

Age at Arrival, Parents and Neighborhoods: Understanding the Educational Attainment of Immigrants' Children*

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Abstract

This paper documents how children of immigrants cope in early adulthood in Finland. We first show that, on average, they have dramatically lower educational attainment than children of natives do. This difference can be attributed to age at arrival, parental income and neighborhood quality. In fact, Finnish-born children of immigrants obtain more education than children of natives growing up in the same zip codes and in families with similar parental income and family structure. Sibling comparisons suggest that age at arrival has a causal impact on educational attainment. The results are very similar for the likelihood of being idle and having been convicted of a crime, but are starkly different for the likelihood of having been reimbursed for psychotropic medication.

Keywords: children of immigrants, second-generation immigrants, education, age at arrival. **JEL Classification:** I14, I21, J15

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1 Introduction

In continental Europe, children of immigrants tend to have lower educational attainment and achievement than do children of natives, particularly among immigrant groups in which parents struggle in the labor market (Algan et al. 2010; Dustmann et al. 2012; Schnepf 2007). This stylized fact has given rise to concerns about whether the offspring of immigrants will integrate into host countries' societies even in the long term. Indeed, claims about the perceived lack of integration and appropriate policy responses are among the most important, and controversial, topics of many countries' public debates.

Designing efficient policies requires informed hypotheses about the reasons for why so many children of immigrants fall behind. One possibility is that the educational gaps simply reflect the fact that immigrants' children often grow up in low-income families and in deprived neighborhoods. In this case, policy makers might be best advised to focus on general policies attempting to help disadvantaged children (regardless of their parents' immigrant status). Policies helping adult immigrants in the labor market might also have spillover effects for their offspring. Alternatively, at least a subset of immigrants' children might require special attention. In this case, the first step of meaningful policy formation is to understand which groups are the most vulnerable.

This paper adds to the debate by documenting how the offspring of immigrants cope in early adulthood in Finland. Our primary purpose is to establish a set of facts that are directly relevant for policy and that can be used as a basis for future research. We address two broad questions. First, we ask how large the immigrant-native gaps in educational attainment are, how much heterogeneity there is across different immigrant groups, and how much of these gaps can be attributed to differences in other background characteristics, neighborhood quality and age at migration. Second, we examine whether the differences in education also extend to other domains.

We start by documenting large differences in educational attainment between children of immigrants and children of natives. For example, less than half of immigrants' children have completed secondary education by age 20 (in comparison to four fifths among the children of natives). Part of this gap is due to children of immigrants progressing more slowly through their education. Nevertheless, even for immigrant children at age 23, we find a 21 percentage point gap in the likelihood of having graduated from high school or vocational education, and a 17 percentage point gap in the likelihood of having attended

college.

The unconditional differences in educational attainment contain many layers of heterogeneity. We start unpacking them by showing that Finnish-born children of immigrants obtain much more education than do those immigrating with their parents. We also document large differences across source areas. Children of immigrants from Somalia, Turkey and Iraq tend to have particularly low educational attainment.

In the last step of our baseline analysis, we compare children of immigrants with native children who grew up in the same zip codes and in similar families in terms of household structure, parental income and parental employment. We find that, on average, second-generation immigrants are as likely to hold an upper secondary degree and are more likely to attend college than are members of this comparison group. The only subgroup for which we find a statistically significant negative difference is that of children of immigrants from Somalia.

These observations suggest that it might be necessary to design policies tailored for the needs of children arriving with their parents. In this task, policy makers would benefit from understanding why age at migration predicts lower education. The key challenge in interpreting our baseline results is that families choosing to migrate with children might differ in many ways from those whose children are born only after they have settled into the host country. We examine the importance of such selection by comparing siblings who grow up in the same families, but arrive in Finland at different ages. This analysis is likely to capture the causal impact of age at arrival, because siblings share time-invariant family characteristics that likely lead to selection bias in cross-sectional analysis.

We find that even after conditioning on time-invariant family characteristics, age at arrival affects educational attainment in an economically and statistically significant manner. To better understand how this effect arises, we conduct a more detailed analysis. The results suggest that arriving as a small child has a strong negative effect in comparison to being born in Finland. This pattern is inconsistent with the age at arrival effects being primarily driven by the critical period of language acquisition. Furthermore, parents' exposure to Finland prior to the birth of the child does not seem to have an impact, suggesting that the length of the child's own exposure to Finland is the most likely explanation for why age at arrival matters in our context.

