The role of parental education on children's educational outcomes:

A comparison of Sweden and Hungary

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ABSTRACT

The influence of parental education on children's educational outcomes has been a subject of interest, given its impact on social mobility and equality of opportunity. This study analyzes the effect of parental education on children's academic achievement in Sweden and Hungary, two countries with distinct socioeconomic contexts. Using data from the PISA2018 survey, linear regression models are employed to examine the relationship between parental education and children's math and reading scores. The results indicate a significant positive association between higher parental education levels and improved math and reading scores, supporting the hypothesis that parental education influences children's academic outcomes. Additionally, the study highlights the positive impact of parental emotional support and access to books at home. Country-specific comparisons reveal that while the relationship between parental education and children's educational outcomes exists in both countries, it is more pronounced in Hungary, suggesting the influence of cultural and societal factors. The findings underscore the importance of addressing socioeconomic disparities and providing equal opportunities for all. Policy recommendations aim to enhance support for disadvantaged students, promote parental involvement, improve access to educational resources, and address language barriers to foster equality in education.

Keywords: parental education, socioeconomic, cultural capital, emotional support, language barriers, Hungary, Sweden

1. Introduction

1.1 Motivation

Education is positively related to the improvement of human capital and economic growth. Human capital is measured as the aggregation of the level of education, training, skills and health, which in turn are factors that affect the development and adoption of new technologies that boost productivity. Several studies have shown that the average year of education affects the subsequent economic growth of nations. This can be used to study the measures that explain the variations resulting from the distribution of duration of schooling/education (Lim et al., 2018). Education plays a significant role in eradicating poverty and improving prosperity. Especially in rapidly changing times, education is very critical for social welfare (World Bank, 2018). Policies should focus on improving the learning of children to tackle the problems arising due to the variation in education levels.

It is established that education is important for reducing inequality, boosting economic growth, and increasing informed citizens. Research says that greater educational attainment leads to higher social mobility. Education expansion alone, without any decrease in educational inequality, exhibits the tendency to increase social fluidity. As more people acquire higher levels of education, the overall associations between origins and destinations will decline (Breen 2010).

One significant factor that affects the Children's educational outcomes is parental education level. Education perpetuates inequalities passed on from one generation to another, based on different educational levels. Research has established a strong link between parental education and children's educational attainment and early career success (Blossfeld & Shavit, 1993; Davis-Kean, 2005). Children of more educated parents tend to achieve higher levels of education, transmitting the educational advantage intergenerationally. Exploring the mechanism behind this phenomenon, a study (Davis-Kean, 2005; Englund, 2004) has highlighted the indirect effects of Socioeconomic status (SES), particularly parental education and income, on children's academic performance. Recent research by Havari et al. (2013) confirms this positive, substantial, and causal effect of parental education on children's educational trajectories.

1.2 Why study Sweden and Hungary?

The effects of parental education on children's educational outcomes are not uniform across all countries. Having educated parents is a stronger advantage and has more pronounced effects on children's educational outcomes in Eastern European countries when compared to Nordic countries (Iannelli 2002).

With a robust education system, Sweden is characterized by high levels of educational attainment and a stronger sense of equity (Gustafsson, 2010). Added to this is the comprehensive welfare system designed to provide equal opportunities to all citizens regardless of their social background (Esping-Andersen, 1999). Studying Sweden gives us the opportunity to explore the role of state or robust welfare mechanisms that eradicate intergenerationally transmitted education inequalities. However, Hungary has higher variability in socioeconomic factors. Hungary's education system has seen significant changes over the years since the fall of communism. Due to its rigid social structure, children from lower social backgrounds find it difficult to break out of their circumstances and achieve higher outcomes in education (Robert, 1991). Hungary's educational system follows segregation and tracking from earlier stages of education. This makes the educational system more rigid when compared to the Sweden's educational system.

Given different national contexts, socioeconomic and cultural differences, we attempt to examine the relation between parental education and children's educational outcomes in Sweden and Hungary through this study. In Addition to the impact of parental education on children's education, this research asks how significantly parental education influences a child's educational attainment in contrasting national contexts: Sweden, with its robust welfare state, and Hungary, characterized by greater socioeconomic disparities.

2. Theory and Policy Context

2.1 Theoretical Frameworks

Several theoretical frameworks explore the relation between social background and educational attainment. The chosen three theories (for this study), provide a robust sociological framework to understand the outcomes of this study.

The theory of social stratification as proposed by Boudon, classifies the effects of stratification as primary effects and secondary effects. The primary effects are the direct

impact of social background (often determined by parental education and income) on a child's educational performance. Lower social class is associated with factors like limited educational resources and lower parental educational expectations. These factors contribute to lower academic achievement in children. Children from the same social background make different educational choices due to their social class, despite having similar academic abilities. These are the secondary effects of social stratification. For example, a student from lower class might take vocational training to enter the job market while an upper-class student chooses to pursue higher education to maintain their social class. Given their limited exposure to higher education and resources, students from low-class backgrounds tend to have different educational aspirations, different choice of schools, etc. (Boudon, 1974).

The cultural capital theory by Bourdieu highlights the importance of knowledge, skills and experiences valued in a particular social group, passed down through families. Cultural capital is gained by individuals through initial learning, which are unconsciously influenced by their surroundings. For example, an individual trained in a prestigious university will carry such values or alike with them wherever they go. 'Taste' is something that cannot be self-developed or improved over time, it is rather the reflection of one's cultural trajectory, most particularly in terms of family and education (Huang, 2019). Parents with higher education, who possess more cultural capital through acquired life experiences, will pass down better study habits, educational aspirations, and access to resources to their children. Due to Sweden's egalitarian systems, where access to resources and opportunities are equal, it could explain why parental education has weaker influence on children in Sweden.

The social capital theory focuses on the positive consequences of involvement and participation of parents in social groups. Through social capital, actors gain access to economic resources (like investment tips), increase their cultural capital (by talking to experts or distinguished individuals), or affiliate themselves with institutions of great value. Often, these things are hard to measure and have an element of uncertainty (Portes, 1998). Highly educated parents might have better connections to gather information regarding schools, skill development programs and mentorships. These can prove to be valuable and resourceful opportunities for their children, influencing their educational attainment. In countries like Hungary, where the state institutions are relatively rigid and have more scope for welfare, social connections of the parents could play an important role in the Child's educational attainment.

These theoretical lenses provide for a nuanced understanding of how social background influences social structures and shapes educational outcomes. A comparative study of Sweden and Hungary in this context, will shed light on the opportunities to mitigate the influence of social background on children's futures and promote equal opportunities.

2.2 Existing Research

Several Studies have explored the factors that influence children's educational outcomes.

