Title: Do the Family Structures Influence the Academic Performance between Native Children and Immigrant Children?

Master's Degree Programme in Inequalities, Interventions and New Welfare State (INVEST)

Master's thesis

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03.05.2023

Turku

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Number of pages: 37 pages + 2 appendices pages
Date: 03.05.2023

Abstract: The study aims to find out the differences in academic performances among native, first-generation immigrant, and second-generation children when their family structure differs by two-parent families and single-parent families. Children of Finland and Great Britain are chosen from the PISA 2012 dataset for the analysis. Linear regression with stepwise models and interaction between immigration status and family structure has been used for the analysis. The study found that there is a significant difference in academic performance among Finnish native and immigrant children, however, after controlling Economic, Social, and Cultural status (ESCS), the significant association between academic performance and second-generation immigrant children has been lost. And no significant differences have been found when family structure interacts with immigrant status. Finnish native children who are raised by both parents have the highest significant PISA scores among all the groups of children and 1st generation immigrant children from one-parent families have the lowest estimated PISA scores. British 1st generation immigrant children with two-parent family backgrounds have the highest estimated PISA scores and British 2nd generation immigrant children from single-parent families have the lowest estimated PISA scores. Negative significant associations on academic differences have been found between native and second-generation immigrant groups. Correspondingly, a negative significant

interaction effect has been found between family structure and second-immigrant status after controlling ESCS. According to the study, it can be argued that Finland's 1st generation immigrant children and British second-generation children from one-parent families are having the double disadvantage of being immigrants and being single-parent families

Key Words: Academic performances, Immigrant, Native, Single parent family, Two parent family, Finland, Great Britain.

1. Introduction:

Changes in family structure and increased frequency of immigration have been a significant role in changing the socioeconomic condition of the world and the whole of Europe (Erman and Harkonen, 2017). Children suffer the most because of these factors. The negative effects of parental separation often cause a loss in socioeconomic resources, leading to a transition to poverty. Feelings of sadness, loneliness, and depression may result from parental separation, which diverts into lower academic achievement (Erman and Harkonen, 2017). Lower levels of education, vulnerable labor market position, and lower income are the reflection of lower socioeconomic status, which are common among immigrant and other minority groups. Besides these negative factors when an immigrant child faces parental separation, family life becomes more unstable, hampering his well-being, academic performance, and potential future. Parental separation may lead to worse school achievement, which can intensify inequities among children of various groups (Bernardi and Boertien, 2017). According to Bernardi and Boertien (2017), immigrant groups in which parental separation is more common tend to have weaker penalties for separation, which helps to balance out the unequal effects in a similar way to weaker penalties for families with lower socio-economic status.

People generally move from one place to another place for better living arrangements. Adults as parents migrate to a new destination country for the well-being of the family, especially for their children's success. In this regard, educational attainment is considered to be one of the best benchmarks to determine immigrant children's development. Academic performance can also measure the ability to integrate with the destination country (Kilpi-Jakonen, 2011; Schnell and Azzolini, 2015). It is obvious that immigrant families have fewer resources with fewer opportunities than native families and also the language barrier hinders them to integrate with the host country (Planting, 2022). Therefore, children from immigrant families hold less socioeconomic support in their upbringing. As a consequence, they lag behind in competition with native peers to achieve academic goals. On the other perspective, the opposite results have also been found by another group of researchers. Many studies claim that immigrant children are in a strong position to aiming better academic performances than their native fellow students (Akhter and Robinson, 2014; Dustmann and Theodoropoulos, 2010; Level and Dronkers, 2008). Friendly immigration policies of destination countries (Akhter and Robinson, 2014; Level and Dronkers)

and the origin country's political stability influence immigrant students' better educational attainment (Level and Dronkers, 2008).

Immigrant children's education is critical since it can affect their future success and assimilation into society. While several studies have looked into the academic performance discrepancies between native and immigrant children, few have looked into the impact of family structure. In this study, I would try to point out this gap by reviewing the native-immigrant differences in achieving academic goals with their different family status from two countries such as Finland and the United Kingdom. The United Kingdom and Finland were selected as the countries of investigation for this study because of the striking differences between their educational systems, the different origins of immigrants, and the different welfare system. Because of these distinctions, I am investigating the differences in academic performance between native and immigrant children from these two countries, whether the results are similar or different, as well as comprehending the influence that the composition of the family has on academic achievement in a variety of settings. In addition, both Great Britain and Finland have a great reputation for high-quality education, making them good case studies for analyzing the academic experiences of immigrant students. Understanding the specific patterns of this relationship can help policymakers, educators, and researchers to develop more targeted interventions and policies that can support academic success for native and immigrant children in these countries.

Great Britain has a long history of immigration, and the country has experienced a significant influx of immigrants in recent decades. Britain is a liberal welfare state that emphasizes the male breadwinner paradigm, the market and private sectors, little government intervention, and means-tested benefit distribution (Hadjar and Uusitalo, 2016; Rahkonen et al., 2000) for lone mothers (Rahkonen et al., 2000). The British welfare system provides fewer incentives for women to work with less publicly financed childcare (Rahkonen et al., 2000). Despite efforts by the government to support immigrant children in their academic performance, such as the Ethnic Minority Achievement Grant (EMAG), immigrant children in Britain still face significant barriers to success in school (Tikly et al., 2005). This study tries to explore the experiences of immigrant children in comparison with native children of Great Britain and to understand the impact of family structure on their academic performance.

In the sense of migration, historically Finland had been known as a country of emigration (Harju-Luukkaine and McElvany, 2019). But in the last few decades, it has become a new destination for immigrants where most of them are humanitarian migrants or asylum seekers with a lower level of education (Sara et al., 2016). The presence of a strong government, universal social rights, and relatively few disparities in terms of wealth, social class, and gender (Hadjar and Uusitalo, 2016; Rahkonen et al., 2000) define Finland as a social-democratic welfare state (Hadjar and Uusitalo, 2016) which also known as Nordic Welfare model (Rahkonen et al., 2000). This Nordic Welfare model encourages women to participate in full-time jobs along with men with the service of publicly financed daycare (Rahkonen et al., 2000). Finland has taken a more inclusive approach to the integration of immigrants and their children into the educational system. The Finnish educational system places a strong emphasis on equality and provides equal opportunities for all children, regardless of their background (Hadjar and Uusitalo, 2016). Despite these efforts, immigrant children still face challenges in their academic performance, and family structure can play a role in these difficulties. The present study focuses to examine the experiences of immigrant children in Finland and to understand the impact of family structure on their academic performance.

