# The Intergenerational Transmission of Education: A Case Study from Iceland

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## Abstract

We estimate the relation between parents' education and the education of their children, using survey data from Iceland. We find a positive correlation between the education of parents and their children, as well as a positive correlation between parents' emphasis on the importance of education and their children's education. Parents with strong educational emphasis do not necessarily need to have high educational attainment in our sample. The mother's education appears to matter somewhat more than that of the father. In a multiple regression analysis, we find a positive and statistically significant effect of both the mother and the father's education on the educational attainment of children as well as an effect of the mother and the father's emphasis of the importance of education, while controlling for gender, age and residence. The results show that parents' emphasis on education has almost the same effect on children as the parents' education level. We attempt to make a comparison between the correlation in Iceland and in other countries, in particular the four Nordic countries that have a weaker transmission between generations than most other nations. We find that it is lower in Iceland than the Nordic average. Finally, we find that the influence of parents has not changed much over time by omitting the youngest cohort between the ages of 24 and 35.

**Keywords:** Education; generations; transmission.

## Introduction

We study how educational attainment persists across generations using data from Ice-
land. We use survey data to derive measures of the correlation of parents' education
and that of their children as well as the emphasis they place on education using multiple
regression. The results are then used to compare the intergenerational transmission of
education in Iceland to that of other countries, in particular the four Nordic countries.

It has been observed in many countries that children whose parents have higher edu-
cation tend to seek more education for themselves.[1] While a large literature exists on this
subject in other countries, there is, to our knowledge, no published analysis of this issue
using data from Iceland. We will use data assembled for this study to explore the inter-
generational linkages in Iceland. A positive relation between the educational level of
parents and children can be due to both individual circumstance as well as the structure
of the education system. We will distinguish between the individual circumstances that
stem from the education level of parents and how much they emphasise the merits of
education. In order to understand the influence of the system of education, we compare
the intergenerational linkages to those in other countries.

The paper starts with a comparison of the distribution of educational attainment
levels in the Nordic countries and other European countries. The comparison should
give insight into how educational distributions reflect social mobility and opportunities.
Next, we estimate the correlation between the educational attainment of parents and
children, using our data. Finally, a multiple linear regression analysis is performed where
the dependent variable is the respondent's educational attainment and the regressors in-
clude the educational attainment of the parents, as well as a measure of how much they
emphasise education. We also include respondent's age and gender, as well as a dummy
variable for the capital region.[2] A key result is the estimated coefficients of parents'
educational attainment level and their emphasis on the value of education as predictors
of their child's educational achievements. We compare our results to published results
on the intergenerational correlation in other countries. The results are discussed in the
final section of the paper.

## 1. A brief survey of the literature

There are many individual factors, which may affect children's choice of education. Par-
ents may be role models to their children when it comes to the choice of education and
they may instil values conducive to better school performance. Their income provides
opportunities for extracurricular activities that may enhance non-cognitive skills, which
may be more important than their IQ (see Duckworth & Seligman 2005). Legewie and
Diprete (2012) studied German data on 9-10 year old elementary school pupils in order
to explore to what extent school performance depended on the social class of parents.
They found that boys from families belonging to higher social classes had a more posi-
tive attitude towards schooling while the attitude of girls depended less on the social
status of parents. In an earlier study using U.S. data on primary school children in Balti-
more, Entwisle, Alexander, and Olson (2007) found that the reading ability of boys was

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lower than for girls when they were eligible for subsidised school meals but equal if they did not. The authors postulated that the fathers of boys receiving subsidised meals had less education than those who did not. They drew the conclusion that the economic or social status of parents mattered for boys' performance. Erikson et al. (2005) studied the relation between the social class of parents and the academic performance of 16-year old students in the U.K. They found that more children from the higher social classes entered A-level education (advanced level academic qualification) and attributed this to higher levels of academic performance and, in addition, to fewer children from lower class background continuing to A level education. These authors found that the effect of lower academic performance are three times larger than the effect of different choices.

We will separate the education of parents from their emphasis on the value of education for the children. Thus, we will ask survey respondents about both the education of their parents as well as on how much they emphasised education in their upbringing. Davis-Kean (2005) studied how socioeconomic status, that is parents' education and income, was related to children's academic achievement through parents' beliefs and behaviours using U.S. data on 8-12 year olds. They found that socioeconomic factors were related indirectly to the academic achievement of children though parents' beliefs and behaviours. Dubow, Boxer, and Huesmann (2009) used the Columbia County Longitudinal Study to study the predictors of individual's educational and occupational success at age 48 based on the education of parents, controlling for indices of socioeconomic status and children's IQ. They found no direct effect but indirect effects going through educational aspirations at age 19. Halle et al. (1997) studied low-income families in the U.S. and found that mothers with higher education had higher expectations for their children's school performance and that these expectations translated into subsequent performance in mathematics and reading. Piopiunik (2014) studied the compulsory schooling reforms that were implemented in West German states between 1946 and 1969 and found that an additional year of schooling for women strongly affected the education of their sons. He found that individuals with more schooling value their children's educational success more than other parents did. Holmlund, Lindahl, and Plug (2011) found similar results for Sweden.