In a cross-country study among the US and top five performing Asian countries, the authors found that the mathematics score of the students is related to outside the school factors like parental education, the availability of computers at home or school, extra tutoring lessons and self-confidence. These variables positively impact the mathematics achievement among children (used to measure children's educational outcome) (Liu, Wu, & Zumbo, 2006).

In a report by OECD (2017), it is concluded that a parent's educational achievement has a stronger effect on an individual's educational attainment than age or gender. Another study examines the effect of parental education on children's educational aspirations and finds interesting differences amongst the effects of paternal education and maternal education. Despite different effects of an individual parent's education, the combined effect of high educational achievement by both parents has a far more positive effect on children's educational aspirations (Sewell & Shah, 1968).

Another study explains that parental support is essential in developing their children's social/emotional skills to achieve high educational standards and improve other aspects of their life. Parental involvement is seen as the behavior of parents that supports children's educational achievement and their social/ emotional skill development (Roy & Giraldo-García, 2018). Findings of a study show that poor academic achievement at secondary school level is primarily because of lack of parental awareness and interest in children's school activities (Aman et al., 2019).

There has been long standing literature on using 'number of books' as a factor to assess the effect it has on children's educational outcomes. Families from different socio-economic backgrounds invest differently in the amount and kind of resources that result in social inequalities in students' educational achievement. Economic resources (income or

wealth), social resources (social networks, information, values) and cultural resources or cultural capital are typically identified by the literature as standard parameters to measure investment in resources by a family (Heppt, Olczyk, & Volodina, 2022). Bourdieu subdivided cultural capital into incorporated, institutionalized, and objectified cultural capital. It is under objectified cultural capital that physical cultural goods like the number of books or works of art fall under (Bourdieu, 1986). A study indicates that being raised in a home with a 500-book library when compared to a bookless home has a greater effect on the level of education of children (similar to the effect of having parents who have a university degree). Having 20 books as a starting point has shown a positive impact on encouraging children to pursue higher education (University of Nevada, Reno, 2010).

Migration is another factor that plays a significant role in children's educational outcomes, as one faces a loss of social capital as they lose ties with their community when they migrate. By compensating for the loss of community, parental support leads to higher educational outcomes (Portes, 1998).

Previous studies and research findings lay the ground for our analysis, as they shed light on some important concepts and provide robust empirical findings that support our analysis.

2.3 Hypotheses

Based on the literature and previous research findings, we formulate three hypotheses for this study.

Hypothesis 1:

Parental education level significantly influences children's academic achievement, with students more likely to attain better educational outcomes when their parents have higher levels of education.

Hypothesis 2:

Parents' educational attainment and family environment, including emotional support and household possessions such as books, also influence children's educational achievement.

Hypothesis 3:

In Eastern European nations like Hungary, paternal education has a stronger impact compared to maternal education, whereas in Nordic countries such as Sweden, this influence is less pronounced.

3. Data & Results

3.1 Data Explain

The PISA2018 dataset, which stands for "Programme for International Student Assessment," is a widely used dataset for studying educational outcomes and inequalities across countries. It includes information on the educational achievements of 15-year-old students across 79 participating education systems, as well as background information on their parents and schools.

The sample comprises 8922 observations, with 4594 from Sweden and 4328 from Hungary, extracted from the PISA2018 dataset which initially included 10636 observations. 1714 observations were removed due to missing values for parental education, number of books, and parental emotional support.

3.2 Analytical Strategy

This study will utilize linear regression models to explore the correlation between parental education and educational achievements of children in Sweden and Hungary, two countries with different socioeconomic contexts and educational systems. Results from previous research suggest that both maternal and paternal education are important predictors of children's educational outcomes. In addition to the educational level of parents, the dataset also includes data on secondary factors like student gender, emotional support and household belongings.

3.3 Descriptive Statistics

Dependent Variable

The study's dependent variable is children's educational outcomes, measured using the values in mathematics and text structure (reading and cognitive skills test). For performance,

the estimation uses ten plausible values for each student's performance on the reading scale. These plausible values are designed to account for measurement error and provide a more reliable estimation of educational outcomes.

Figure 1. Distribution of Math and Reading Score by Country

Figure 1 shows that both math and reading scores follow similar normal distributions, while the average math score appears to be higher than the average reading score. Notably, a potential skew towards the higher end for Sweden's scores might suggest stronger performance among Swedish students in math and reading.

Independent Variable

The independent variables in this study include both maternal and paternal highest education, as well as other control variables such as student gender, emotional support, household belongings, migration background, and language spoken at home.

- **Age:** The age of the respondents.
- **Gender:** The gender of the student is coded as 1 for female and 2 for male.
- **Country:** The country in which the student is located, coded as 'SWE' for Sweden and 'HUN' for Hungary.
- **Mother's Highest Education:** The highest level of education attained by the mother.
- **Father's Highest Education:** The highest level of education attained by the father.
- **Number of Household Books:** The number of books in the home, indicates the availability of educational resources and intellectual stimulation within the home environment.

- **Emotional Support:** The index of parents' emotional support perceived by students was constructed based on a trend question asking students whether they with the following statements: "My parents support my educational efforts and achievements"; "My parents support me when I am facing difficulties at school"; and "My parents encourage me to be confident".
- **Migration Background**: Binary variable about students' migration background.
- **Language Spoken at Home:** Binary variable about the language spoken at home compared with the language of the test.

Sample Statistics

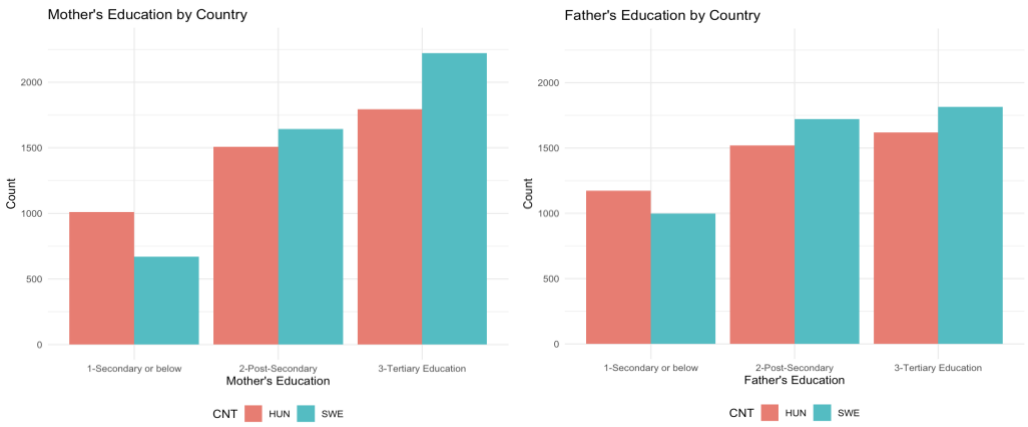
Table 1. Sample Statistics of Main Independent Variables in Sweden and Hungary