In the final part of the paper, we complement our main analysis by examining factors

that might be consequences or causes of low educational attainment. We document differences in idleness, criminal convictions and the use of medical services. Some of the results closely mirror the pattern of results for educational attainment. Children of immigrants are much more likely to be idle (i.e., not to be in education, employment or training) and to have been sentenced for a crime than are children of natives. Similar to education, the gaps are driven by those moving to Finland with their parents, whereas Finnish-born children of natives and immigrants growing up in similar circumstances seem to have similar outcomes. Interestingly, however, the results for health outcomes are very different. Children of immigrants are less likely to have a diagnosis of severe illness or to have purchased psychotropic medication. For psychotropic medication, the gaps are larger for second-generation immigrants and increase when conditioning on other background characteristics. These results are somewhat surprising because immigrants tend to have worse self-reported health than do natives (Matikka et al. 2015). We interpret this pattern to be most likely due to immigrants using fewer medical services than do natives with similar underlying health problems.

These results add to a growing literature documenting differences in educational attainment between children of immigrants and children of natives.¹ Our contribution to this literature is twofold. First, we present the first comprehensive documentation of how children of immigrants cope in the Finnish educational system. Second, and more importantly, we examine the importance of childhood resources by conditioning on both family characteristics and childhood neighborhoods. While earlier work has typically shown that conditioning on parental characteristics—most often parental education—decreases educational gaps, the role of neighborhoods has received little attention.² Our results show that this omission is important. Specifically, while controlling for parental characteristics and family structure reduces the immigrant-native gap in completing secondary

¹Earlier work on educational attainment includes Chiswick and DebBurman (2004), Glick and White (2004), and Pereira et al. (2006) for the United States; Dustmann and Theodoropoulos (2010) for the United Kingdom; Gang and Zimmermann (2000) and Riphahn (2003) for Germany; Belzil and Poinas (2010) and Dos Santos and Wolff (2011) for France; Baert and Cockx (2013) for Belgium; Van Ours and Veenman (2003) for the Netherlands; Bratsberg et al. (2012) for Norway; Hällsten and Szulkin (2009) for Sweden; and Algan et al. (2010) for France, Germany and the United Kingdom. Earlier work on Finland is limited to that of Kilpi-Jakonen (2011), who examines transitions from middle school to upper secondary education, whereas we document educational attainment in early adulthood. This distinction is important in the Finnish context, because differences in educational attainment are largely driven by dropping out from secondary degree programs rather than never enrolling in one.

²Hällsten and Szulkin's (2009) study seems to be the only earlier study conditioning on relatively small neighborhoods.

education by a half, adding neighborhood fixed effects to the specification eliminates the rest of the gap in the Finnish context.

We also contribute to the literature documenting a negative association between age at arrival and educational attainment.³ Earlier work using sibling comparisons to examine the role of selection in creating this association include Bratsberg et al. (2012) and Hermansen (2017) for Norway and Åslund et al. (2015) for Sweden.⁴ Similar to us, these studies find that while selection plays a role, age at migration also has a causal impact.

Finally, we add to the research on crime and the health of immigrants' children.⁵ Similar to our analysis for educational attainment, our contribution is to present the first comprehensive overview of these outcomes for immigrant children living in Finland. Furthermore, our paper is unique in using identical methodology to examine a wide set of outcomes across several domains. This approach allows us to paint a more nuanced picture of the situation of immigrants' offspring and to examine the extent to which lessons from one set of outcome variables can be extrapolated into other domains.

We proceed as follows. The next section provides a brief introduction to Finland's immigration experience and institutional context. We present our data in Section 3, report the results for educational attainment in Section 4, and complement this analysis by examining crime and the use of medical services in Section 5. We conclude by discussing potential interpretations of our results and our results' implications for public policy and future research.