There are also studies of the role of genetic makeup in academic performance. Dominique et al. (2015) used a pool of 125,000 people from Western Europe, Australia, and the US, and identified genetic markers that contributed to a person's level of education. They used genome-wide data from siblings to study the relation between polygenic scores and educational attainment. They found that, among pairs of siblings, the sibling with the higher polygenic score typically completed more years of schooling. Black et al. (2005) reached a similar conclusion. They took advantage of a natural experiment using educational reforms in Norway that increased the length of compulsory education. They found that significant OLS estimates of the effect of parent's education on children's education did not mainly reflect a causal effect of education spillovers but rather reflected the effects of inherited ability. However, they did find some evidence that mother's length of education affected the education of sons. In contrast, Silles

(2017) found evidence for the effect of nurture on educational choices. She used a large sample of adoptees taken from the American Community Survey and found that while the mother's education was not an important determinant of the education of adopted children, the father had a statistically significant effect on the grades of these children.

The education system also matters for the generational transmission of education. The education system may be designed around the needs and values of children coming from the middle and upper echelons of society. In addition to the investment in private and public education, the returns to education also influence children's educational attainment (see Huang 2012). Van Doorn, Pop, and Wolbers (2011) found that both the level of industrialization and female Labor force participation had a positive effect on the educational level of respondents. We explore whether Iceland's intergenerational education transmission is similar to that of other Nordic nations, which offer equal access to education through a public school system. The countries most comparable to Iceland in terms of the system of education, the tax system, and the distribution of income are the other four Nordic countries. It has been found that the Nordic countries have, on average, lower parent-child education correlation than other OECD countries (see Black & Devereux 2011; Hertz et al. 2008), indicating greater intergenerational mobility, i.e., the opportunity for children of low-education parents to acquire higher education. For example, Hertz et al. (2008) found that the Nordic countries had an average correlation of .34 when education was measured by the number of years spent in school, while the non-Nordic average was .41. These were Denmark (.30), Finland (.33), Norway (.35), and Sweden (.40).[3]

## 2. Descriptive evidence from EU-SILC data

To our knowledge, there are no papers on the intergenerational transmission of education in Iceland. However, *Eurostat* collected data from 36 countries, including Iceland, on the transmission of educational attainment from parents to children. The number of participants was 1,026, aged 25 to 59 years. Educational levels were categorised using the *International Standard Classification of Education* (ISCED). The education of parents was categorised according to ISCED97, which has six classes of education. The children's education was classified by ISCED2011, which has nine levels. Both parents and current adults' educational levels were aggregated into three distinct groups, which are shown in Table 1.

**Table 1.** Classifications of ISCED97 and ISCED2011

| Education | ISCED97 (parents) | ISCED2011 (children) |
|---|---|---|
| Low | Pre-orimary, primary, and lower secondary education (levels 0-2) | Less than primary, primary, and lower secondary education (levels 0-2) |
| Medium | Upper secondary and post-secondary non-tertiary education (levels 3 and 4) | Upper secondary and post-secondary non-tertiary (levels 3 and 4) |
| High | First and second strage of tertiary education (levels 5 and 6) | Short-cycle tertiary, bachelor or equivalent, masters or equivalent and doctoral or equivalent (levels 5-8) |

Source: https://circabc.europa.eu/sd/a/3b3f4939-5e18-478d-b954-42e112f8ed05/SECTION1_EA(0).htm

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In Table 2, we show Eurostat data from ten countries: the five Nordic countries and Britain, France, Italy, Germany, and Ireland. The table shows the proportion of individuals belonging to each educational group for each educational group of parents. Thus, each line can be read as showing how the children of each group of parents fare. The parents' education is on the vertical left side in each table, and children's education is on the horizontal top row.[4] The table shows that the Nordic countries' educational distribution patterns were more similar to one another than to the other EU countries.

What mainly distinguished between Nordic and non-Nordic countries with the exception of Germany, is that in the Nordic countries a lower proportion of children of high-education and medium-education parents went to university while the proportion of children of people with low education who went to university was no higher. Iceland shares the pattern of the other Nordic countries.

**Table 2.** Children's education by parents' education for ten European countries (EU-SILC 2011 results)

| Iceland | Children's edu. Level proportions | | | Sum across columns |
|---|---|---|---|---|
| Parents' disbtib. | Level 0-2 | Level 3-4 | Level 5-8 | |
| Level 0-2 | 48.3% | 32.8% | 18.9% | 100% |
| Level 3-4 | 32.2% | 36.2% | 31.7% | 100% |
| Level 5-6 | 13.8% | 25.7% | 60.5% | 100% |

| Britain | Children's edu. Level proportions | | | Sum across columns |
|---|---|---|---|---|
| Parents' disbtib. | Level 0-2 | Level 3-4 | Level 5-8 | |
| Level 0-2 | 47.1% | 32.6% | 20.3% | 100% |
| Level 3-4 | 18.2% | 42.0% | 39.8% | 100% |
| Level 5-6 | 5.6% | 25.8% | 68.6% | 100% |

| Denmark | Children's edu. Level proportions | | | Sum across columns |
|---|---|---|---|---|
| Parents' disbtib. | Level 0-2 | Level 3-4 | Level 5-8 | |
| Level 0-2 | 46.9% | 33.8% | 19.4% | 100% |
| Level 3-4 | 34.0% | 36.4% | 29.6% | 100% |
| Level 5-6 | 15.7% | 27.8% | 56.6% | 100% |