2. Previous Literature:

The Effect of Parental Separation on Academic Performances

The effect of parental separation on children's educational attainment has been studied by several researchers with different methodological perspectives. Considering the research outcomes, one group has found that parental separation does not influence children's academic performance when they are from a privileged group of society as their parents have available resources. Another group of researchers argued that children of privileged parents suffer more or fail to attain better academic achievement as they lose more resources when their parents are apart (Guetto et.al.,2022). Negative academic performance in early childhood has an adverse long effect on further educational attainment (Harju-Luukkaninen et al., 2018). Though it is found that native children perform better in academic achievement than immigrants sometimes the scenario changes when their family status changes to parents' dissolution (Guetto et.al.,2022). According to the same research, from the Italian perspective, native children suffer more disadvantages as they lose

more socioeconomic resources due to parental separation. Most of the time these disadvantages lead to lower academic performance. On the other hand, immigrant children are already considered a vulnerable group in a society with lower socioeconomic resources. Therefore, parental separation does not make a significant negative effect on their educational attainment. Subsequently, first-generation immigrant children from single-parent families are more successful in academic performance than second-generation and native children of single-parent families (Guetto et al., 2022).

However, other researchers found that the effect of parental separation depends on both parents' educational backgrounds and with whom the children are staying after separation (Bernardi and Boertien, 2017; Krein, and Beller, 1988). These last two studies found that highly educated mothers can reduce the negative effect of separation while fathers' higher education (in separation) has less influence on children's academic attainment. Additionally, Mothers' economic resources, educational attainment, and amount of spending quality time (Krein, and Beller, 1988) are considered more important than fathers, as in most cases children stay with their mothers after separation. From another point of view, children are dispossessed of more resources if the father is more affluent. Considering heterogeneity in maternal resources, the previously mentioned research from Bernardi and Boertien (2017) found no significant result in children's academic performance between privileged and non-privileged families due to parental separation. Nonetheless, this same study found that privileged children have a higher likelihood of being losers in the sense of socioeconomic resources than non-privileged children when their parents separate. Children raised by single parents often face social and financial obstacles (Creighton et al., 2009). It is found that families with just one parent are more likely to be poor and insecure financially (Krein, and Beller, 1988) than two-parent families. In comparison with other parental types, Li and Mumford (2009) found that British children who are raised by dual biological parent families are more successful in literacy skills in math and English. A narrower achievement gap has been found among Finnish students with different socioeconomic family backgrounds (Ai Hong, 2017). Bjorn and Kyttala, 2010 found that children from single parents or non-two biological parents have better academic skills in comparison with their peer groups who are living with two-biological parents though the sample size of the study was small.

Immigrant Children from Single Mother's Family

Single mother-headed households may not have the same employment opportunities as compared with households headed by single male earners or two parents (Creighton et al., 2009). The same study found that poor economic and social status is the main disadvantage to education, faced by children when they are raised by a single mother. The effect of parental separation on the educational attainment of immigrant children varies by the origin of the mother. Ermann and Harkonen (2017) found that migrant children of Chilean ancestry where parental separation is common, experience less penalty in academic performance than children from Bosnia and Herzegovina where parental separation is rare. It is found that the parental separation or absence of a father does not always affect the well-being of children ((Erman and Harkonen, 2017; Krein, S. F., and Beller, A. H.,1988). Kalmijn (2010) as cited in Erman and Harkonen (2017) found that the self-esteem of Caribbean and African children is not affected by the absence of a father but the absence of a father lowers the self-esteem among the children of the Middle Eastern and South-Central Asians.

It is obvious that single motherhood has a detrimental effect on children's academic performance (Dronkers and Kalmijn, 2013). And surprisingly the authors claimed that this negative effect of single motherhood is higher among native children in comparison with immigrant children. For immigrants, the effect of parental separation on children's academic performance may depend on the time spent by the family. The relationship between parental separation and academic achievement may be more comparable to that of the native group for those immigrants who have lived in the host nation for a longer period of time (Erman and Harkonen, 2017) because they have been more assimilated into the family customs and culture of the country (Erman and Harkonen, 2017; Level et al., 2008).

Differences in Academic Achievement between native and immigrant children

Academic performance and well-being of immigrant children in comparison to native children have been widely researched and studied. The findings vary based on different factors such as the parent's country of origin, the immigration policies of the destination country, and the socioeconomic status of the family.

According to a study by Akhter and Robinson (2014), native students tend to have higher academic performance in mathematics and science, and reading literacy compared to first and second-generation immigrant students. Rodreguez et al. (2020) also found that native students have a higher level of self-efficacy and school attachment, resulting in greater life satisfaction. On the other hand, first-generation immigrant students often have lower motivation and attachment to school life (Rodriguez et al., 2020), leading to a higher likelihood of dropping out of upper secondary education (Kilpi-Jakonen, 2011). In some countries which are well known for their better integration policies for migrants, immigrant students have been found to perform better academically than native students (Akhter and Robinson, 2014). For example, first-generation Canadian immigrant students have better mathematics and reading skills (Akhter and Robinson, 2014). The same study also found that, in Australia, significant advanced results have been found for both first and second-generation immigrant children. In contrast, both first and second-generation immigrant students in New Zealand tend to perform worse in science and other academic skills compared to native students.

Factors Affecting Immigrants Academic Performance

The success of immigrant students in a particular country is often tied to the country's immigration policies and the resources available to the family. A family's socioeconomic status is highly influential in attaining academic achievement (Ai Hong, 2017; Harju-Luukkainen et al., 2018). Israel et al., 2001 suggested that academic achievement could be enhanced by highlighting social capital in both households and the community. Harju-Luukkainen et al, (2018) found that first-generation immigrant students perform better in mathematics scores with a higher value in the index of ESCS (Economic, social, and cultural status) than second-generation immigrant students in Finland. The educational background of the parents and the availability of financial and substantial resources also play a crucial role in determining the academic performance of immigrant children (Schnell and Azzolini, 2015). If immigrant parents are unable to secure higher-level jobs in the destination country, they may not be able to provide enough resources for their children, leading to lower academic achievement (Guetto et. al., 2022; Schnell and Azzolini, 2015). In Mexico, being in a household of immigrants has been associated with a reduction in the likelihood of completing middle school for both boys and girls (Creighton et al., 2009). The academic outcomes of immigrant children also vary based on their country of origin. For example,

children of immigrants from Iran and Eastern Europe perform better academically than Swedish natives, while immigrants from the Middle East, Africa, and other Nordic nations perform worse (Erman and Harkonen, 2017).

3. Research Questions:

Both Britain and Finland are examples of Western welfare states with different education systems. Providing equal learning opportunities for all children, regardless of background factors like socioeconomic status or learning difficulties, is a core tenant of the Finnish education system (Bjorn and Kyttala, 2011). The subsequent implementation of comprehensive schools and equal-quality education for all children make the Finnish education structure one of the least stratified in the world (Smithers and Robinson, 2010). Despite these efforts, immigrant children in Finland still face difficulties in their academic performance.