2 Institutional context

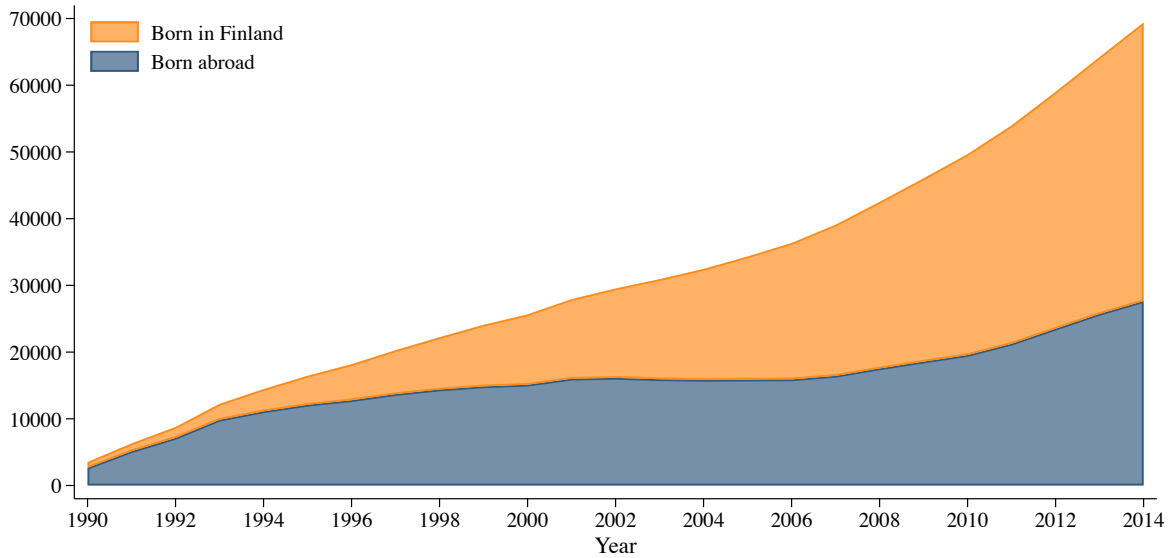
Finland presents an interesting setting to study the integration of the children of immigrants because of its record of providing opportunities for children growing up in disadvantaged families. Finland has one of the world's highest rates of intergenerational

³Previous work using cross-sectional data includes Chiswick and DebBurman (2004), Bleakley and Chin (2004), Gonzalez (2003), Lee and Edmonston (2011), and Myers et al. (2009) for the United States; Corak (2012), Lee and Edmonston (2011), and Schaafsma and Sweetman (2001) for Canada; Van Ours and Veenman (2006) for the Netherlands; and Söhn (2011) for Germany.

⁴In addition, Böhlmark (2008) uses sibling comparisons to examine the impact of age at migration on test scores in Sweden.

⁵Earlier work on crime includes Bersani (2014), Bui (2009) and Rumbaut et al. (2006) for the United States; Junger-Tas et al. (2012, 2010) for various European countries; and Kardell and Carlsson (2009) for the Nordic countries. For health outcomes, see surveys by Molcho et al. (2010), Pfarrwaller and Suris (2012) and Stevens and Vollebergh (2008).

Figure 1: Children with foreign-born parents living in Finland in 1990-2014



Note: This figure reports the number of under 18-year-old individuals living in Finland with both parents (or the only known parent) foreign-born. Source: Statistics Finland.

mobility (Corak 2013; Jäntti et al. 2006) and the PISA assessments have consistently shown that Finland has both high average test scores and a weak relationship between students' family background and performance (OECD 2013). The Finnish government has relied on universal policies, that is, virtually no policies are specifically targeted at children of immigrants.

On the other hand, Finland also has a relatively short immigration history. For most of the post-WWII period, Finland has been an emigration country, where immigrants were primarily return migrants and their family members. Finland became a destination country for immigrants only in the early 1990s. Figure 1 illustrates the pace of this change by plotting the number of children with foreign-born parents living in Finland in 1990–2014. Our analysis focuses on the children of immigrants who arrived during a period when the immigrant population was still small. In 2014, when we measure the outcomes of our youngest cohorts, 5% of the Finnish population were immigrants and 6% were categorized as being of a foreign background (i.e., both parents or the only known parent was born abroad).

The share of economic migrants to Finland has been low. Furthermore, a large share of the arrival cohorts we examine arrived during an exceptionally severe recession in the early 1990s. These factors are reflected in the low initial employment rates and incomes

of adult immigrants in comparison to those of natives. The gaps decreased over time, but even after living in Finland for 15 years, immigrants tend to perform substantially worse in the Finnish labor market than comparable natives (Sarvimäki 2011, 2017).