| France | Children's edu. Level proportions | | | Sum across columns |
|---|---|---|---|---|
| Parents' disbtib. | Level 0-2 | Level 3-4 | Level 5-8 | |
| Level 0-2 | 40.8% | 37.4% | 21.8% | 100% |
| Level 3-4 | 15.3% | 26.5% | 58.2% | 100% |
| Level 5-6 | 8.9% | 17.7% | 73.4% | 100% |

| Norway | Children's edu. Level proportions | | | Sum across columns |
|---|---|---|---|---|
| Parents' disbtib. | Level 0-2 | Level 3-4 | Level 5-8 | |
| Level 0-2 | 50.3% | 34.1% | 15.5% | 100% |
| Level 3-4 | 32.9% | 39.3% | 27.9% | 100% |
| Level 5-6 | 21.2% | 25.4% | 53.5% | 100% |

| Italy | Children's edu. Level proportions | | | Sum across columns |
|---|---|---|---|---|
| Parents' disbtib. | Level 0-2 | Level 3-4 | Level 5-8 | |
| Level 0-2 | 45.6% | 34.3% | 20.1% | 100% |
| Level 3-4 | 8.8% | 36.7% | 54.5% | 100% |
| Level 5-6 | 2.3% | 16.9% | 80.8% | 100% |

| Finland | Children's edu. Level proportions | | | Sum across columns |
|---|---|---|---|---|
| Parents' disbtib. | Level 0-2 | Level 3-4 | Level 5-8 | |
| Level 0-2 | 43.7% | 34.7% | 21.6% | 100% |
| Level 3-4 | 31.8% | 34.7% | 33.5% | 100% |
| Level 5-6 | 13.8% | 28.9% | 57.4% | 100% |

| Germany | Children's edu. Level proportions | | | Sum across columns |
|---|---|---|---|---|
| Parents' disbtib. | Level 0-2 | Level 3-4 | Level 5-8 | |
| Level 0-2 | 72.2% | 17.0% | 10.8% | 100% |
| Level 3-4 | 29.8% | 42.2% | 28.1% | 100% |
| Level 5-6 | 13.4% | 27.7% | 58.9% | 100% |

| Sweden | Children's edu. Level proportions | | | Sum across columns |
|---|---|---|---|---|
| Parents' disbtib. | Level 0-2 | Level 3-4 | Level 5-8 | |
| Level 0-2 | 53.1% | 33.0% | 14.0% | 100% |
| Level 3-4 | 31.8% | 38.3% | 30.0% | 100% |
| Level 5-6 | 13.9% | 26.7% | 59.4% | 100% |

| Ireland | Children's edu. Level proportions | | | Sum across columns |
|---|---|---|---|---|
| Parents' disbtib. | Level 0-2 | Level 3-4 | Level 5-8 | |
| Level 0-2 | 47.5% | 34.4% | 18.2% | 100% |
| Level 3-4 | 25.2% | 35.6% | 39.2% | 100% |
| Level 5-6 | 6.2% | 24.3% | 69.6% | 100% |

Source: Eurostat.

It is interesting that the Nordic countries differed from the rest, Germany not included, in children of university-educated parents (as well as those with medium education) who choose not to go to university, while the proportion of children of the least-educated parents who did make it to university was similar across the whole sample, again Germany being an exception. Germany resembles the Nordic countries in that a smaller fraction of children of university-educated parents choose to go to university and a higher fraction end up in the lowest or the middle education category. However, Germany differs from all other countries in the table in that a large fraction of children of parents in the lowest category end up in that same category or 72.2%.

Differences in the return to education might help us explain this pattern in the data. Blanden (2013) showed that countries with a higher return to education typically had a lower intergenerational income mobility coefficient. She took France and Italy as examples of countries with a high return to education and low-income mobility in contrast to the Nordic countries. A lower university wage premium may explain why more children of high-education parents choose not to go to university.

## 3. Method and descriptive results

Our dataset was collected specifically for this study using a web-survey by the marketing research firm *Maskína Research* in 2017. The sample of 1,800 people was drawn from Maskina's panel of about 20,000 Icelanders who were originally chosen randomly from the National Registry of Iceland. All members of the panel have an email address, which was used to contact them.[5] There were 871 individuals who responded to the survey, which is a 48.4% response rate – a typical response rate in web-surveys of this kind. The average time it took to answer the survey was less than 10 minutes, which is below the recommended maximum length of 20 minutes in web surveys (Callegaro, Lozar Manfreda, & Vehovar 2015). All answers were weighted with the representative proportion of gender, age group, and residence for the whole population according to the National Registry. The respondents were between 25 and 69 years of age and with a roughly equal proportion of females and males. The upper limit in age is somewhat arbitrary, but we decided to contact people who were younger than 70 years old.

The survey was conducted in Icelandic, as the purpose was to generalize the results to those who have Icelandic as a mother tongue and not to focus on differences in the transmission of education between the indigenous and immigrant populations. The survey included five main questions and a few background questions. The first asked about the participant's own highest educational level. In the next two, respondents were asked about the highest educational level of their mother and their father, or the individual who represented them in the participant's upbringing. Finally, there were questions about the mother and the father's emphasis on the value of education. The first three questions had an ordinal scale from *not finishing primary education* to the last option of *finished a doctoral degree*. The answer to the two questions about parents' emphasis on their

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children's education ranged from *very much* to *very little to none*. Table 3 shows the number of observations ($N$), the mean ($M$), range, and standard deviation ($S$) of the data.