On the contrary, Great Britain has been remaining on the top list for immigrants from the very early period (Dustmann and Theodoropoulos, 2010). In Britain, immigrant students are able to make significant achievements throughout the period of compulsory schooling and some immigrant students surpass their native white contemporaries (Dustmann and Theodoropoulos, 2010). In Britain, local education administrations are responsible for state school funding and admissions, where the public and private sectors coexist with a very low degree of uniformity (Hadjar and Uusitalo, 2016). The British education system is highly stratified (Hadjar and Uusitalo, 2016; Smithers and Robinson, 2010) and dominated by secondary education whereas the state comprehensive schools allow students for admission according to their family background (Smithers and Robinson, 2010).

The main aim of this study is to find out the differences in academic performance between native and immigrant students when their family backgrounds differ by single-parent families and two-parent families from Great Britain and Finland. Therefore, the following research questions are set up to find out the aim of the study:

1. **How does the family structure (single-parent and two-parent families) of native and immigrant children in Great Britain and Finland affect their academic performance?**

2. **How does control for the mother's origin and children's Economic and Social Status (ESCS) change the effect of family structure on academic performance among native and immigrant children in Great Britain and Finland?**

3. **How do estimated PISA scores differ country-wise among native and immigrant children with different family backgrounds?**

According to research question 3, this study can expect some differences in estimated PISA scores between native children and immigrant children. These expectations are

- Native children from two-parent families have better estimated PISA scores than immigrant children from two-parent families.
- Immigrant children from two-parent families have better estimated PISA scores than native one-parent families as immigrants would have both parents in support.
- Immigrant children from one-parent families have lower estimated PISA scores than children of native one-parent families.
- Native children from one-parent families have lower estimated PISA scores than children of immigrant one-parent families.

The last two expectations are inconsistent with one another. The contradiction between these expectations is due to the fact that, despite their similar family structures, different immigrant statuses would result in a different relationship between family structure and academic performance. Either the estimated PISA scores of immigrant children from one-parent families are lower because they have the double disadvantage of being immigrants and from broken families or the estimated PISA scores of native children from one-parent families are lower because they lose more resources due to the parental separation (Guetto et al., 2022). It is probable that native children may have greater challenges as a result of the separation of their parent's marriage since they would have to readjust their lives in a less advantageous manner when they were previously leading a more advantageous life than the immigrant children.

4. **Data and Method:**

As the study aims to find out the academic achievement of immigrant children in comparison with native children when these two groups differ in their family structure (Two parent families and one-parent families). The data for this study were obtained from the Program for International

Student Assessment (PISA) 2012 dataset, a large-scale international assessment that measures the academic performance of 15-year-old students in reading, mathematics, and science. The PISA 2012 dataset consists of a complex survey design, involving a multistage sampling method and complex weights, clustering, and stratification. The dataset was collected from 65 countries and economies, including Finland and the UK (OECD, 2006). The data were collected through a questionnaire with a cross-sectional survey. Immigrant children of Finland were oversampled for the first time in PISA 2012. As the number of immigrant children in Finland was too small, therefore it was quite difficult to get a significant result from those samples. Therefore, oversampling helped to obtain representative data on Finnish immigrant children (Harju-Luukkainen et al., 2018). In this study, 7,937 observations from Finland and 10,989 observations from Great Britain are considered. The number of observations is accounted for after deducting the missing data. 892 students from Finland and 2,230 students from Great Britain have been deducted due to missing values. Most of the missing values accounted for the variable which presents the family structure for both countries.

To analyze the PISA 2012 dataset, a statistical software package "repest" is used, which is designed to handle complex survey data. The use of "repest" command is crucial for accurately estimating regression models that account for complex survey design, including weighting, clustering, and stratification. Failing to consider these design features can lead to biased estimates and incorrect conclusions. "Repest" employs replicate weights to calculate statistics that accurately reflect the complex survey design, especially for the OECD's PISA, PIAAC, and TALIS datasets. Additionally, it enables the use of multiple imputed variables or plausible values, where the mean estimate across plausible values is presented and imputation error is included in the variance estimator (Keslair, 2017). Overall. the use of "repest" is essential for seeking valid statistical inferences from complex survey data.

To handle missing data, variables are recoded to create new categories by dropping the missing values from each variable. This approach allowed us to include all available observations (without missing values) in our regression models, while also minimizing the potential for bias due to missing data. To investigate the effect of family structure on academic performance among native and immigrant children, a linear regression model will be analyzed which includes academic

performance as the dependent variable, immigrant status, and family structure are independent variables, and the interaction between two independent variables.

The linear regression model can be represented by the following equation:

Academic Performance (Mathematics Skills) = $\beta 0 + \beta 1$ Immigrant Status + $\beta 2$ Family Structure + $\beta 3$(Family Structure * Immigrant Status) + ε

In this model, $\beta 0$ is the intercept, $\beta 1$ is the coefficient for immigrant status, $\beta 2$ is the coefficient for family structure, $\beta 3$ is the coefficient for the interaction between immigrant status and family structure, ε is the error term. The coefficient for immigrant status ($\beta 1$) represents the difference in academic attainment between native and immigrant children when family structure is in its reference value (one-parent family). The coefficient for family ($\beta 2$) represents the difference in academic performance between children from one-parent families and two-parent families when they are from native groups. The coefficient for the interaction term ($\beta 3$) represents the difference in the effect of family structure on academic performance between native and immigrant (second-generation students and first-generation students) students. If $\beta 3$ is positive, it means that the effect of family structure on academic performance is stronger among immigrant children in reference to native children when the family structure is in its reference value and vice versa. In addition, the linear regression analysis is conducted by stepwise models to show the changes in the effect of interaction between family structure and immigration status by controlling the mother's origin and children's economic, social, and cultural status (ESCS). And finally, differences in the estimated PISA score among native and two-immigrant groups of children are figured out by using STATA's margin command.

Variables:

Dependent Variable

For this research, I will focus on students' mathematics scores to measure their academic performances. I have chosen the mathematics score as the method of math calculation is the same, where the reading differs by vocabulary, pronunciation, or set of letters. In PISA mathematics ability is measured by five plausible values.

Table 1: Plausible Values of Mathematics for Finland

Plausible-Values (Mathematics)	Observation	Mean	Std. Dev.	Min.	Max.
pv1math	7,937	515.0	86.4	208.3	769.8
pv2math	7,937	514.2	86.3	182.4	779.2
pv3math	7,937	515.0	86.1	193.4	807.1
pv4math	7,937	514.5	86.1	208.1	793.1
pv5math	7,937	514.9	86.2	218.6	804.1

Table 2: Plausible Values of Mathematics for Great Britain

Plausible-Values (Mathematics)	Observation	Mean	Std. Dev.	Min.	Max.
pv1math	10,989	497.9	88.4	167.6	817.5
pv2math	10,989	497.7	88.7	168.7	807.6
pv3math	10,989	497.8	88.6	142.0	807.2
pv4math	10,989	498.1	88.6	160.0	793.9
pv5math	10,989	498.5	88.4	159.8	818.1

Independent Variables:

For the independent variable, I have chosen the immigrant status of students as they are natives or immigrants which is coded into three categories (Native= 0, Second generation immigrant =1, and first-generation immigrant=2). Another independent variable is family structure, whether they live with one parent or they live with two parents which are also coded as dummy variables (One-parent family =0 and two-parent family=1). The interaction between two independent variables will lead to answering research question 1.