	HUN (N=4312)	SWE (N=4535)	Overall (N=8847)
Mother's Education			
1-Secondary or below	1011 (23.4%)	671 (14.8%)	1682 (19.0%)
2-Post-Secondary	1508 (35.0%)	1642 (36.2%)	3150 (35.6%)
3-Tertiary Education	1793 (41.6%)	2222 (49.0%)	4015 (45.4%)
Father's Education			
1-Secondary or below	1172 (27.2%)	999 (22.0%)	2171 (24.5%)
2-Post-Secondary	1520 (35.3%)	1720 (37.9%)	3240 (36.6%)
3-Tertiary Education	1620 (37.6%)	1816 (40.0%)	3436 (38.8%)
Parental Emotional Support			
Mean (SD)	0.0287 (0.954)	0.00314 (0.969)	0.0156 (0.962)
Median [Min, Max]	0.217 [-2.45, 1.03]	0.213 [-2.45, 1.03]	0.213 [-2.45, 1.03]
Number of Books			
1.0-10	484 (11.2%)	585 (12.9%)	1069 (12.1%)
2.11-25	542 (12.6%)	665 (14.7%)	1207 (13.6%)
3.26-100	1091 (25.3%)	1299 (28.6%)	2390 (27.0%)
4.101-200	844 (19.6%)	853 (18.8%)	1697 (19.2%)
5.201-500	728 (16.9%)	726 (16.0%)	1454 (16.4%)
6.500+	623 (14.4%)	407 (9.0%)	1030 (11.6%)
Migration Background			
Native	4215 (97.8%)	3773 (83.2%)	7988 (90.3%)
Immigrant	97 (2.2%)	762 (16.8%)	859 (9.7%)
Language Spoken at Home			
1-Language of the test	4235 (98.2%)	3870 (85.3%)	8105 (91.6%)
2-Other language	77 (1.8%)	665 (14.7%)	742 (8.4%)
Country			
HUN	4312 (100%)	0 (0%)	4312 (48.7%)
SWE	0 (0%)	4535 (100%)	4535 (51.3%)
Gender			
1-Male	2084 (48.3%)	2182 (48.1%)	4266 (48.2%)
2-Female	2228 (51.7%)	2353 (51.9%)	4581 (51.8%)
Age			
16	4312 (100%)	4535 (100%)	8847 (100%)

Table 1 summarizes the characteristics of students from Hungary and Sweden. It shows that mothers' education in both nations is higher than fathers' education. In Sweden, 49.0% of mothers have tertiary education compared to 40.0% of fathers. (This translates to 2222 mothers and 1816 fathers). In Hungary, fathers' education is slightly higher than mothers' education. In Hungary, 41.6% of mothers have tertiary education compared to 37.6% of fathers. (This translates to 1793 mothers and 1620 fathers). The sample is nearly balanced between Hungary (48.7%) and Sweden (51.3%) with similar numbers of males (48.2%) and females (51.8%) students, while the number of books at home varies, with the most common range being 26-100 books (27.0%).

Figure 2 reveals a clear difference in parental education between Hungary and Sweden. The left plot shows a significantly higher number of students in Sweden with mothers who have a tertiary education compared to Hungary. Conversely, Hungary has remarkably more students with mothers in the "Secondary or below" category compared to Sweden. The pattern is also shown in the father's education distribution, while the gaps are comparatively insignificant.

Figure 2. Distribution of Mother's and Father's Education by Countries



3.4 Regression Results

Linear Regression with the whole sample

Given the disparity in mothers' education levels between the two countries, we begin by exploring its influence on children's educational outcomes. To gain a more comprehensive understanding of the factors at play, we analyzed three linear regression models. **Table 2** (see below) summarizes the key findings from these models, with a specific focus on the coefficients.

The coefficients represent the estimated effect of each variable on math scores. For instance, in Model 1, students with mothers in the "Post-Secondary" category are predicted to score 40 points higher on math scores compared to the reference category ("Secondary or below"). The results indicate that higher levels of parental education are associated with improved math and reading scores, highlighting the role of socioeconomic status in shaping educational achievement. In Model 2, Parental Emotional Support has a statistically significant effect ($p < 0.001$) on the outcome variable. This effect is positive, with scores being associated with 13 points higher on the math. Additionally, we introduced the Number of Books in Model 3 analysis. There is a strong positive relationship between parental emotional support and the presence of books at home with math scores. The number of books at home reflects exposure to educational materials and a conducive learning environment, which can enhance students' academic performance.

Table 2. Linear Regression Models Predicting Math Scores with Mother's Education and Parental Emotional Support

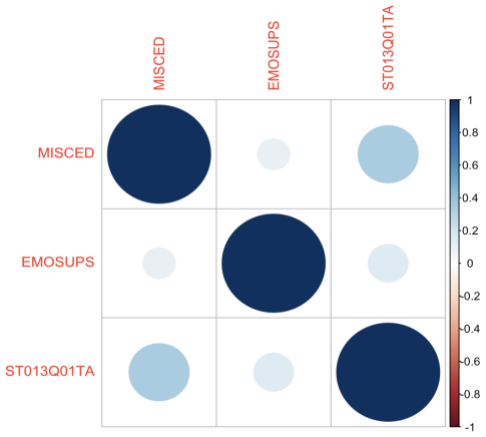
	Model1			Model2			Model3		
Characteristic	**Beta**	**95% CI[1]**	**p-value**	**Beta**	**95% CI[1]**	**p-value**	**Beta**	**95% CI[1]**	**p-value**
Mother's Education									
1-Secondary or below	—	—		—	—		—	—	
2-Post-Secondary	40	35, 45	<0.001	38	33, 43	<0.001	22	17, 26	<0.001
3-Tertiary Education	61	56, 66	<0.001	58	53, 62	<0.001	28	23, 33	<0.001
Gender									
1-Male	—	—		—	—		—	—	
2-Female	-6.2	-9.8, -2.7	<0.001	-7.7	-11, -4.2	<0.001	-14	-17, -10	<0.001
Parental Emotional Support				13	11, 15	<0.001	8.9	7.2, 11	<0.001
Number of Books									
1.0-10							—	—	
2.11-25							28	22, 34	<0.001
3.26-100							59	54, 65	<0.001
4.101-200							81	75, 87	<0.001
5.201-500							105	99, 111	<0.001
6.500+							105	98, 112	<0.001

[1] CI = Confidence Interval

The results suggest a strong link between higher parental education and math scores, supporting **Hypothesis 1** which proposes that increased parental education is linked to better academic outcomes for children. Furthermore, the study underscores the role of parental emotional support and access to books at home in enhancing math performance. These findings underscore the significance of both parental education and supportive home environments in contributing to improved educational results, reinforcing **Hypothesis 2**.