**Table 3.** Summary statistics for data with separate parents' educational attainment levels

| Variables | N | M | Range | S |
|---|---|---|---|---|
| Children's education | 871 | 4.81 | 1 to 8 | 1.53 |
| Mother's education | 871 | 3.19 | 1 to 8 | 1.67 |
| Father's education | 871 | 3.87 | 1 to 8 | 1.67 |
| Mother's educational emphasis | 864 | 6.13 | 1.6 to 8 | 1.69 |
| Father's educational emphasis | 856 | 6.04 | 1.6 to 8 | 1.70 |
| Highest parent's education | 871 | 4.22 | 1 to 8 | 1.66 |
| Highest parent's educational emphasis | 856 | 6.44 | 1.6 to 8 | 1.54 |
| Average parents' education | 871 | 3.54 | 1 to 7.5 | 1.43 |
| Average parents' educational emphasis | 871 | 3.81 | 1.6 to 8 | 1.56 |

We classify our education levels in a way comparable to that used in the EU-SILC 2011 data, shown in Table 2. The first part of Table 4 shows the distribution of respondents' education for each level of the mother's education. The next shows the same for the father's education. In the bottom part, the parents' education was measured by the education of the parent with the higher level. Using only the highest education of parents, or the individual who represented them in the participant's upbringing, is a common method of displaying parents' education and is the only method comparable to tables built from the EU-SILC 2011 data.[6]

A comparison can be made between Tables 2 and 4 by including only the highest education of either parent in Table 4. We see that no dramatic differences exist between the two tables. Some features were different, though. The most noticeable change was a slight lean in Table 4 towards high education in both the low- and the high-educated parental groups, implying that the respondents had better education than their parents did. Children of mothers with low and medium education are somewhat more likely to get university education and less likely to get low education and children of high education parents are less likely to end up in the bottom group than in Table 2. The difference between the two tables could indicate some sort of time trend since data in the EU-SILC table were collected in 2011 and the data in Table 4 are from 2017. We see that some elements in Iceland's educational attainment distribution have changed, showing some evidence of a lean towards higher education.

**Table 4.** Children's education by parent's education

| Mother's education | Children's edu. Level proportions | | | Sum |
|---|---|---|---|---|
| Classification | Level 0-2 | Level 3-4 | Level 5-8 | |
| Level 0-2 | 40.8% | 32.4% | 26.8% | 100% |
| Level 3-4 | 21.1% | 40.7% | 38.3% | 100% |
| Level 5-8 | 10.7% | 27.3% | 62.0% | 100% |
| **Father's education** | *Children's edu. Level proportions* | | | Sum |
| Classification | Level 0-2 | Level 3-4 | Level 5-8 | |
| Level 0-2 | 46.7% | 28.5% | 24.8% | 100% |
| Level 3-4 | 28.5% | 40.2% | 31.4% | 100% |
| Level 5-8 | 11.6% | 25.8% | 62.6% | 100% |
| **Highest education** | *Children's edu. Level proportions* | | | Sum |
| Classification | Level 0-2 | Level 3-4 | Level 5-8 | |
| Level 0-2 | 49.1% | 26.5% | 24.4% | 100% |
| Level 3-4 | 31.5% | 41.2% | 27.3% | 100% |
| Level 5-8 | 11.0% | 27.7% | 61.3% | 100% |

Note: The columns show the proportion of respondents belonging to each of three education categories, while the rows show the education levels of their parents. Thus, the first number in the top row says that 40.8% of mothers of individuals in the sample with education level 0-2 also have the same education level.

A common measure for intergenerational education persistence is the correlation between parents and children's educational attainment, which tells us how the educational attainment of the child varies with a change in the parents' education.[7] We measured the variable *parents' education* in three separate ways: first, by including only the educational attainment of the mother; next, by including only the education of the father; and finally, by including only the higher educational attainment of either parent. Table 5 shows the Pearson correlation between the children's education, on the one hand, and that of their mother and father and the emphasis put on education by either parent, on the other hand. This only shows the relative mobility in terms of educational level, i.e. that children's educational level tend to follow parents' educational level, however, not the absolute mobility which would be whether and how much education is increased between generations, as shown, for example, in Tables 2 and 4.

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**Table 5.** Correlations between children's education and parents' education and emphasis on education

|  | Children's education | Mother's education | Father's education | Mother's emphasis | Father's emphasis |
|---|---|---|---|---|---|
| Children's education | 1.00 | .29 | .27 | .23 | .22 |
| Mother's education |  | 1.00 | .45 | .25 | .14 |
| Father's education |  |  | 1.00 | .2 | .27 |
| Mother's emphasis |  |  |  | 1.00 | .69 |
| Father's emphasis |  |  |  |  | 1.00 |

Note: 855 observations, 5% critical value of Pearson's r (two-tailed) = .07

The correlation between respondents' education and their mother's education was .29, slightly higher than the correlation between their education and that of the father, which was .27. The correlation between each parent's emphasis on education and the education of the respondents was only slightly lower than the correlation between their educational level and that of the respondents.

The correlation between the education of the mother and the father was much higher than the correlation between both individual parent's education and that of their children. The correlation between parents' education was .45, indicating that individuals tended to choose partners with similar education. The same applies to an even greater extent to their emphasis on education, where the correlation coefficient was .69. The correlation between the parents' education and their emphasis on education, at .25 and .27, was not strong, as one can see in Table 5. This finding does indicate that parents with strong educational emphasis do not necessarily need to have high educational attainment.