3 Data, definitions and descriptive statistics

3.1 Data sources and sample restrictions

Population-wide data Our population-wide data cover the Finnish population aged 15–70, who were residents in Finland between 1988 and 2014. Statistics Finland has constructed these data by drawing information from several administrative registers, which contain rich information on individual characteristics, educational attainment, employment status and income. We also observe identification codes for individuals' households and family units, and the zip codes of their places of residence. The sample for which we examine educational outcomes consists of individuals who were born between 1975 and 1991. We further restrict the sample to those living in Finland continuously between the ages of 15 and 23. Lastly, we include only individuals who were either born in Finland or immigrated to Finland at age 15 or younger.

Two factors motivate our cohort restrictions. First, hardly any immigrants' children living in Finland were born before 1975. Second, those born in 1991 are the the last cohort for whom we observe the educational attainment at age 23. We require continuous residence in Finland in adolescent years in order to exclude temporary migrants. Furthermore, we study immigrants arriving as children or early adolescents in order to focus on those likely to participate in compulsory education, and to exclude immigrants arriving as exchange students or for employment purposes.

Crime and health data A limitation of our population-wide data is that they do not include information on other potentially relevant outcome variables beyond educational attainment. Thus, we augment our analysis by using another data set consisting of a 20% random sample of the population born between 1967 and 1990. Similar to our population-wide data, these data are drawn from several administrative registers that are linked together at Statistics Finland. Importantly, however, this data set includes detailed information on the purchases of prescription drugs and on criminal sentences. We

study individuals' medication use and criminal sentences by the age of 23, and construct the sample similarly as described above. However, we observe these outcomes only up to the end of 2008 and thus limit the sample to individuals born between 1975 and 1985. In other respects, the data set contains background information on individuals that is similar to, though somewhat less precise than, the background information in the population-wide data.⁶

3.2 Definitions of family and immigrant status

We define families in a given year as persons living in the same household and belonging to the same family unit as defined by Statistics Finland's family register. "Parents" are adults who are first observed in the same household as the individuals we study (henceforth "the children"). We consider children to be siblings if they have the same mother. However, if there is no mother in the same household, we define siblings using the father's identification code. We exclude from the sample individuals with no observed parents.

In the baseline analysis, we group children into three categories according to the origin of their parents. We call individuals whose parents are both natives "children of natives," those with one immigrant and one native parent "children of immigrant-natives," and those whose parents are both immigrants "children of immigrants."⁷ These definitions do not depend on whether the child was born in Finland or abroad. If we observe only one parent, we categorize the child according to the status of that parent (i.e., immigrant or native). In the analysis with more detailed origin categories, we use the mother's origin if we observe her before or at the same time as the child's father, and use the father's origin otherwise.

⁶In the smaller data set, information on individuals' place of residence is not as detailed as such information in the population-wide data is. See the Data Appendix for how we construct this variable in the crime and health data.

⁷We define parents' immigrant status according to their country of birth and registered language. We define natives as individuals who are either born in Finland or born abroad and whose registered native language is Finnish or Swedish in the first year we observe them. An exception is Swedish-born, Swedish-speaking individuals, who are defined as immigrants because a majority of them are likely to be Swedes rather than Swedish-born children of Finnish emigrants. Furthermore, we consider individuals born in the former Soviet Union countries to be immigrants regardless of their registered language. Those born in the Soviet Union but having Finnish as their registered language are likely to be Ingrian Finns, whose standing in Finland is likely to be more comparable to that of immigrants than to that of natives.

3.3 Background characteristics

Table 1 presents averages of the background characteristics for the three categories of children defined in the previous section, measured in the year the children turned 15 years old. It shows that children of immigrants grow up, on average, in households with low incomes and low parental labor market attachment. They are also more likely to live in single-parent households. The differences are smaller when we compare native families to families where one parent is a native and the other is an immigrant. We do not report the education of the parents (or control for it in our regressions), because education obtained abroad is poorly measured in our data.⁸

Importantly, our definition of immigrants' children includes both those born in Finland and those who moved to Finland before or at the age of 15. Appendix Table A1 shows the distribution of age at immigration for the children in our main data. Indeed, 57% of children of immigrant parents in our sample immigrated between ages 7–15, and only 12% were born in Finland (or arrived as infants). Thus, it is important to bear in mind that the majority of individuals we examine are not second-generation immigrants.