While a positive relationship exists between parental emotional support and the presence of books at home, the correlation between these variables themself (Mother's Education, Parental Emotional Support, and Number of Books) likely doesn't significantly impact our results. **Figure 3** based on the correlation regression suggests a non-significant interaction term. This allows us to proceed with the current model without concerns about this specific interaction affecting the overall research findings.

Figure 3. Correlation between Independent Variables:
Mother's Education, Parental Emotional Support and Number of Books



Math and Reading Comparison

To understand the specific variables influencing each test score, separate linear regression models for Math and Reading were conducted.

Table 3. Comparison of Mother's Education on Math and Reading Scores

	Math			Read		
Characteristic	**Beta**	**95% CI**[1]	**p-value**	**Beta**	**95% CI**[1]	**p-value**
Mother's Education						
1-Secondary or below	—	—		—	—	
2-Post-Secondary	22	17, 26	<0.001	28	22, 33	<0.001
3-Tertiary Education	28	23, 33	<0.001	30	25, 36	<0.001
Parental Emotional Support	8.9	7.2, 11	<0.001	12	9.6, 14	<0.001
Number of Books						
1.0-10	—	—		—	—	
2.11-25	28	22, 34	<0.001	35	27, 42	<0.001
3.26-100	59	54, 65	<0.001	69	62, 75	<0.001
4.101-200	81	75, 87	<0.001	95	88, 102	<0.001
5.201-500	105	99, 111	<0.001	121	113, 128	<0.001
6.500+	105	98, 112	<0.001	118	110, 126	<0.001
Gender						
1-Male	—	—		—	—	
2-Female	-14	-17, -10	<0.001	15	12, 19	<0.001

[1] CI = Confidence Interval

Table 3 shows that the mother's education, parental emotional support, the number of books at home, and student gender are all significantly associated with math and reading scores in the sample. Being female is negatively associated with math scores but positively associated with reading scores. Meanwhile, the impact of mothers' education on reading scores seems to be stronger than its impact on math scores.

Country-specific Comparison

Table 4. Country-specific Comparison of Parental Education on Math and Reading Scores

	Hungary Math			Hungary Read			Sweden Math			Sweden Read		
Characteristic	**Beta**	**95% CI[1]**	**p-value**	**Beta**	**95% CI[1]**	**p-value**	**Beta**	**95% CI[1]**	**p-value**	**Beta**	**95% CI[1]**	**p-value**
Mother's Education												
1-Secondary or below	—	—		—	—		—	—		—	—	
2-Post-Secondary	18	12, 24	<0.001	22	15, 29	<0.001	15	8.2, 23	<0.001	21	12, 29	<0.001
3-Tertiary Education	24	18, 30	<0.001	26	19, 33	<0.001	20	13, 27	<0.001	17	8.9, 26	<0.001
Parental Emotional Support	12	9.6, 14	<0.001	16	13, 19	<0.001	6.3	3.9, 8.8	<0.001	7.9	5.0, 11	<0.001
Number of Books												
1.0-10	—	—		—	—		—	—		—	—	
2.11-25	29	20, 38	<0.001	36	25, 46	<0.001	28	19, 37	<0.001	35	25, 46	<0.001
3.26-100	63	55, 71	<0.001	70	61, 79	<0.001	59	51, 67	<0.001	70	61, 80	<0.001
4.101-200	87	78, 95	<0.001	100	91, 110	<0.001	81	73, 90	<0.001	97	86, 107	<0.001
5.201-500	113	105, 122	<0.001	127	117, 137	<0.001	102	94, 111	<0.001	123	112, 133	<0.001
6.500+	119	110, 128	<0.001	133	122, 144	<0.001	100	90, 110	<0.001	116	104, 128	<0.001
Gender												
1-Male	—	—		—	—		—	—		—	—	
2-Female	-15	-20, -11	<0.001	17	12, 22	<0.001	-12	-17, -7.2	<0.001	14	8.5, 20	<0.001

[1] CI = Confidence Interval

Aligning with previous models, **Table 4** highlights a consistent pattern across both Hungary and Sweden. Higher levels of mother's education, parental emotional support, and the number of books at home are all positively associated with both math and reading scores. While the coefficients suggest these factors are important in both countries, they have a stronger influence on students' educational outcomes in Hungary compared to Sweden.

Paternal and Maternal Education Influence Comparison

By analyzing data from both countries, we aimed to understand how a mother's and father's education level might be associated with children's academic performance. This study respectively examines the impact of maternal and paternal educational attainment on math and reading Scores in Hungary and Sweden. The findings in **Table 5** reveal that both maternal and paternal education have a significant positive association with math and reading scores in both countries.

Maternal schooling is believed to potentially have a greater influence on mathematics performance, which differs from our **Hypothesis 3** and prior research results. One possible explanation is that the societal role of mothers holds more significance in educational participation than that of fathers. The results from Sweden did not show a significant difference in parental influence, particularly in math scores. This suggests that the effect of maternal education on academic success may be affected by cultural and societal factors.

Table 5. Comparison of Paternal and Maternal Education on Math and Reading Scores by Country

	Sweden Math						Sweden Read					
Characteristic	**Beta**	**95% CI[†]**	**p-value**	**Beta**	**95% CI[†]**	**p-value**	**Beta**	**95% CI[†]**	**p-value**	**Beta**	**95% CI[†]**	**p-value**
Mother's Education												
1-Secondary or below	—	—					—	—				
2-Post-Secondary	15	8.2, 23	<0.001				21	12, 29	<0.001			
3-Tertiary Education	20	13, 27	<0.001				17	8.9, 26	<0.001			
Parental Emotional Support	6.3	3.9, 8.8	<0.001	6.4	4.0, 8.8	<0.001	7.9	5.0, 11	<0.001	8.2	5.3, 11	<0.001
Number of Books												
1.0-10	—	—		—	—		—	—		—	—	
2.11-25	28	19, 37	<0.001	28	19, 37	<0.001	35	25, 46	<0.001	36	26, 47	<0.001
3.26-100	59	51, 67	<0.001	60	52, 68	<0.001	70	61, 80	<0.001	72	63, 81	<0.001
4.101-200	81	73, 90	<0.001	82	74, 91	<0.001	97	86, 107	<0.001	99	89, 109	<0.001
5.201-500	102	94, 111	<0.001	103	94, 112	<0.001	123	112, 133	<0.001	125	114, 135	<0.001
6.500+	100	90, 110	<0.001	100	90, 111	<0.001	116	104, 128	<0.001	118	106, 131	<0.001
Gender												
1-Male	—	—		—	—		—	—		—	—	
2-Female	-12	-17, -7.2	<0.001	-12	-16, -7.1	<0.001	14	8.5, 20	<0.001	14	8.7, 20	<0.001
Father's Education												
1-Secondary or below				—	—					—	—	
2-Post-Secondary				16	9.3, 22	<0.001				11	3.8, 19	0.003
3-Tertiary Education				20	14, 26	<0.001				6.3	-1.2, 14	0.10