Native Children: Native children are those children who were born and have at least one native parent born in the country of assessment for the PISA survey (Sara et al., 2016). In this study, a total of 6,873 Finnish native children and 10,100 British native children are considered.

Second-Generation Immigrant Children: Children who have been born in the country of assessment for the PISA survey but whose parents were born in a foreign country are considered second-generation immigrant children (Sara et al., 2016). 506 second-generation immigrant children from Finland and 376 second-generation immigrant children from Britain are included in this study.

First-Generation Immigrant Children: First-generation immigrant children refer to those children who are foreign-born and have migrated with their foreign-born parents to the country of assessment for the PISA survey (Sara et al., 2016). 558 first-generation immigrant children from Finland and 513 first-generation immigrant children from Britain are included in this analysis.

Table 3: Cross-tabulation of Finnish Children's Immigration Status and Family structure in Percentage (Total Number)

Immigration Status (Origin)	*One-Parent Family*	*Two-Parent Family*	*Total*
Natives	16.7% (1,150)	83.2% (5,723)	100% (6,873)
Second Generation Immigrants	16.0 % (81)	83.9% (425)	100% (506)
First Generation Immigrant	22.4% (125)	77.6% (433)	100% (558)
Total	17.0% (1,356)	82.9% (6,581)	100% (7,937)

Based on 7,937 Finnish children, Table 3 shows family types and immigration statuses. 1,150 (16.7%) of 6,873 native households are one-parent, while 5,723 (83.2%) are two-parent. 81 (16%) of 506 second-generation immigrant households had one parent, while 425 (83.9%) have two. 125 (22.4%) of the 558 first-generation immigrant households have one parent, and 433 (77.6%) have two parents. Overall, this table allows for comparisons between groups of families based on their immigration status and family type. It shows that a higher proportion of native and second-generation immigrant families tend to be two-parent families, while a higher proportion of first-generation immigrant families tend to be one-parent families. However, it is important to keep in mind that the sample for this data is oversampled for immigrant children (Finland) and the results

of the table are made from the unweighted sample, meaning that the percentage values may not necessarily reflect the total population in Finland. However, this data can still provide insights into the distribution of families based on immigration status and family type among the native and immigrant populations in Finland.

Table 4: Cross-tabulation of British Children's Immigration Status and Family Structure (%)

Immigration Status (Origin)	One-Parent Family	Two-Parent Family	Total
Natives	15.9% (1,612)	84.0% (8,488)	100% (10,100)
Second Generation Immigrants	14.1% (53)	85.9% (323)	100% (376)
First Generation Immigrant	17.7% (91)	82.2% (422)	100% (513)
Total	15.9% (1,756)	84.0% (9,233)	100% (10,989)

Table 4 illustrates that most British children, regardless of immigration status, come from two-parent homes. 15.9% of natives are from one-parent households, while 84% are from two-parent homes. Most natives are reared in two-parent households. 85.9% of second-generation immigrants had two parents, whereas 14.1% have one. Like natives, most second-generation immigrants are reared in two-parent homes. 82.1 percent of first-generation immigrants had two parents, while 17.8% have one. First-generation immigrants are more likely than natives and second-generation immigrants to be raised in single-parent families.

Control Variables:

For observing additional structural changes between the dependent and independent variables, the study uses a set of control variables. Research question 2 aims to find out the changes in the effect of family structure on the academic performances of native and immigrant children when mothers' origin and children's ESCS are controlled for. As it is said earlier, children's academic outcomes are more influenced by mothers' background, therefore mothers' origin is selected as a control variable in this study. In Finland, immigrant mothers originated from Asia, the Middle East, Somalia, other European countries, and some other countries. The mothers who originated from Estonia and Russia are included in Native groups as they were married to Finnish males (Heikkilä and Peltonen, 2002). Asia, Africa and the Middle East, other European countries, and other countries are the immigrant mothers' countries of origin in Great Britain. In addition, another

control variable is ESCS which represents children's index of economic, social, and cultural status. As the study aims to find out the effect of family structure on academic performance among students, therefore family background could have a vital role in students' academic skills (Hauju-Lukkainen et al., 2018). ESCS is an index of composition where the level of parents' education, occupational status of parents, and family's wealth and cultural possession are measured altogether (Harju-Lukkainen et al, 2018; Riudavates, 2020). A higher score of ESCS specifies a higher level of economic, social, and cultural status; a lower score of ESCS specifies a lower level of children's economic, social, and cultural status. By controlling these variables, it could be seen how the effect of family structure changes children's academic performance to their immigration status. Age and sex are the basic control variables in this study which are not the main concern of this study.

Table 5: Descriptive statistics for Control Variables (Finland)

Categorical Variables	**Categories**	**Percentage (%)**	**Frequencies**
Gender	Female	50.7	4,024
	Male	49.3	3,913
Mothers' Origin	Finnish	87.1	6,915
	Asian	0.8	66
	Middle Eastern	1.1	90
	Somalian	2.8	148
	European	2.3	189
	Other	6.6	529

Continuous Variable	**Observation**	**Mean**	**Std. Dev**	**Min.**	**Max.**
Age of Respondents	7,937	15.7	.2	15.2	16.2
Index of Economic, Social, and Cultural Status (ESCS)	7,937	.3	.8	-4.2	2.5

Table 6: Descriptive Statistics of Control Variable (Great Britain)

Categorical Variables	Categories	Percentage (%)	Frequencies
Gender	Female	49.7	5,468
	Male	50.2	5,521
Mothers' Origin	British	89.6	9,849
	Asian	0.4	49
	African &ME	0.1	21
	European	0.4	47
	Other	9.3	1,023

Continuous Variable	Observation	Mean	Std. Dev	Min.	Max.
Age of Respondents	10,989	15.7	.2	15.2	16.2
Index of Economic, Social, and Cultural Status (ESCS)	10,989	.27	.8	-3	2.6

The above tables (1-6) are calculated without using the "Respest" command, which means the results are found from the unweighted sample.