For a more detailed analysis, the education of parents and their educational emphasis was combined into a single variable to show the collective parental effect on their children. Two variables showed the higher educational attainment of the parents, as well as their emphasis on the importance of education, and the other variable showed the average educational attainment of the parents and the average educational emphasis. In Table 6 (6a and 6b), we see that the Pearson correlation of parents' education, measured as both the higher level and the average, with children's education was somewhat higher than the correlation between either parents' emphasis in Table 5. Again, the correlation between the education level and education emphasis of parents is not strong.

**Table 6a.** Correlations between children's education and parents' higher and average education, and parents' higher and average emphasis on education (Individuals 25 years and older)

| | Higher educa-tion level | Higher education-al emphasis | Average educa-tion level | Average educa-tional emphasis |
|---|---|---|---|---|
| Children's education | .31 | .25 | .33 | .25 |
| Higher education level of parents | 1.00 | .26 | .93 | .24 |
| Higher educational emphasis of parents | | 1.00 | .28 | .93 |
| Average education level of parents | | | 1.00 | .27 |
| Average educational emphasis of parents | | | | 1.00 |

Note: 871 observations. 5% critical value of Pearson's r (two-tailed) = .07. The first row shows the correlation between children's education (three groups, as in Table 4), on the one hand, and the education level of the parent with the higher level of education, the emphasis on education by the parent who emphasizes it more, the average level of education of the parents and their average emphasis on education, on the other hand. The remaining rows show the correlation matrix between the parental variables.

**Table 6b.** Correlations between children's education and parents' higher and average education, and parents' higher and average emphasis on education (Individuals 36 years and older)

| | Higher educa-tion level | Higher educa-tional emphasis | Average educa-tion level | Average educa-tional emphasis |
|---|---|---|---|---|
| Children's education | .31 | .24 | .33 | .23 |
| Higher education level of parents | 1.00 | .24 | .93 | .23 |
| Higher educational emphasis of parents | | 1.00 | .26 | .94 |
| Average education level of parents | | | 1.00 | .26 |
| Average educational emphasis of parents | | | | 1.00 |

Note: 754 observations. 5% critical value of Pearson's r (two-tailed) = .08. The first row shows the correlation between children's education (three groups, as in Table 4), on the one hand, and the education level of the parent with the higher level of education, the emphasis on education by the parent who emphasizes it more, the average level of education of the parents and their average emphasis on education, on the other hand. The remaining rows show the correlation matrix between the parental variables.

For a comparison, we rely on Hertz et al. (2008), which gives a comparison of 42 countries' coefficients and correlation over a fifty-year trend. In Table 6a, we find a correlation coefficient for the higher educational attainment of either parent with their children to be .31 for Iceland and a correlation coefficient for the average educational attainment level of both parents with their children to be .33. This correlation was slightly lower than the average correlation for the Nordic countries in Hertz et al. (2008), which was .34, and Iceland had the same correlation as Finland. The only country with a lower correlation than what we found for Iceland was Denmark (.30), while Norway and Sweden had higher correlation coefficients, .35 and .40, respectively. Because the Hertz numbers

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are based on surveys that cover the period before 2008 we repeated our analysis for those who were 36 years of age or older in 2017, which would make them 24 or older in 2005, which was the last year for some of the countries in his study. Table 6b has the correlations for this group of respondents. The results are similar and, if anything, the correlations are slightly lower when the 24-35 age group is omitted.

## 4. Predictors of education levels

Next, we move on to equations that take into account personal characteristics when estimating the intergenerational education linkages. Table 7a and 7b shows the results of ten regression analyses using the method of ordinary least squares.[8] In models 1-3, we used the father and the mother's educational level; in model 4, we added the emphasis on education; and then, in models 5 through 10, we added gender (dummy variable for males), age, age-squared, and a dummy variable for the capital region. The coefficients in Table 7 were all statistically significant.[9,10]

Both coefficients for parents' education were statistically significant, although both models had quite a low adjusted R-squared. Thus, the education of the parents did matter somewhat, but there were many other factors that also mattered. The coefficient for the mother's education was slightly larger than the father's coefficient. In the mother's case, as can be seen in Table 7a, model 1, an increase by one educational category would affect the individual's own highest educational attainment level, increasing it by 0.27 parts towards the next education level. In the second model, we see the same effect only for the father's education. In model 3, both parents' educational levels were included.

In model 4, both parents' education and their educational emphasis were included in the regression. The estimated coefficient for the mother's education was still slightly larger than the parameter for the father, but both coefficients decreased somewhat. In addition, the parents' emphasis on education did influence children's education, with both coefficient estimates significant. The effects of parents' educational emphasis are smaller than the effects of parents' education on children's education.

In model 5, we added gender (dummy variable for male) to the regression. We see that gender's impact was highly significant and increased adjusted R-squared somewhat, and the sign of its coefficient implies that males had lower educational levels, on average, than females. In model 6, a dummy variable measuring whether the individual lived in the capital region or not was included. Its coefficient of .55 was significant at the .01 level. This may be partly due to the migration of educated individuals to the capital region, where demand for their services is greater, as well as a greater demand for workers with higher education creating incentives to acquire further education in the capital area. In models 7 and 8, age and age-squared were added to the regression. Parents' education decreased both with age and with age squared. The latter regression had a higher adjusted R-squared proportion, where age was marginally significant and age-squared was even more significant. This shows that participant's educational level is decreasing in age as described by a non-linear concave function. The explanation can be found in educational attainment rising over time so that the older cohorts have lower levels of education, other things being equal.