[†] CI = Confidence Interval

	Hungary Math						Hungary Read					
Characteristic	**Beta**	**95% CI[†]**	**p-value**	**Beta**	**95% CI[†]**	**p-value**	**Beta**	**95% CI[†]**	**p-value**	**Beta**	**95% CI[†]**	**p-value**
Mother's Education												
1-Secondary or below	—	—					—	—				
2-Post-Secondary	18	12, 24	<0.001				22	15, 29	<0.001			
3-Tertiary Education	24	18, 30	<0.001				26	19, 33	<0.001			
Parental Emotional Support	12	9.6, 14	<0.001	12	10, 15	<0.001	16	13, 19	<0.001	16	14, 19	<0.001
Number of Books												
1.0-10	—	—		—	—		—	—		—	—	
2.11-25	29	20, 38	<0.001	30	21, 39	<0.001	36	25, 46	<0.001	37	27, 47	<0.001
3.26-100	63	55, 71	<0.001	64	56, 72	<0.001	70	61, 79	<0.001	72	63, 81	<0.001
4.101-200	87	78, 95	<0.001	89	81, 98	<0.001	100	91, 110	<0.001	103	93, 113	<0.001
5.201-500	113	105, 122	<0.001	117	108, 126	<0.001	127	117, 137	<0.001	130	121, 140	<0.001
6.500+	119	110, 128	<0.001	123	114, 132	<0.001	133	122, 144	<0.001	137	127, 147	<0.001
Gender												
1-Male	—	—		—	—		—	—		—	—	
2-Female	-15	-20, -11	<0.001	-16	-21, -12	<0.001	17	12, 22	<0.001	16	11, 21	<0.001
Father's Education												
1-Secondary or below				—	—					—	—	
2-Post-Secondary				15	8.7, 20	<0.001				16	9.7, 23	<0.001
3-Tertiary Education				17	11, 23	<0.001				20	14, 27	<0.001

[†] CI = Confidence Interval

Controlling Migration Background

Table 6. Linear Regression Models Predicting Math and Reading with Migration Background and Language Spoken at Home

	Hungary Math			Hungary Read			Sweden Math			Sweden Read		
Characteristic	**Beta**	**95% CI[1]**	**p-value**	**Beta**	**95% CI[1]**	**p-value**	**Beta**	**95% CI[1]**	**p-value**	**Beta**	**95% CI[1]**	**p-value**
Mother's Education												
1-Secondary or below	—	—		—	—		—	—		—	—	
2-Post-Secondary	18	12, 24	<0.001	22	15, 28	<0.001	9.6	2.4, 17	0.009	13	4.3, 21	0.003
3-Tertiary Education	24	18, 30	<0.001	26	19, 33	<0.001	15	8.0, 22	<0.001	12	3.2, 20	0.007
Migration Background												
Native	—	—		—	—		—	—		—	—	
Immigrant	9.1	-5.7, 24	0.2	23	6.4, 40	0.007	-23	-31, -14	<0.001	-20	-30, -10	<0.001
Language Spoken at Home												
1-Language of the test	—	—		—	—		—	—		—	—	
2-Other language	-16	-33, 0.61	0.059	-26	-44, -7.1	0.007	-20	-29, -11	<0.001	-39	-49, -28	<0.001
Parental Emotional Support	12	9.5, 14	<0.001	16	13, 18	<0.001	6.5	4.1, 8.9	<0.001	7.9	5.1, 11	<0.001
Number of Books												
1.0-10	—	—		—	—		—	—		—	—	
2.11-25	29	20, 38	<0.001	35	25, 45	<0.001	22	13, 31	<0.001	27	17, 38	<0.001
3.26-100	62	54, 70	<0.001	69	60, 78	<0.001	49	41, 57	<0.001	57	48, 66	<0.001
4.101-200	86	78, 95	<0.001	100	90, 109	<0.001	69	60, 78	<0.001	80	70, 90	<0.001
5.201-500	113	104, 122	<0.001	127	116, 137	<0.001	90	81, 99	<0.001	106	95, 117	<0.001
6.500+	119	110, 128	<0.001	133	123, 144	<0.001	88	78, 99	<0.001	101	89, 113	<0.001
Gender												
1-Male	—	—		—	—		—	—		—	—	
2-Female	-15	-20, -11	<0.001	17	12, 22	<0.001	-11	-16, -6.5	<0.001	15	9.7, 21	<0.001

[1] CI = Confidence Interval

After accounting for the influence of migration background, it was observed that the relationships between parental education, family environment, and student scores remained robust. In contrast to the limited statistical significance of migration background, the language spoken at home emerged as a more potent factor influencing student scores.

Table 6 presents data indicating that in Sweden, students with a migrant background achieved lower scores in math and reading tests. In contrast, the impact on test scores was not significant in Hungary, where some students even displayed higher reading scores. Moreover, using a language at home other than the test language appeared to be linked to reduced performance in both countries. These findings imply that speaking a different language at home could pose challenges for students in these academic subjects.

4. Summary

4.1 Key Findings

The analysis revealed several key findings regarding the factors influencing math and reading Scores.

Firstly, higher levels of parental education were found to be significantly associated with improved math and reading scores. The coefficients from the linear regression models indicated that students with mothers in the "Post-Secondary" category were predicted to score 40 points higher on math scores compared to those in the "Secondary and below" category. This supports the hypothesis that increased parental education is linked to better academic outcomes for children.

Secondly, the study highlighted the positive impact of parental emotional support and access to books at home on educational outcome. The presence of books at home, as an indicator of cultural capital, was found to be positively associated with math and reading scores. This underscores the significance of a supportive home environment in contributing to improved educational results.

Additionally, the comparison of country-specific data revealed a consistent pattern across both Hungary and Sweden, showing that higher levels of parental education, parental emotional support, and the number of books at home were all positively associated with both, math and reading Scores. Notably, the stronger influence of these factors on students' educational outcomes in Hungary compared to Sweden may be influenced by cultural and societal differences, including varying levels of emphasis on education and support for academic achievement within each country.

Furthermore, the influence of parental education on student scores was examined in both maternal and paternal contexts. The findings showed that both maternal and paternal education had a significant positive association with math and reading scores in both countries. However, the influence of maternal education on mathematics performance differed from prior research results, suggesting that societal and cultural factors may play a role in the significance of maternal influence on educational participation.

Lastly, after controlling for migration background, it was observed that the relationships between parental education, family environment, and student scores remained robust. The language spoken at home emerged as a more potent factor influencing student scores, with students speaking a different language at home showing reduced performance in both academic subjects.

