	64.91	20.39
27	Ireland	20.95	64.11	14.94
28	Iceland	15.24	65.22	19.54
29	Israel	15.48	65.66	18.86
30	Italy	20.00	61.81	18.19
31	Jordan	15.60	62.82	21.58
32	Japan	16.82	62.04	21.15
33	Kazakhstan	7.51	86.67	5.82
34	Korea, Republic of	10.11	64.95	24.93
35	Liechtenstein	10.79	65.83	23.38
36	Lithuania	8.95	83.21	7.83
37	Luxembourg	11.06	69.14	19.80
38	Latvia	12.43	81.54	6.03
39	Macao - China	19.47	60.68	19.85
40	Mexico	19.57	58.21	22.22
41	Montenegro	12.90	69.53	17.58
42	Malaysia	11.01	74.87	14.12
43	Netherlands	9.16	81.19	9.65
44	Norway	12.80	77.28	9.91
45	New Zealand	14.47	65.54	19.98
46	Peru	11.30	68.83	19.86
47	Poland	19.44	64.82	15.74
48	Portugal	22.89	60.94	16.17
49	Qatar	9.94	70.18	19.88
50	Shanghai-China	14.15	67.23	18.62
51	Romania	10.59	75.69	13.71
52	Russian Federation	5.69	89.96	4.35

53	Singapore	12.02	75.29	12.69
54	Serbia	12.58	74.51	12.92
55	Slovakia	17.00	64.11	18.89
56	Slovenia	15.75	70.00	14.25
57	Sweden	22.81	64.59	12.60
58	Taipei	14.67	68.55	16.78
59	Thailand	11.62	71.55	16.83
60	Tunisia	10.43	62.89	26.67
61	Turkey	7.65	62.20	30.15
62	Uruguay	21.88	54.06	24.06
63	United States	17.46	69.44	13.10
64	Viet Nam	15.75	64.79	19.46
	Average	15.28	67.64	17.09

OLS Regression Results

We examined how educational assortative marriage was associated with children's math achievement for each of 64 societies by conducting the OLS regression. Here, we summarize four different patterns of the relationship between educational assortative marriage and children's math achievement (see Table 2).

First, we found that 34 out of 64 societies showed a positive relationship between educational homogamy marriage and children's math achievement. In other words, in these 34 societies, children with hypogamy or hypergamy parents showed significantly lower math scores than children with educational homogamy parents, after controlling for the highest level of parental education, grade and gender. The United States was one example in the first category. Children in the United States who had educationally hypogamy or hypergamy parents performed significantly worse on math than their counterparts who had educationally homogamy parents.

Second, we found that in 14 societies, although children who had educationally hypogamy or hypergamy parents showed lower math achievement than their counterparts who had educationally homogamy parents, one of the coefficients for either hypogamy or hypergamy was not statistically significant. For example, In Sweden, children whose parents had different levels of education were worse off than their peers whose parents had the same highest level of education, especially for children whose father had a higher level of education than their mother. However, the negative coefficient for children whose father's education lower than their mother's education was small and not statistically significant, suggesting that there was no significant difference between children with educationally homogamy parents and these with hypogamy parents in Sweden.

Third, we found that in 12 societies children with either educationally hypogamy or hypergamy parents tended to show better performance on math than those with educationally homogamy parents, but this difference was not statistically significant. These societies include Slovenia, Latvia, Lithuania, Hungary, Austria, Netherlands, Montenegro, Luxembourg, Croatia, Hong Kong, United Kingdom, and Albania.

Finally, we found that in three societies, both children with hypogamy and hypergamy parents tended to be better off than their peers whose parents had same highest level of education, but this difference was again not statistically significant. These societies included Slovakia, Macao in China and Estonia.