<mark>We have found that parents' emphasis on children's education had a sizable effect on the individual's educational level.</mark> The standardized beta coefficient was added to the analysis to further address the question whether parents' educational emphasis or their own education explains children's education better. Models 9 and 10 show the same regression as in models 7 and 8, with standardized coefficients. Because dispersion differs between predictors, their standard deviations must be accounted for to enable a comparison of the effects of the predictors on the dependent variable.[11] Therefore, we used a standardized beta to answer our question. In model 9, the strongest predictor was capital area residence (.18). In model 10, age-squared has been added to capture the non-linearity in the relationship with age. <mark>Again, we find evidence that parents' educational emphasis was almost as important a factor for children's education as the parents' education.</mark> As in the case of Table 6, we tested for robustness by omitting the 24-35 age group in Table 7b. This facilitates comparison with estimates from other countries. The results are similar to the results in Table 7a.

**Table 7a.** Effect of fathers and mother's education and emphasis on educational attainment of children (Individuals 25 years and older)

| Models | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Predictors | Coefficients (t-ratios in parentheses) | | | | | | | | Std. beta | Std. beta |
| Constant | 3.96 *** | 3.85 *** | 3.57 *** | 2.75 *** | 2.84 *** | 2.71 *** | 3.63 *** | 1.37 | 3.63 *** | 1.38 |
| (t-ratio) | (36.99) | (30.54) | (26.94) | (13.12) | (13.49) | (12.97) | (11.83) | (1.51) | (11.83) | (1.51) |
| Mother's education | .27 *** | | .19 *** | .17 *** | .17 *** | .15 *** | .11 *** | .12 *** | .13 *** | .13 *** |
| | (9.00) | | (5.92) | (5.09) | (5.17) | (4.49) | (3.35) | (3.60) | (3.35) | (3.60) |
| Father's education | | .25 *** | .16 *** | .13 *** | .13 *** | .10 *** | .10 *** | .10 *** | .11 *** | .10 *** |
| | | (8.33) | (4.92) | (3.84) | (3.89) | (3.11) | (3.02) | (2.88) | (3.02) | (2.88) |
| Mother's emphasis | | | | .08 ** | .10 *** | .10 ** | .11 *** | .11 *** | .12 *** | .12 *** |
| | | | | (1.98) | (2.38) | (2.48) | (2.65) | (2.71) | (2.65) | (2.71) |
| Father's emphasis | | | | .09 ** | .08 * | .07 * | .08 ** | .09 ** | .09 ** | .10 ** |
| | | | | (2.15) | (1.84) | (1.82) | (2.02) | (2.18) | (2.02) | (2.18) |
| Male | | | | | -.30 *** | -.27 *** | -.24 ** | -.22 ** | -.08 ** | -.07 ** |
| | | | | | (3.00) | (2.80) | (2.51) | (2.29) | (2.51) | (2.29) |
| Capital area | | | | | | .55 *** | 0.55 *** | .56 *** | .18 *** | .18 *** |
| | | | | | | (5.52) | (5.61) | (5.72) | (5.61) | (5.72) |
| Age | | | | | | | -.02 *** | .08 ** | -.13 *** | .58 ** |
| | | | | | | | (4.07) | (2.12) | (4.07) | (2.12) |
| Age^2 | | | | | | | | -.001 *** | | -.71 *** |
| | | | | | | | | (2.62) | | (2.62) |
| Adjusted R-squared | .08 | .07 | .11 | .13 | .14 | .17 | .18 | .19 | .18 | .19 |
| F-statistic | 80.978 | 69.504 | 53.648 | 32.893 | 28.365 | 29,542 | 28.156 | 25.665 | 28.155 | 25.665 |
| Obsercations (n) | 871 | 871 | 855 | 855 | 855 | 855 | 855 | 855 | 855 | 855 |

Note: t statistics in parentheses. *** < .01. ** < .05. * < .10. Method of estimation: Ordinary least squares.

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**Table 7b.** Effect of fathers and mother's education and emphasis on educational attainment of children (Individuals 36 years and older)