Overall, the key findings from the analysis underscore the significance of parental education, parental emotional support, home environment, and language spoken at home in influencing student scores in math and reading. These findings have important implications for understanding the factors that contribute to academic performance in different cultural and societal contexts.

4.2 Limitations:

This research acknowledges several limitations that hinder establishing definitive causal relationships between parental education, family background, and children's academic achievement. Firstly, the study design reveals correlational patterns, not causation. Parental education may co-occur with other unobserved factors that truly drive academic success in children. Secondly, the analysis likely omits relevant variables such as parental involvement, school quality, or individual student characteristics. These unaccounted factors could bias the observed associations. Thirdly, the cross-sectional data provides a single point in time, limiting the ability to understand how parental education influences outcomes over time. Fourthly, the country comparison, while informative, may not fully capture the nuances of each educational system and cultural context that shape parental influences. Finally, the reliance on self-reported data introduces potential measurement error or bias due to subjective reporting. These limitations necessitate further research designs and methodologies to establish more robust causal inferences.

4.3 Policy Recommendations

Based on the findings of this study, we propose policy recommendations to address the influence of parental education on children's educational outcomes and promote equality of opportunity. Firstly, enhancing support for disadvantaged students must be given priority. Given the significant impact of parental education on children's academic achievement, it is crucial to provide additional support for students from disadvantaged backgrounds, such as those with low parental education levels. This can include targeted interventions, tutoring programs, and mentorship opportunities to help bridge the gap and ensure equal opportunities for all.

Second, policy makers should focus on bridging the gap between Nordic and Eastern European countries. The differences observed between Sweden and Hungary in the strength of the relationship between family background factors and educational outcomes point to the potential role of broader social and economic policies. Policymakers could investigate ways to adapt the more universalistic welfare state approaches of Nordic countries to the Eastern European context, to reduce educational disparities.

Third, Governments should devise policies that support shared parental responsibility. Challenge gender stereotypes in countries like Hungary, including fathers in early education alongside mothers. Advocate for policies that make it easier for fathers to take on childcare responsibilities (e.g., parental leave extensions).

Fourth, improving access to educational resources is a very essential step to reduce educational inequalities among students. The availability of books and other educational resources at home was found to be positively associated with children's academic performance. Policies should aim to improve access to such resources, especially for low-income families, through initiatives such as school or community libraries, book donation programs, and digital resource platforms.

Finally, addressing language barriers plays a significant role in ensuring equal opportunities for academic success. The language spoken at home was identified as a significant factor influencing student scores, particularly for students from migrant backgrounds. Policies should focus on providing additional language support and resources to help students overcome language barriers and ensure equal opportunities for academic success, regardless of their native language.

In the rapidly growing and changing labor market scenario, the wage gap between highly qualified workers to that of low qualified workers is widening. On average, it is noted that less educated adults have high unemployment rates. These trends deepen existing inequalities and lead to heavier social burdens that are both costly and difficult to address. It is important to provide support and assistance for students from disadvantageous backgrounds (often identified as being of low socio-economic status). Everyone should have equal opportunities and access to resources to attain the education they aspire to, despite not wanting to pursue tertiary education. The importance of education is marked by the development of skills that enable people to adapt to changing labor market demands, and such benefits should not be limited to a few (OECD, 2017). Policy interventions should focus on enhancing support for disadvantaged students, bridging the gap between different regions, promoting shared parental responsibility, improving access to educational resources, and addressing language barriers.