3.4 Outcomes

Our primary outcome is an indicator for holding an upper secondary degree at age 23. These degrees are granted by general upper secondary schools ("academic track") and vocational upper secondary schools and roughly correspond to high school degrees in the U.S. context.⁹ Most 16-year-olds enroll in one of these institutions after completing the obligatory nine-year comprehensive education. Failing to complete a secondary degree is a strong predictor of low income, high unemployment, and a poor level of housing (Aro 2009).

Our second measure of educational attainment is an indicator for having ever been

⁸The Register of Educational Qualifications and Degrees has comprehensive coverage only of degrees attained in Finland. Some degrees of immigrants are recorded in this register via the employment services, but the recording of this information is incomplete and available only for selected groups of immigrants. Using survey data, Sutela and Larja (2015) find that 24% of working-age immigrants had completed at most lower secondary education, 42% had at most an upper secondary degree, and 35% had a degree from higher education. The corresponding shares among persons with a Finnish background were 17%, 49% and 35%, respectively.

⁹We use a relatively old age for measuring secondary education because many children of immigrants progress through the educational system with some delay. However in our data, almost all individuals who had completed upper secondary education had graduated by age 23. See the Data Appendix for a more detailed discussion.

Table 1: Background characteristics

	Native	Immigrant- native	Immigrant
<i>A: Population-wide sample</i>			
Parents' average months of unemployment	1.36	2.05	4.07
Parents' combined income, euros	53,033	48,246	24,278
Parents' combined income, deciles	5.52	4.78	2.37
Mother's age	43.1	43.1	40.9
Father's age	45.2	46.6	43.8
Number of under-aged children	1.83	1.83	2.32
Age at arrival, defined by child	0.06	2.63	8.55
Mother present when child 15	0.97	0.96	0.95
Father present when child 15	0.84	0.78	0.74
Mother present ever	1.00	1.00	0.99
Father present ever	0.97	1.00	0.90
<i>B: Crime and health sample</i>			
Parents' average months of unemployment	1.04	1.66	4.39
Parents' combined income, euros	50,465	48,250	20,883
Parents' combined income, deciles	5.63	5.09	2.26
Mother's age	42.7	42.8	40.4
Father's age	44.8	46.0	43.1
Number of under-aged children	2.07	2.03	2.38
Age at arrival, defined by child	0.07	2.73	10.57
Mother present when child 15	0.96	0.95	0.93
Father present when child 15	0.85	0.81	0.72
Mother present ever	1.00	1.00	0.99
Father present ever	0.96	1.00	0.86
Observations (population)	1,039,341	13,045	13,424
Observations (crime and health sample)	138,094	1,330	1,039

Note: Average background characteristics are measured in the year the person turns 15 years old. A person is categorized as a "native" if both of her parents are natives, as an "immigrant-native" if one of her parents is an immigrant and the other is a native, and as an "immigrant" if both parents are immigrants. See Section 3.2 and the Data Appendix for variable definitions.

Table 2: Outcomes

	Native	Immigrant-native	Immigrant
<i>A: Education</i>			
Holds a secondary degree at age 20	0.80	0.69	0.48
Holds a secondary degree at age 23	0.86	0.79	0.65
Enrolled in higher education by age 23	0.47	0.43	0.29
<i>B: Criminal sentences</i>			
Sentenced to fines by age 23	0.10	0.13	0.20
Sentenced to imprisonment or community service by age 23	0.04	0.05	0.09
Sentenced to unconditional imprisonment by age 23	0.01	0.01	0.02
<i>C: Medical services</i>			
Prescribed medication for severe illness	0.04	0.03	0.02
Used psychotropic medication	0.11	0.13	0.09

Note: This table reports averages of our outcome variables by parental background. A person is categorized as a "native" if both her parents are natives, as an "immigrant-native" if one of her parents is an immigrant and the other is a native, and as an "immigrant" if both her parents are immigrants. See Section 3.2 and the Data Appendix for variable definitions.

enrolled in higher education between ages 20 and 23.¹⁰ In Finland, college education is provided by universities and universities of applied sciences (also known as polytechnics). Finns who hold a college degree have substantially higher lifetime income (Koerselman and Uusitalo 2014), better self-rated health and a lower incidence of long-standing limiting illness (Laaksonen et al. 2005; Lahelma et al. 2004), and lower mortality and lifespan variation (Elo et al. 2006; van Raalte et al. 2011) than do Finns holding lower degrees.