| Models | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Predictors | Coefficients (t-ratios in parentheses) | | | | | | | | Std. beta | Std. beta |
| Constant | 3.96 *** | 3.77 *** | 3.51 *** | 2.76 *** | 2.84 *** | 2.69 *** | 4.28 *** | 5.78 *** | 4.28 *** | 5.78 *** |
| (t-ratio) | (33.39) | (27.87) | (24.43) | (12.23) | (12.55) | (11.99) | (11.55) | (3.29) | (11.55) | (3.29) |
| Mother's education | .27 *** | | .19 *** | .17 *** | .17 *** | .15 *** | .12 *** | .12 *** | .12 *** | .12 *** |
| | (7.91) | | (4.87) | (4.33) | (4.41) | (3.92) | (3.11) | (3.06) | (3.11) | (3.06) |
| Father's education | | .26 *** | .18 *** | .15 *** | .15 *** | .12 *** | .11 *** | .11 *** | .12 *** | .12 *** |
| | | (8.05) | (5.98) | (4.06) | (4.13) | (3.31) | (3.11) | (3.14) | (3.11) | (3.14) |
| Mother's emphasis | | | | .05 | .07 | .07 | .09 * | .09 * | .09 * | .10 * |
| | | | | (1.15) | (1.58) | (1.63) | (1.95) | (1.95) | (1.95) | (1.95) |
| Father's emphasis | | | | .10 ** | .08 * | .09 * | .10 ** | .10 ** | .11 ** | .11 ** |
| | | | | (2.21) | (1.89) | (1.90) | (2.22) | (2.18) | (2.22) | (2.18) |
| Male | | | | | -.30 *** | -.26 ** | -.21 ** | -.21 ** | -.07 ** | -.07 ** |
| | | | | | (2.76) | (2.47) | (1.97) | (2.01) | (1.97) | (2.01) |
| Capital area | | | | | | .62 *** | .62 *** | .62 *** | .20 *** | .20 *** |
| | | | | | | (5.74) | (5.91) | (5.88) | (5.91) | (5.88) |
| Age | | | | | | | .03 *** | -.09 | .18 *** | -.52 |
| | | | | | | | (5.33) | (1.33) | (5.33) | (1.33) |
| Age^2 | | | | | | | | .001 | | .35 |
| | | | | | | | | (0.88) | | (0.88) |
| Adjusted R-squared | .08 | .08 | .11 | .12 | .13 | .17 | .20 | .20 | .20 | .20 |
| F-statistic | 62.621 | 64.872 | 45.268 | 26.886 | 23.231 | 25.703 | 26.921 | 23.644 | 26.921 | 23.644 |
| Obsercations (n) | 754 | 754 | 754 | 739 | 739 | 739 | 739 | 739 | 739 | 739 |

Note: t statistics in parentheses. *** < .01. ** < .05. * < .10. Method of estimation: Ordinary least squares.

To study further the different effects of highest and average education level of parents and their emphasis on education, we analysed five different regression models using standardised betas, where both the average and the higher level of education and emphasis on education were included together (see Table 8). In the first three models, we see that parents' average education had a greater effect than the higher-educated parent's education, which was non-significant. Throughout the models 3-6, the parents' highest education never became a significant predictor, whereas the coefficient of the parents' average education remained strong and significant, indicating that the combined effect of both parents explained individuals' educational level more than the effect of only the better educated parent did. In models 4 and 5, we see that parents' average educational emphasis had the same effect on an individual's educational level as the highest emphasis did. In model 6, neither the parents' highest nor their average educational emphasis was significant; only the average level of education was. However, the insignificance of the standardized coefficients of the average emphasis and highest emphasis of parents is

probably due to a high variable inflation factor (multicollinearity). Again, we repeat the analysis for the 36 years and over age group and present the results in Table 8b. The results are similar.

**Table 8a.** OLS results with parents' data merged (Individuals 25 years and older)

| Models | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Predictors | Standardized beta (t-ratios in parentheses) | | | | | |
| Constant | 3.56 * | 3.61 * | 3.55 * | 2.71 * | 2.75 * | 2.62 * |
| (t - ratio) | (27.14) | (26.78) | (26.29) | (11.95) | (12.90) | (11.82) |
| Parents' average education | .33 * | | .30 * | .23 * | .27 * | .24 * |
| | (10.35) | | (3.52) | (2.81) | (3.19) | (2.87) |
| Parents' highest education | | .31 * | .04 | .05 | .02 | .03 |
| | | (9.67) | (0.42) | (0.60) | (0.34) | (0.49) |
| Parents' average emphasis | | | | .17 * | | .06 |
| | | | | (5.12) | | (0.63) |
| Parents' highest emphasis | | | | | .16 * | .13 |
| | | | | | (4.82) | (1.39) |
| Adjusted R-squared | .11 | .10 | .11 | .13 | .13 | .13 |
| F-statistic | 107.025 | 93.503 | 53.551 | 44.927 | 44.341 | 34.215 |
| Observations (n) | 871 | 871 | 871 | 865 | 871 | 865 |

Note: * $p < .01$.

**Table 8b.** OLS results with parents' data merged (Individuals 36 years and older)

| Models | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Predictors | Standardized beta (t-ratios in parentheses) | | | | | |
| Constant | 3.51 ** | 3.56 ** | 3.49 ** | 2.72 ** | 2.77 ** | 2.64 ** |
| (t - ratio) | (24.59) | | (23.94) | (11.95) | (12.12) | (11.09) |
| Parents' average education | .33 ** | | .28 ** | .22 * | .25 ** | .23 * |
| | (9.52) | | (3.01) | (2.39) | (2.75) | (2.44) |
| Parents' highest education | | .31 ** | .06 | .07 | .05 | .06 |
| | | (9.00) | (0.61) | (0.79) | (0.55) | (0.70) |
| Parents' average emphasis | | | | .16 ** | | .04 |
| | | | | (4.38) | | (0.41) |
| Parents' highest emphasis | | | | | .14 ** | .13 |
| | | | | | (4.10) | (1.23) |
| Adjusted R-squared | .11 | .10 | .11 | .13 | .12 | .13 |
| F-statistic | 90.653 | 80.992 | 45.474 | 36.890 | 36.564 | 28.065 |
| Observations (n) | 754 | 754 | 754 | 748 | 754 | 748 |

Note: * $p < .05$ and ** $p < .01$.