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Appendix (R code):

```
library(haven)
library(descr)
library(stargazer)
library(table1)
library(gtsummary)
#### Step 1: data preparation ####
rm(list=ls())
#Read in data
DATA01 <- read_dta("assets/HUNGARY_SWEDEN.dta")
#10636 obs. HUN & SWE
# select variables of interest: Country, Gender, Age, Birth Year, Immigration, language speak at home,
DATA02 <- DATA01[,c("CNT","ST004D01T","AGE","ST003D03T", "IMMIG", "ST022Q01TA",
                    #Math, Text Structure, Reading, Science,
                    "PV1MATH","PV1RTML","PV1READ","PV1SCIE",
                    #Socio-Economic Status Index, Expected ISEI, Parent's Highest ISEI, Mother's ISEI, Father's ISEI,
                    "ESCS","BSMJ","HISEI","BMMJ1","BFMJ2",
                    #Policies for Parental Involvement, Emotional Support, Home Possessions, Number of Books
                    "PASCHPOL", "EMOSUPS", "HOMEPOS","ST013Q01TA",
                    #Parent's Education in Year, Parents Highest Education, Mother's HiEdu, Father's HiEdu.
                    "PARED","HISCED","MISCED","FISCED")]

# filter variables having missing values
DATA02 <- subset(DATA02, !is.na(DATA02$PV1MATH)) # Math Scores
DATA02 <- subset(DATA02, !is.na(DATA02$PV1RTML)) # Text Structure Scores
DATA02 <- subset(DATA02, !is.na(DATA02$MISCED))  # Mother's Education
DATA02 <- subset(DATA02, !is.na(DATA02$FISCED))  # Father's Education
```

```
DATA02 <- subset(DATA02, !is.na(DATA02$ST013Q01TA))  # Number of Books

DATA02 <- subset(DATA02, !is.na(DATA02$EMOSUPS))     # Parental Emotional Support

DATA02 <- subset(DATA02, !is.na(DATA02$IMMIG))       # Migration Background

DATA02 <- subset(DATA02, !is.na(DATA02$ST022Q01TA))  # Language spoken at home

# 8847 obs. HUN & SWE

#### Step 2: variables construction ####

# Students' Characteristics

#VAR: Gender

DATA02$GENDER<-NA

DATA02$GENDER[DATA02$ST004D01T==2]<-"1-Male"

DATA02$GENDER[DATA02$ST004D01T==1]<-"2-Female"

DATA02$GENDER<-as.factor(DATA02$GENDER)

#VAR: Age

DATA02$AGE <- as.numeric(DATA02$AGE)

#VAR: Age by Year

DATA02$AGEBY <- as.factor(2018- as.numeric((DATA02$ST003D03T)))

# Educational Outcomes:

#VAR: Math Scores

DATA02$MATH <- as.numeric(DATA02$PV1MATH)

#VAR: Text Structure Scores

DATA02$TS <- as.numeric(DATA02$PV1RTML)

# Students' family background

# Parens' Education

#VAR: Highest Parental Education

DATA02$HISCEDC <- NA

DATA02$HISCEDC[DATA02$HISCED==0] <- "1-Secondary or below"

DATA02$HISCEDC[DATA02$HISCED==1] <- "1-Secondary or below"

DATA02$HISCEDC[DATA02$HISCED==2] <- "1-Secondary or below"

DATA02$HISCEDC[DATA02$HISCED==3] <- "1-Secondary or below"
```

```
DATA02$HISCEDC[DATA02$HISCED==4] <- "2-Post-Secondary"
DATA02$HISCEDC[DATA02$HISCED==5] <- "2-Post-Secondary"
DATA02$HISCEDC[DATA02$HISCED==6] <- "3-Tertiary Education"
DATA02$HISCEDC <- as.factor(DATA02$HISCEDC)

#VAR: Mother's Education
DATA02$MISCEDC <- NA
DATA02$MISCEDC[DATA02$MISCED==0] <- "1-Secondary or below"
DATA02$MISCEDC[DATA02$MISCED==1] <- "1-Secondary or below"
DATA02$MISCEDC[DATA02$MISCED==2] <- "1-Secondary or below"
DATA02$MISCEDC[DATA02$MISCED==3] <- "1-Secondary or below"
DATA02$MISCEDC[DATA02$MISCED==4] <- "2-Post-Secondary"
DATA02$MISCEDC[DATA02$MISCED==5] <- "2-Post-Secondary"
DATA02$MISCEDC[DATA02$MISCED==6] <- "3-Tertiary Education"
DATA02$MISCEDC <- as.factor(DATA02$MISCEDC)

#VAR: Father's Education
DATA02$FISCEDC <- NA
DATA02$FISCEDC[DATA02$FISCED==0] <- "1-Secondary or below"
DATA02$FISCEDC[DATA02$FISCED==1] <- "1-Secondary or below"
DATA02$FISCEDC[DATA02$FISCED==2] <- "1-Secondary or below"
DATA02$FISCEDC[DATA02$FISCED==3] <- "1-Secondary or below"
DATA02$FISCEDC[DATA02$FISCED==4] <- "2-Post-Secondary"
DATA02$FISCEDC[DATA02$FISCED==5] <- "2-Post-Secondary"
DATA02$FISCEDC[DATA02$FISCED==6] <- "3-Tertiary Education"
DATA02$FISCEDC <- as.factor(DATA02$FISCEDC)

#VAR: Number of Books
DATA02$BOOKSG <- NA
```

```
DATA02$BOOKSG[DATA02$ST013Q01TA==1] <- "1.0-10"

DATA02$BOOKSG[DATA02$ST013Q01TA==2] <- "2.11-25"

DATA02$BOOKSG[DATA02$ST013Q01TA==3] <- "3.26-100"

DATA02$BOOKSG[DATA02$ST013Q01TA==4] <- "4.101-200"

DATA02$BOOKSG[DATA02$ST013Q01TA==5] <- "5.201-500"

DATA02$BOOKSG[DATA02$ST013Q01TA==6] <- "6.500+"

DATA02$BOOKSG <- as.factor(DATA02$BOOKSG)


#VAR: Parental Emotional Support

DATA02$EMOSUPS <- as.numeric(DATA02$EMOSUPS)


#VAR: Migration Background

DATA02$MIG<-NA

DATA02$MIG[DATA02$IMMIG==1] <-"Native"

DATA02$MIG[DATA02$IMMIG==2] <-"Immigrant"

DATA02$MIG[DATA02$IMMIG==3] <-"Immigrant"

DATA02$MIG <-as.factor(DATA02$MIG)

DATA02$MIG <-relevel(DATA02$MIG, ref="Native") #Change reference category


#VAR: Language spoken at home

DATA02$FLANG <- NA

DATA02$FLANG[DATA02$ST022Q01TA==1] <- "1-Language of the test"

DATA02$FLANG[DATA02$ST022Q01TA==2] <- "2-Other language"

DATA02$FLANG <- as.factor(DATA02$FLANG)


# Sample Statistics

table1::label(DATA02$MISCEDC) <- "Mother's Education"

table1::label(DATA02$FISCEDC) <- "Father's Education"

table1::label(DATA02$BOOKSG)  <- "Number of Books"
```

```
table1::label(DATA02$EMOSUPS) <- "Parental Emotional Support"
table1::label(DATA02$MIG)     <- "Migration Background"
table1::label(DATA02$FLANG)   <- "Language Spoken at Home"
table1::label(DATA02$CNT)     <- "Country"
table1::label(DATA02$GENDER)  <- "Gender"
table1::label(DATA02$AGEBY)   <- "Age"

# Meternal and Paternal Education Comparison
table1(~ MISCEDC+FISCEDC+EMOSUPS+BOOKSG+MIG+FLANG+CNT+GENDER+AGEBY | CNT, data = DATA02)
# Immigration Perspective
#table1(~ HISCEDC+MIG+FLANG+EMOSUPS+BOOKSG+CNT+GENDER, data = DATA02)

# Distribution of Math Scores, the x-axis is start from 200 to 800
ggplot(DATA02, aes(x = MATH, fill = CNT)) +