5. **Result:**

The results are interpreted from two tables and figures. For the analysis, the study conducted three models with stepwise regression. The tables show the differences in the effect of family structure among native, second-generation immigrant children, and first-generation immigrant children. In addition, tables also include the academic performances of two different immigrant groups in comparison with native children and academic differences when the children come from different family backgrounds. The figures show the estimated PISA scores among native, first-generation immigrant, and second-generation immigrant children with different family backgrounds after controlling for both mothers' origin and ESCS. Table 7 and Figure 1 represent the outcomes for Finland and Table 8 and Figure 2 represent the outcomes for Great Britain.

Differences in the Effect of Family Structure among Native and Immigrant Children of Finland

In Model 1, basic control variables such as age and sex are included to comprise generational status as the main independent variable of interest. The difference in the effect of a two-parent family between native and second-generation immigrant children's academic performance is -19 which is non-significant, among the second-generation immigrant children the difference between two-parent and one-parent families is 1 (20+ (-19) = 1) which is also non-significant. And the difference in the effect of a two-parent family between native and first-immigrant children's academic performance is only 3 but is also non-significant, among the first-generation immigrant children the difference between two-parent and one-parent is 23 (20+3= 23) (Table 7).

In model two when the mother's origin is controlled for, the difference in the effect of a two-parent family on academic performance between native and second-generation children is increased to -23 though it is not statistically significant. Among second-generation immigrant children, the difference between two-parent and one-parent families is -3. And the difference in the effect of a two-parent family between native and first-immigrant children's academic performance is reduced to 1.1 which is non-significant, among the first-generation immigrant children the difference between two-parent and one-parent is 21.

Model 3 shows the results after controlling children's economic, social, and cultural status (ESCS). The difference in the effect of a two-parent family between native and second-generation immigrant children's academic performance is -12 which is not statistically significant whereas,

among second-generation immigrant children, the difference between two-parent and one-parent families is -5. And the difference in the effect of a two-parent family between native and first-immigrant children's academic performance is 11 which is non-significant, among the first-generation immigrant children the difference between two-parent and one-parent is 18 (Table 5).

Table 7: The Difference in Effect of Family Structures on Academic Performance (Mathematics Skills) Among the Finnish Natives, 1st Generation, and 2nd Generation Children:

	Model 1 *Interaction + controlled by Gender and Sex*	*Model 2* *Interaction + Model 1 +Controlled by Mothers' Origin*	*Model 3* *Interaction + Model 2 +Controlled by Mothers' Origin and ESCS*
Native as Reference			
Second-Generation	-49.25*** (14.65)	-18.10 (15.81)	-19.06 (16.12)
First-Generation	-92.99*** (23.84)	-72.50*** (20.70)	-62.98** (19.71)
One-Parent Family as Reference			
Two-Parent Family	20.16*** (2.98)	20.24*** (2.98)	7.59** (2.88)
Second-Generation *Two-Parent Family	-19.41 (15.93)	-23.62 (15.31)	-12.76 (15.73)

First-Generation*Two-Parent Family	3.49 (24.69)	1.16 (23.22)	11.09 (22.56)
Male **(Female as Reference)**	0.67 (2.78)	0.68 (2.80)	1.65 (2.64)
Age of student	13.79** (4.88)	13.46** (4.88)	14.49** (4.48)
Mothers' Origin (native as Reference)			
Asian		-24.35 (16.74)	-14.12 (16.44)
Middle Eastern		-26.37* (11.35)	-12.46 (11.42)
Somalian		-78.22*** (7.27)	-67.56*** (8.18)
European		-9.57 (7.41)	-5.66 (7.56)
Other		-27.65** (9.45)	-22.84* (8.92)
Index of Economic, Social, and Cultural Status (ESCS)			28.83*** (1.72)
Constant	510.25*** (3.22)	510.51*** (3.22)	508.77*** (2.94)
Observations	7,937	7,937	7,937

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Being a child of first-immigrant children significantly lowers 93 units of doing better in academic performance in comparison with native children when the family structure is a one-parent family.

The gap reduces significantly after controlling mothers' origin in Model 2 and after controlling ESCS in Model 3. Model 1 shows that being a child of second-generation immigrant status (and the family structure is a one-parent family) significantly lowers 49 units of doing better in academic performance in comparison with native children. However, in Model 2 and Model 3, the gaps are reduced with the non-significant result. Additionally, being children from two-parent families significantly increases 20 units of having higher mathematics skills than children from one-parent families in Model 1. The result does not change in Model 2 when the mother's origin is controlled for. And the gap reduces significantly at 7 units when ESCS is controlled for in Model 3. Moreover, it is also found that the higher the economic, social, and cultural status, the higher the academic performance is (Table 7).

The difference in test scores between the children of native one-parent and second-generation immigrant one-parent is 20 which is statistically significant. Between the children of native one-parent and first-generation immigrant one-parent, the difference in test scores is 63 which is also statistically significant. Again between the children of native two-parent and second-generation immigrant two-parent, the difference in test scores is 32. And The difference in test scores between the children of native two-parent and first-generation immigrant two-parent is 52 (See Appendix: Table 1).
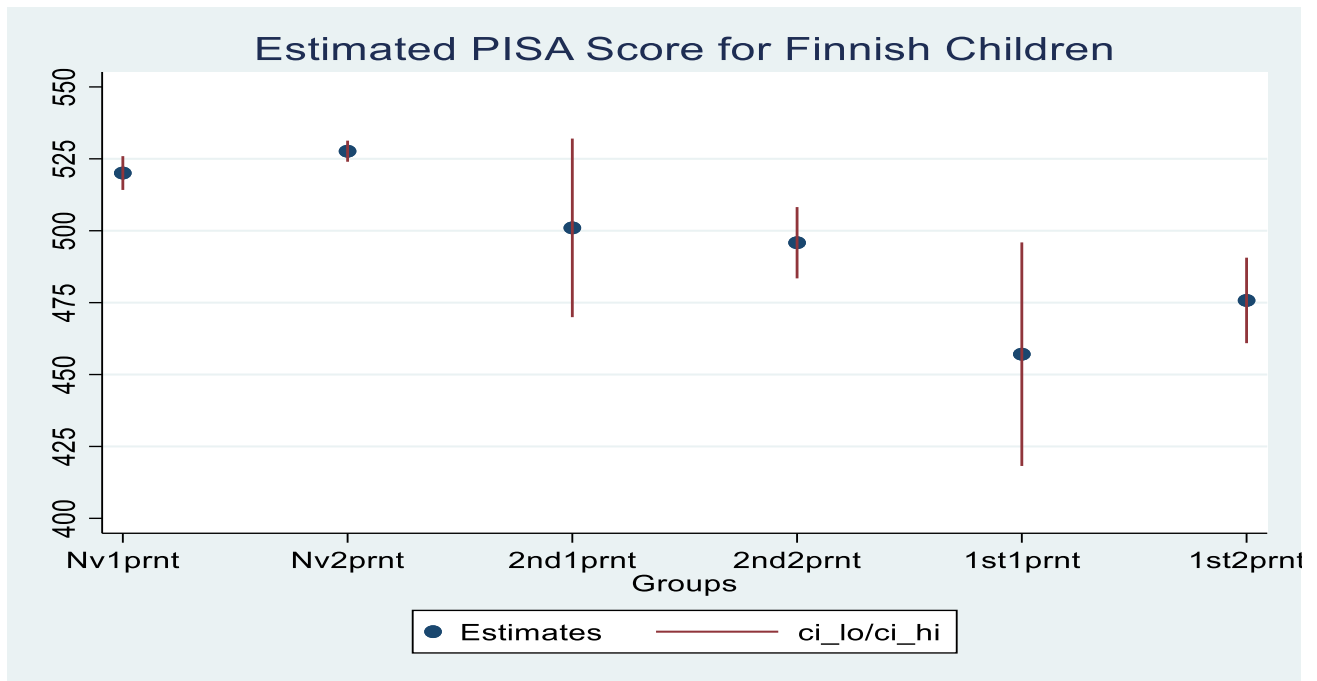
Figure 1: Differences in Estimated PISA scores among native, second-generation, and first-generation children with different family backgrounds based on model 3.