Table 2. Patterns of Parents' Educational Homogamy Marriages and Children's Math Achievement

Math Score	Pattern 1 (United States as an example of 34 societies)		Pattern 2 (Sweden as an example of 14 societies)		Pattern 3 (Austria as an example of 12 societies)		Pattern 4 (Slovakia as an example of 4 societies)	
(Reference: Homogamy Parents)	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
Hypogamy	-9.65**	3.74	-0.13	4.02	-1.52	3.26	1.30	3.80
Hypergamy	-18.02***	3.36	-9.14***	3.22	4.59	3.66	0.14	4.03
Highest Level of Education	14.97***	0.95	7.38***	1.13	10.75***	1.23	7.56***	1.15
Female	-11.92***	2.40	-3.24	2.55	-24.75***	2.53	-11.87***	2.78
Grade	43.60***	2.30	94.63***	5.81	41.72***	2.25	55.60***	2.08
_cons	7.81	23.18	-386.92***	52.14	92.17***	21.57	-58.39**	19.90
Adj. R-Square	11.79		0.0662		0.1013		0.15	
Number of Observations	4869		4496		4631		4606	

Notes: $p<0.001$ ***, $p<0.01$ **, $p<0.05$ *

In sum, this paper investigated cross-national differences in the relationship between educational assortative marriage and children's math achievement. In many societies, parents' educationally homogamy marriage was positively associated with children's math achievement. This finding suggests that indeed the influence of educational assortative marriage actually goes further to the next generation in these countries. Yet, we did not find a significant relationship between educational assortative marriage and children's academic performance in some other countries. A question then raises as to under what context educational assortative marriage has a significant consequence for children's educational outcomes. In the complete paper, we will address this question by further investigating how national contexts and policy environments (e.g., family policy) shape the relationship between educational assortative marriage and children's academic achievement.

Reference:

Blossfeld, Hans-Peter, and Andreas Timm, eds. 2003. *Who marries whom?: educational systems as marriage markets in modern societies*. Vol. 12. Springer Science & Business Media.

Blossfeld, Hans-Peter. 2009. "Educational assortative marriage in comparative perspective." *Annual review of sociology* 35: 513-530.

Davis-Kean, Pamela E. 2005. "The influence of parent education and family income on child achievement: the indirect role of parental expectations and the home environment." *Journal of family psychology* 19, no. 2: 294.

Desforges Charles, and Alberto Abouchaar. 2003. *The impact of parental involvement, parental support and family education on pupil achievement and adjustment: A review of literature*. London: DfES Publications.

Jeynes, William H. "The relationship between parental involvement and urban secondary school student academic achievement a meta-analysis." *Urban education* 42, no. 1 (2007): 82-110.

Magnuson, Katherine. "Maternal education and children's academic achievement during middle childhood." *Developmental psychology* 43, no. 6 (2007): 1497.

Mare, Robert D. 1991. "Five decades of educational assortative mating." *American sociological review*: 15-32.

McClendon, David, Janet Chen-Lan Kuo, and R. Kelly Raley. 2014. "Opportunities to Meet: Occupational Education and Marriage Formation in Young Adulthood." *Demography* 51, no. 4:1319-1344.

Roksa, Josipa, and Daniel Potter. "Parenting and Academic Achievement Intergenerational Transmission of Educational Advantage." *Sociology of Education* 84, no. 4 (2011): 299-321.

Schwartz, Christine R. 2013. "Trends and variation in assortative mating: Causes and consequences." *Annual Review of Sociology* 39: 451-470.

Smits, Jeroen, and Hyunjoon Park. 2009. "Five decades of educational assortative mating in 10 East Asian societies." *Social Forces* 88, no. 1: 227-255.

Smits, Jeroen, Wout Ultee, and Jan Lammers. 1998. "Educational homogamy in 65 countries: An explanation of differences in openness using country-level explanatory variables." *American Sociological Review*: 264-285.

Sweeney, Megan M., and Maria Cancian. 2004. "The changing importance of white women's economic prospects for assortative mating." *Journal of Marriage and Family* 66, no. 4:1015-1028.

Yamamoto, Yoko, and Susan D. Holloway. "Parental expectations and children's academic performance in sociocultural context." *Educational Psychology Review* 22, no. 3 (2010): 189-214.