  geom_histogram(binwidth = 50, position = "dodge") +
  theme_minimal() +
  theme(legend.position = "bottom") +
  labs(title = "Math Scores by Country", x = "Math Scores", y = "Count", fill = "Country") +
  xlim(200, 800) + ylim(0, 1000)

# Distribution of Text Structure Scores
ggplot(DATA02, aes(x = TS, fill = CNT)) +
  geom_histogram(binwidth = 50, position = "dodge") +
  theme_minimal() +
  theme(legend.position = "bottom") +
  labs(title = "Text Structure Scores by Country", x = "Text Structure Scores", y = "Count", fill = "Country") +
  xlim(200, 800) + ylim(0, 1000)
```

```
# Mother's Education Distribution
ggplot(DATA02, aes(x = MISCEDC, fill = CNT)) +
  geom_bar(position = "dodge") +
  theme_minimal() +
  theme(legend.position = "bottom") +
  labs(title = "Mother's Education by Country", x = "Mother's Education", y = "Count") +
  ylim(0, 2300)

# Father's Education Distribution
ggplot(DATA02, aes(x = FISCEDC, fill = CNT)) +
  geom_bar(position = "dodge") +
  theme_minimal() +
  theme(legend.position = "bottom") +
  labs(title = "Father's Education by Country", x = "Father's Education", y = "Count") +
  ylim(0, 2300)
#Split Sub-Dataset by Country
HUN <- subset(DATA02,DATA02$CNT == "HUN")
SWE <- subset(DATA02,DATA02$CNT == "SWE")
#### Step 3: Data Analysis ####
# 1. Linear Regression with whole dataset
# 1.1 Math Scores as Outcome Variable
# Mother's Education, Gender
MODEL01 <- lm(MATH ~ MISCEDC+GENDER, data = DATA02)
# Mother's Education, Emotional Support, Gender
MODEL02 <- lm(MATH ~ MISCEDC+EMOSUPS+GENDER, data = DATA02)
# Mother's Education, Emotional Support, the Number of Books and Gender
MODEL03 <- lm(MATH ~ MISCEDC+EMOSUPS+BOOKSG+GENDER, data = DATA02)
OUTPUT01 <- tbl_regression(MODEL01)
OUTPUT02 <- tbl_regression(MODEL02)
```

```
OUTPUT03 <- tbl_regression(MODEL03)

tbl_merge(tbls = list(OUTPUT01, OUTPUT02, OUTPUT03), tab_spanner = c("Model1", "Model2",
"Model3"))

# Check Correlation between Variables

corrplot::corrplot(round(cor(DATA02[,c("MISCED","EMOSUPS","ST013Q01TA")], use = "complete.obs"),2))

Model3c <- lm(MATH ~ (MISCEDC+EMOSUPS)*BOOKSG, data = DATA02)

summary(Model3c)

# It shows that the interaction term is not significant, so we can remove it from the model.

# 1.2 Text Structure Scores as Outcome Variable

MODEL04 <- lm(TS ~  MISCEDC+EMOSUPS+BOOKSG+GENDER, data = DATA02)

stargazer(MODEL03, MODEL04,type="text")

# Compare Math and Reading Scores

OUTPUT04 <- tbl_regression(MODEL04)

tbl_merge(tbls = list(OUTPUT03, OUTPUT04), tab_spanner = c("Math", "Read"))

# 2. Linear Regression with country-specific models

MODEL03_HUN <- lm(MATH ~ MISCEDC+EMOSUPS+BOOKSG+GENDER, data = HUN)

MODEL03_SWE <- lm(MATH ~ MISCEDC+EMOSUPS+BOOKSG+GENDER, data = SWE)

MODEL04_HUN <- lm(TS ~ MISCEDC+EMOSUPS+BOOKSG+GENDER, data = HUN)

MODEL04_SWE <- lm(TS ~ MISCEDC+EMOSUPS+BOOKSG+GENDER, data = SWE)

stargazer(MODEL03_HUN, MODEL04_HUN, MODEL03_SWE, MODEL04_SWE, type="text")

OUTPUT03_HUN <- tbl_regression(MODEL03_HUN)

OUTPUT04_HUN <- tbl_regression(MODEL04_HUN)

OUTPUT03_SWE <- tbl_regression(MODEL03_SWE)

OUTPUT04_SWE <- tbl_regression(MODEL04_SWE)


tbl_merge(tbls = list(OUTPUT03_HUN, OUTPUT04_HUN, OUTPUT03_SWE, OUTPUT04_SWE),

      tab_spanner = c("Hungary Math", "Hungary Read", "Sweden Math", "Sweden Read"))
```

```
# 3. Analyze country-specific models with paternal education and maternal education comparison
# Math Scores
MODEL05_HUN <- lm(MATH ~ MISCEDC+EMOSUPS+BOOKSG+GENDER, data = HUN)
MODEL05_SWE <- lm(MATH ~ MISCEDC+EMOSUPS+BOOKSG+GENDER, data = SWE)
MODEL06_HUN <- lm(MATH ~ FISCEDC+EMOSUPS+BOOKSG+GENDER, data = HUN)
MODEL06_SWE <- lm(MATH ~ FISCEDC+EMOSUPS+BOOKSG+GENDER, data = SWE)
# Reading Scores
MODEL07_HUN <- lm(TS ~ MISCEDC+EMOSUPS+BOOKSG+GENDER, data = HUN)
MODEL07_SWE <- lm(TS ~ MISCEDC+EMOSUPS+BOOKSG+GENDER, data = SWE)
MODEL08_HUN <- lm(TS ~ FISCEDC+EMOSUPS+BOOKSG+GENDER, data = HUN)
MODEL08_SWE <- lm(TS ~ FISCEDC+EMOSUPS+BOOKSG+GENDER, data = SWE)

stargazer(MODEL05_HUN, MODEL06_HUN, MODEL07_HUN, MODEL08_HUN,type="text")
stargazer(MODEL05_SWE, MODEL06_SWE, MODEL07_SWE, MODEL08_SWE,type="text")

OUTPUT05_HUN <- tbl_regression(MODEL05_HUN)
OUTPUT05_SWE <- tbl_regression(MODEL05_SWE)
OUTPUT06_HUN <- tbl_regression(MODEL06_HUN)
OUTPUT06_SWE <- tbl_regression(MODEL06_SWE)
OUTPUT07_HUN <- tbl_regression(MODEL07_HUN)
OUTPUT07_SWE <- tbl_regression(MODEL07_SWE)
OUTPUT08_HUN <- tbl_regression(MODEL08_HUN)
OUTPUT08_SWE <- tbl_regression(MODEL08_SWE)
# Math Comparison
tbl_merge(tbls = list(OUTPUT05_HUN, OUTPUT06_HUN, OUTPUT07_HUN, OUTPUT08_HUN),
        tab_spanner = c("Hungary Math", "Hungary Math", "Hungary Read", "Hungary Read"))
# Reading Comparison
tbl_merge(tbls = list(OUTPUT05_SWE, OUTPUT06_SWE, OUTPUT07_SWE, OUTPUT08_SWE),
        tab_spanner = c("Sweden Math", "Sweden Math", "Sweden Read", "Sweden Read"))
```

```
# 4. Analyze Migrant Background

freq(HUN$MIG) #has 2.25% migrants

freq(SWE$MIG) #has 16.80% migrants


# Math Scores

MODEL07_HUN <- lm(MATH ~ MISCEDC+MIG+FLANG+EMOSUPS+BOOKSG+GENDER, data = HUN)

MODEL07_SWE <- lm(MATH ~ MISCEDC+MIG+FLANG+EMOSUPS+BOOKSG+GENDER, data = SWE)


# Text Structure Scores

MODEL08_HUN <- lm(TS ~ MISCEDC+MIG+FLANG+EMOSUPS+BOOKSG+GENDER, data = HUN)

MODEL08_SWE <- lm(TS ~ MISCEDC+MIG+FLANG+EMOSUPS+BOOKSG+GENDER, data = SWE)

stargazer(MODEL07_HUN,MODEL08_HUN,MODEL07_SWE,MODEL08_SWE,type="text")


OUTPUT07_HUN <- tbl_regression(MODEL07_HUN)

OUTPUT08_HUN <- tbl_regression(MODEL08_HUN)

OUTPUT07_SWE <- tbl_regression(MODEL07_SWE)

OUTPUT08_SWE <- tbl_regression(MODEL08_SWE)


tbl_merge(tbls = list(OUTPUT07_HUN, OUTPUT08_HUN, OUTPUT07_SWE, OUTPUT08_SWE),

        tab_spanner = c("Hungary Math", "Hungary Read", "Sweden Math", "Sweden Read"))
```