Figure 1 shows that Finland's estimated PISA test score is significantly highest for native students of two-parent families (Nv2prnt). Significant lowest estimated PISA test score is found for first-generation immigrant students from one-parent families (1st1prnt). Children from two-parent families of native origin have a significantly higher estimated PISA score than immigrant (both 1st and 2nd generation) children of two-parent families, which supports the first expectation of research question 1. Both 1st and 2nd generation immigrant children from two-parent families have significantly lower estimated PISA scores than native children from one-parent families which, rejects the second expectation. In Finland, Immigrant children (both 2nd generation and 1st generation) from one-parent families have significantly lower PISA scores than native children who are also from one-parent families. This result supports the third expectation. Again native children from one-parent families have significantly higher PISA scores than immigrant (both 2nd and 1st generation) children from one-parent families, which contradicts the fourth expectation. It is remarkable in Finland that, native children from both single-parent and two-parent families have higher test scores than immigrant children from both single-parent and two-parent families. Also, among second-generation immigrants, children from one-parent families have higher scores than children from two-parent families.

Result: Differences in the Effect of Family Structure among Native and Immigrant Children of Great Britain

In Model 1 the difference in the effect of a two-parent family between native and second-generation immigrant children's academic performance is 28 which is not statistically significant whereas, among second-generation immigrant children, the difference between two-parent and one-parent families is 50 (28+22=50). And the difference in the effect of a two-parent family between native and first-immigrant children's academic performance is 24 which is non-significant, among the first-generation immigrant children the difference between two-parent and one-parent is 46 (24+22=46) (Table 8).

After controlling mothers' origin in Model 2 the differences in the effect of a two-parent family on academic performance among all the groups of children remain unchanged from Model 1 (It is because the mothers' origin does not differ among native children).

Model 3 represents the results after controlling children's economic, social, and cultural status (ESCS). The difference in the effect of a two-parent family between native and second-generation immigrant children's academic performance is 41.71 which is statistically significant whereas, among second-generation immigrant children, the difference between two-parent and one-parent families is 48. And the difference in the effect of a two-parent family between native and first-immigrant children's academic performance is 23 which is non-significant, among the first-generation immigrant children the difference between two-parent and one-parent is 30 which is not statistically significant (Table 8).

Model 1 shows that being a second-generation immigrant child significantly decreases 33 units of achieving better academic results in comparison with a native child when they come from one parent family. After controlling for the mother's origin and ESCS in Model 2 and Model 3 respectively, the gaps increase significantly. When the family structure is a one-parent family first-generation immigrant children have 31 lower units in math performance in comparison with native children when mothers' origin is controlled for in Model 2. However, no significant result is found in Model 1 and Model 2 for first-generation immigrant children. After controlling for mothers' origin in Model 2, the result remains the same. And the result loses its significance after controlling the ESCS in Model 3.

The difference in test scores between the children of native one-parent and second-generation

immigrant one-parent is 49 which is statistically significant. Between the children of native one-parent and first-generation immigrant one-parent, the difference in test scores is 22 which is also statistically significant. Again between the children of native two-parent and second-generation immigrant two-parent, the difference in test scores is 8. And The difference in test scores between the children of native two-parent and first-generation immigrant two-parent is 1 (See Appendix: Table 2).

Table 8: The Difference in the Effect of Family Structure on Academic Performance (Mathematics Skills) Among British Native and 1ˢᵗ Generation and 2ⁿᵈ Generation Immigrant Children

	Model 1	Model 2	Model 3
	Interaction + controlled by Gender and Sex	Interaction + Model 1 +Controlled by Mothers' Origin	Interaction + Model 2 +Controlled by Mothers Origin and ESCS
Native as Reference			
Second-Generation	-33.38* (13.55)	-47.422** (15.09)	-49.50*** (13.86)
First-Generation	-17.11 (14.15)	-31.27* (15.68)	-22.44 (15.67)
One-Parent Family as Reference			
Two-Parent Family	22.66*** (4.35)	22.29*** (4.33)	7.26 (3.89)
Second-Generation*	28.29 (15.78)	28.62 (15.80)	41.71** (13.96)

Two-Parent Family			
First-Generation* Two-Parent Family	24.39 (16.34)	24.70 (16.40)	23.55 (15.57)
Gender **(Female as Reference)**	10.27* (4.61)	10.33* (4.59)	9.40* (4.02)
Age of student	22.37*** (4.76)	22.35*** (4.74)	22.18*** (4.53)
Mothers' Origin (Native as Reference)			
Asian		26.84 (15.15)	34.76* (14.50)
African & Middle Eastern		30.55 (22.38)	9.03 (21.22)
European		25.15 (16.26)	28.64* (14.42)
Others		14.68* (7.28)	8.53 (6.13)
Index of Economic, Social, and Cultural Status (ESCS)			38.10*** (2.16)
Constant	480.12*** (5.20)	479.67*** (5.25)	480.76*** (4.72)
Observations	10,989	10,989	10,989