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The measured effect of parents' education in Iceland was lower than in almost all other countries studied by Hertz et al. (2008). Our highest estimate for the standardised coefficient of parents' education for Iceland was .34, when both parents' educational levels were measures by a single explanatory variable. Hertz et al. (2008) found that the estimated coefficients for the other Nordic countries were .49 for Denmark, .40 for Norway, .58 for Sweden, and .48 for Finland. All coefficients are higher than what we found in our data for Iceland.

To address differences in the measurement methods used in the comparative research, we need to point out that in our research we used the highest educational attainment level of both parents and children, whereas Hertz et al. (2008) used the average number of schooling years for parents and the number of schooling years for children. They also categorised years of schooling into four different categories (none, primary, secondary, college) and found that the intergenerational correlation was not greatly affected. This indicates that our correlation coefficient was comparable to the findings of Hertz et al. (2008). This confirms our findings of a particularly low regression coefficient in Iceland for the effect of parents' education on their children's education, as well as comparably high educational mobility in Iceland.

## 5. Conclusion

Education plays an important role in the transmission of income status between generations. In this paper, we examined how parents' education and their emphasis on education are correlated with their children's level of education. We found a positive correlation between the education of individuals and both parents and the correlation is lower than the Nordic average. This indicates that educational mobility in Iceland is higher, on average, than in the Nordic countries. In addition, the estimated coefficient measuring the relation between the education of parents and their children for Iceland proved considerably lower than the coefficients reported in Hertz et al. (2008) for other countries. Iceland's coefficient was the second lowest in all of their comparison countries. The low correlation reflects the extent to which the school system benefits students with different backgrounds.

We found that parents' educational emphasis was a strong determining factor in their children's education, having almost the same effects on children's educational attainment as the parent's education level. Interestingly, the correlation between the education and educational emphasis of either parents is only around .25. We also found that the mother's education had a stronger effect on her children's education than that of the father. Other factors, such as gender and residence, also had a significant effect on children's education.

What should we conclude from our analysis? At a normative level, a zero correlation between the education of parents and children is neither a realistic nor a desirable goal of public policy. This would require interference in the life of families that would infringe on our rights to privacy. Moreover, there is nothing wrong, and a lot to be commended, with parents instilling values conducive to academic success, prodding their

children to study and creating an environment in which they can flourish. However, these considerations do not preclude policies intended to help those less fortunate in their family surroundings from being able to do better than their parents. There is also a question of fairness of the school system when it comes to the mechanisms of transmission of income from parents to children. Policy should attempt to widen opportunities, combat the effect of unfair treatment due to discrimination and improve the quality of public schools.

From our analysis, we can also conclude that instilling values that emphasise the importance of education influences the educational choices of children irrespective of the education of parents. Thus, a policy to promote constructive values among the youth may improve academic performance.

## Acknowledgement

## Disclosure statement

We, the authors, declare that there were no competing interests for us in this research.

## Endnotes

1    See, amongst others, Klebanov et al. (1994), Haveman and Wolfe (1995), Nagin and Tremblay (2001) and Smith, Brooks-Gunn, and Klebanov (1997).

2    The capital region consists of Reykjavik, Kópavogur, Hafnarfjörður, Garðabær, Seltjarnarnes, Mosfellsbær and Kjósarhreppur.

3    Peru had the highest correlation coefficient (.66) – indicating low educational mobility between generations – followed by six other Latin-American countries whose coefficients ranged from .55 to .61.

4    First, to be able to compare the children's educational proportional distributions within each level of parental education from the EU-SILC 2011 data, it was necessary to recode how the distributions were represented. Instead of showing the proportions of parents' educational level within each group of their children's education, as in the original representation of the data, the proportions were rearranged to show the proportions of children in each group for each parental group.

5    Web surveys are the most used method of collecting survey data according to A. Palsson, director of data collection and analysis at Maskina, personal communication, November 23, 2020.

6    Van Doorn et al. (2011) used the measure for only the better-educated parent and stressed that the most important effect is that of the parent with the highest educational attainment. Another common form of measuring parents' education is measuring the average education level of parents. Which method is preferred is irrelevant for a *correct* interpretation, as is pointed out by Hertz et al. (2008, 26).

7    Hertz et al. (2008) pointed out that the advantages of the correlation coefficient are that it takes the dispersion of status into account for each generation. In addition, it has proven more robust to alternative coding assumptions and is less volatile over time than the regression coefficient. Another advantage of the correlation coefficient is that it does not change with trends across generations, in contrast to the regression coefficient. The same authors found that the regression coefficient has fallen substantially over the last 50 years, while this trend was not observed in the correlation coefficient.

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8   See Angrist and Pischke (2009) on the use of least squares in estimating equation with discrete dependent variables.

9   In all nine models, the F-statistic shows that our included regressors are jointly significant.

10  An alternative measure commonly used is years of schooling (Hertz et al. 2008). This measure is usually employed when a cross-country comparison is performed (Blanden 2013). The main reason not to use standardized educational classification is that the classifications might vary between countries. However, a weakness of using years of schooling is that it implies that the effects of years of schooling on the next generation is linear and monotonic, which seems unlikely (Blanden 2013). Another problem that might arise using years of schooling as a measure is that it does not necessarily represent educational success.

11  In our data, the Variance Inflation Factor (VIF) is low between mothers and fathers' educational attainment and their emphasis on education. The highest value for the mother and father's education and emphasis is the mother's education, with a VIF of 3.3. In general, if the VIF exceeds five, there is a multicollinearity problem.

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