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
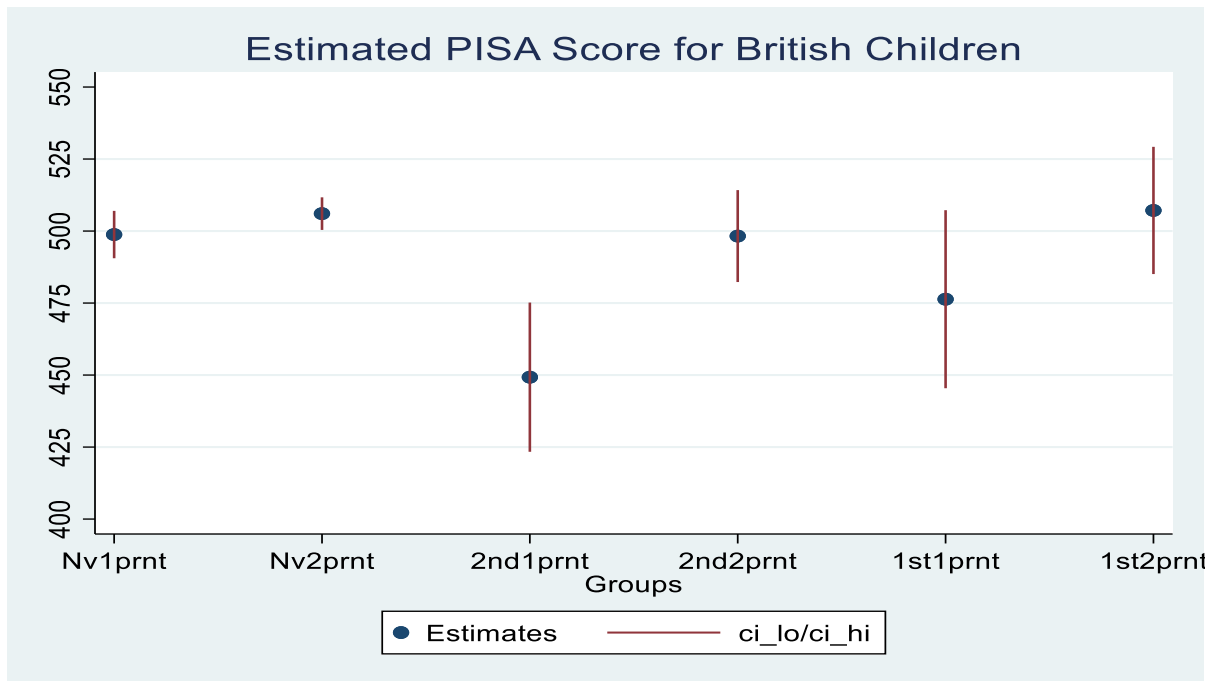
Figure 2: Differences in Estimated PISA scores among native, second-generation, and first-generation children with different family backgrounds based on model 3.

Figure 2 shows that the significantly highest estimated PISA score in Great Britain is observed for first-generation immigrant children from two-parent families (1st 2prnt). Second-generation one-parent family children have significantly the lowest estimated PISA score (2nd1prnt). Native children from two-parent families have higher PISA scores which are significant than second-generation immigrant children of two-parent families. Therefore, the first expectation is accepted. However, children of native background from two-parent families have significantly lower PISA scores than first-generation immigrant children of two-parent families, which rejects the first expectation. 1st generation immigrant children from two-parent families have significantly higher PISA scores than native one-parent children which supports the second hypothesis. Additionally, second-generation immigrant children of two-parent families and native children from one-parent families have almost equal PISA scores. Immigrant children (both 2nd and 1st generation) from one-parent families have significantly lower PISA scores than native one-parent families which supports the third expectation. And native children, who are raised by one parent have significantly higher scores than immigrant children (both 2nd and 1st generation) of one-parent families which contradicts the fourth expectation. It is notable that, British children from a two-parent family,

whether their origin is native or immigrant, have higher estimated PISA scores than children from a one-parent family.

6. **Discussion and Conclusion:**

The association between immigration and family structure on academic achievement has not been done so extensively in previous research. This research used linear regression with a stepwise model to investigate the possible interaction impact of immigration and family structure on academic achievement. The study explored the mathematical PISA score as academic achievement of Finnish and British children. It compared the academic differences among native, second-generation immigrants, and first-generation immigrant students when their family background is heterogeneous by one-parent families and two-parent families. As the PISA 2012 data set does not tell us about the combination of two-parent families, whether both parents are biological or not, it cannot be determined that two-parent families consist of two biological parents. Furthermore, it is reasonable to assume that after a divorce, exclusive custody of a child is assigned to the mother though co-parenting is practiced in Finland.

In the case of Finland, the study's findings indicate that the main association between first-generation immigration status and academic performance is significant, showing that immigrant students from the first generation have lower mathematics skills than native students (whether their mother's origin and ESCS are controlled for or not). The association is moderated by the family structure which shows that the association between native and academic performance is positive regardless of socioeconomic status. On the other hand, there is a negative association between first-generation and academic performance whether their socioeconomic status is accounted for or not and the association becomes more negative when the children come from one-parent families.

 In this regard, it could be said that first-generation immigrant students are unable to perform better academically due to being immigrants, having language inefficiency, or lacking integration capacity. However, when control variables are not taken into account, a negative significant association between second-generation and academic performance emerges. This may indicate that second-generation children are impacted by their families' socioeconomic background which means a second-generation student's academic performance declines as the family's socio-economic status declines.

The models, however, failed to detect a significant interaction association between immigration and family structure on academic achievement. This implies that immigrant status and family structure have a significant association with academic performance and that these associations do not show any substantial interaction effect on students' academic performance. Therefore, it can be said the academic differences between natives and immigrant is not dependent on the family structure.

However, estimated PISA scores from the interaction between immigration status and family structure, it is found that native children from both two-parent and one-parent are significantly doing well in comparison with both groups of immigrant children. Since they have access to more resources (Guetto et al., 2022), it could be claimed that their native status and language proficiency (Planting, 2022) aid in their academic success. Greater access to resources and proximity of both parents (Li and Mumford, 2009) contribute to higher PISA scores for children of native and first-generation immigrant groups in two-parent families compared to one-parent families, although the differences in the effect of two-parent families among native, second-generation, and first-generation children are not statistically significant. (we can assume that the number of participants is small in number for an insignificant result). Another significant finding for Finland is, children of second-generation immigrants who are raised by a single parent have significantly higher PISA scores than children from two-parent families of the same generation. The possible reason behind this result could be that these children might have a positive influence from their intergenerational cohabitation in their upbringing (Deleire and Kalil, 2002). Native children from single-parent families are also doing better than immigrant children of dual-parent families. The reason behind this could be, that although they are from non-conjoint families due to being natives they do not have to integrate with a new society or do not have any language barrier or they have support from grandparents, therefore, parental separation does not distress them the same way, which distresses immigrant children.

Overall, immigrant children in Finland are behind in academic performance compared to their native peers. One reason could be that most of the time it is difficult to cope with a new destination country, second, both parents and children face a language barrier in Finland, and the third reason could be less social integration with the host society. First-generation children from one-parent families have the lowest estimated PISA score. Already they are facing an adaptation problem in

a new place, in the meantime dissolution between parents makes them more vulnerable, which demonstrated that they face the double disadvantages of being an immigrant and also from being a broken family background (Guetto et al., 2022).

As it is stated that Britain is a country, where people like to move from the very early period. Many immigrants are living in Britain for three generations. From the perspective of previous studies, it is also found that immigrant children have better academic performances than their native peers (Dustmann and Theodoropoulos, 2010).

The present study has found mixed results on the association between immigration status and academic achievement, moderated by family structure in the case of Britain. A significant negative association between second-immigration status and academic performance is found before (Model 1) and after (Model 2 and Model 3) controlling the mothers' origin and ESCS. This means second-generation students perform worse than native children regardless of their socioeconomic status. And a significant negative association has been found for first-generation immigrants with academic performance children when mothers' origin is controlled for. Therefore, first-generation immigrant children show lower academic performance than native children irrespectively of their mothers' origin. Therefore, it can be said that native children have a positive association and immigrant children have a negative association with academic performance. The association between immigrant children and academic performance is more negative when their family structure tends to one-parent family.

The models failed to detect a significant interaction association between the family structure and first-generation children. This suggests that first-generation immigrant students' academic performance is not significantly associated with interactions between family structure and immigrant status, despite the fact that these determinants have differing effects on academic performance when their economic, social, and cultural status differ. However, the interaction effect of family structure and immigrant status is positively significant among second-generation students and native students after controlling ESCS along with mothers' origin. This means children from two-parent families of the second generation have significantly positive academic performance than native children when they come from two-parent families, even though their economic, social, and cultural status is controlled for. In this regard, parental involvement in

academic activities could be the reason for positive academic achievement by immigrant students (Ho, 2006).

The estimated significant PISA scores from the interaction between immigration status and family structure reveal that first-generation immigrant children of two-parent families are at a higher position of estimated PISA scores than all other groups of children. Britain is a traditional immigrant-accepting country for immigration (Dustmann and Theodoropoulos, 2010; Level and Dronkers, 2008), and parents' efficiency in the English language which helps them to get involved in children's academic activities, could be the influencer behind this outcome. Overall children from two-parent families of all the groups have higher PISA scores as the two-parent families are more resourceful (Guetto et.al.,2022; Li and Mumford, 2009) and also are more effective in generating better educational results for children than one-parent families (Li and Mumford, 2009). Second-generation immigrant children from one-parent families have significantly the lowest estimated PISA scores of all the other groups of children. Their lowest PISA scores tell that; parental dissolution and immigrant background make them more vulnerable than other groups of children. On the other hand, immigrant children (both 1st and 2nd generation) of single-parent families have lower scores than native children from single-parent families. In this situation, it could be said that, as immigrant children are already regarded as an unprivileged group due to being immigrants, above and beyond parental dissolution make them a double disadvantaged group (Guetto et al., 2022).

From the perspective of a less stratified education system and comparatively fewer social inequalities, it could be estimated that immigrant children might have a comprehensive academic performance in Finland. However, the result of this study reveals the opposite. The academic performances of immigrant children are significantly lower than their native peers, though when family structure interacts the difference is not significant. Therefore, it can be said that the Finnish integration law for immigrants is still not favorable for immigrants as immigrant children are lagging behind (Lower estimated PISA scores and negative association with academic performance) than their native peers whether they are from two-parent families or one-parent families. Finnish policymakers should give more concentration on immigrant integration law as they are also part of the country. Because it is not possible to make a welfare state by keeping one group of people aside.

On the other hand, due to the highly stratified education policy and means-tested benefits system, immigrant children of Great Britain seem to have lower academic performance than their native peers. With this regard, the association between immigrant children and academic performance is found negative in comparison with native children. However, the effect of a two-parent family among native and second-generation is positively significant. That means second-generation immigrant children are doing better academic performance in comparison with native children when they come from two-parent families. On the other hand, British first-generation immigrant children are doing better (estimated PISA scores) than their native peers, and the difference in academic performance is found to be non-significant which could be the result of their better integration skills of them or a better British integration law for immigrants.

Every research study has limitations that need to be acknowledged. In this particular study, there are several limitations that must be taken into account. One of the main limitations is the use of cross-sectional data, which only provides a snapshot of a particular moment in time. This means that we cannot examine changes in academic performance before and after parental separation. A better approach would be to use panel data, which allows for the observation of changes over time. Another limitation of the study is the lack of information about family structure. For example, the study does not indicate whether both parents in a two-parent family are biological or not, nor does it specify whether the single parent in a one-parent family is a mother or a father. This information is important because family structure can have a significant impact on children's academic performance. In addition, the sample size of immigrant children in the study is too small in comparison to the native group. As a result, we may not have enough data to draw meaningful conclusions about the differences in academic performance between these two groups. Finally, the data used in this study is almost 12 years old. While the study provides valuable insights into the differences in academic performance between native and immigrant children, we need to update our information to reflect changes in family structure and the immigrant population in recent years.

Given the significant impact of family environment on children's development, it is important to continue studying the effects of family structure on academic performance. In future research, a longitudinal data set would be ideal to track changes in academic performance over time. This would allow us to examine how different family structures affect children's academic outcomes and to identify potential interventions to improve educational outcomes for all children, regardless

of their family background. Additionally, a separate analysis could be done only for immigrant children by controlling mothers' origin to observe the differences between the two generations.

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Appendix:

Table 1: Estimated PISA scores among native, second-generation and first-generation students when their family structure differs by one-parent family and two-parent family in Finland (controlled by mothers' origin and ESCS)

*Immigration Status*Family Structure*			*Estimated PISA Scores*
Native*One-Parent Family			520.06*** (2.99)
Native*Two-Parent Family			527.65*** (1.87)
Second-Generation*One-Parent Family			500.99*** (15.83)
Second-Generation* Two-Parent Family			495.83*** (6.32)
First-Generation*One-Parent Family			457.07*** (19.82)
First-Generation*Two-Parent Family			475.76*** (7.58)
Constant	510.25*** (3.22)	510.51*** (3.22)	508.77*** (2.94)
Observations	7,937	7,937	7,937

Standard errors in parentheses
$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Table 2: Estimated PISA scores among native, second-generation and first-generation students when their family structure differs by one-parent family and two-parent family in Great Britain (controlled by mothers' origin and ESCS)

*Immigration Status*Family Structure*			*Estimated PISA Scores*
Native*One-Parent Family			498.77*** (4.19)
Native*Two-Parent Family			506.04*** (2.88)
Second-Generation* One-Parent Family			449.27*** (13.21)
Second-Generation* Two-Parent Family			498.25*** (8.14)
First-Generation* One-Parent Family			476.33*** (15.76)
First-Generation* Two-Parent Family			507.15*** (11.26)
Constant	480.12*** (5.20)	480.76*** (4.72)	480.76*** (4.72)
Observations	10,989	10,989	10,989

Standard errors in parentheses
* *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001