Table 2 shows that 80% of the children of natives in our sample held an upper secondary degree at age 20 and the share increases to 86% by age 23. Among children of immigrant parents, holding this degree is less common, with less than half the children of immigrants having attained the degree at age 20, and 63% at age 23. The difference between children of natives and children of immigrants is apparent also in higher education enrollment. While nearly half the children of native parents and native-immigrant parents had been enrolled in higher education by age 23, the corresponding figure for the children of immigrants was only 29%.¹¹

¹⁰We have information on enrollment beginning from 1995, when the birth cohort of 1975 was age 20. To have the same at-risk period for all cohorts, we measure the outcome variable when the person is ages 20 and 23.

¹¹We do not examine employment or earnings, because a large proportion of Finnish youth are still in education at the age of 23. Thus, income and employment at this age are unlikely to provide good proxies for their future labor market potential.

Panel B of Table 2 reports the share of individuals having been sentenced for a crime by the District Courts and/or the Courts of Appeal by age 23. A fifth of the children of immigrants have been sentenced to fines as compared with a tenth of the children of natives. The relative differences are comparable also for the indicators of more serious crimes, measured by having been sentenced to conditional imprisonment, community service or unconditional imprisonment.

The last panel of Table 2 reports two measures of the use of medical services. It shows that children of immigrants are less likely to be treated for severe and chronic illnesses or to be prescribed psychotropic medication. We emphasize that these outcomes do not necessarily measure differences in the underlying health, but rather the combination of health and the capability (or willingness) to make one’s way through the health care system. We return to this issue in Section 5.

4 Educational attainment

In the previous section, we documented large differences in the average educational attainment between children of immigrants and children of natives. We now examine the extent to which these differences reflect the fact that the children of immigrants grow up in poorer families and in worse neighborhoods. We also examine in detail the role of age at migration and parental region of origin.

4.1 Baseline results

We start by measuring differences in educational attainment between immigrants’ children relative to native children in early adulthood by using a linear probability model

$$y_i = \alpha + I_i\beta + \theta A_i + X_i\gamma + \varepsilon_i \quad (1)$$

where y_{ij} is an indicator variable for individual i ’s educational attainment, I_i is a vector of indicator variables for her parents’ immigrant category (using children with both parents native as the omitted category), A_i is her age at arrival (zero for those born in Finland), X_i is a vector of year of birth indicators and background characteristics measured at age 15, and ε_i is an error term. We report estimates for the baseline specification controlling only for the individual’s year of birth and then gradually add control variables for age at

migration, background characteristics and residential location. The standard errors are clustered at the level of municipality of residence.¹²

Table 3 reports the results using a specification with the same two categories for immigrant background as in the previous section. The baseline estimates reported in column (1) condition only on differences in year of birth and corresponds closely to the raw differences discussed above. That is, children of families with one native and one immigrant parent are 10.6 percentage points less likely to have completed secondary education by age 20 than individuals who grew up in entirely native families. The gap between all-immigrant and all-native parents is substantially larger at 31.3 percentage points.

The next column reports estimates from a specification controlling for age at migration. The estimates reveal large differences across this dimension. Second-generation immigrants—defined as children of all-immigrant families who are born in Finland—are 12.8 percentage points less likely to hold a secondary degree than children of all-native families, while the gap is $12.8 + 15 \times 2.2 = 45.8$ percentage points for those moving to Finland when they are 15 years old.

In the last two specifications, we add controls for background characteristics and residential location. Controlling for parental labor market outcomes and family size reduces the estimates for β by roughly a half among the children of immigrants (column 3, see table notes for details of the control variables). Controlling for the zip code where the person lived at age 15 further reduces the estimates (column 4). Indeed, we do not find statistically significant different graduation rates between Finnish-born children of immigrants and children of natives who grow up in the same zip codes and in similar families in terms of observable characteristics. However, large differences remain between those born in Finland and those arriving at an older age.

Panel B of Table 3 reports similar estimates using graduation by age 23 as an outcome variable. We find a very similar, though somewhat attenuated, pattern as above. These results suggest that the unconditional differences observed at age 20 largely reflect slower progress through the educational system. Thus we focus on graduation by age 23 in much of the further analysis below.

The remaining estimates of Table 3 examine the likelihood of starting higher education

¹²We have chosen this level of clustering to take into account regional variation rising from, for example, the supply of post-mandatory education and returns to education.

Table 3: Educational Attainment in Comparison to that of Children of Natives

	(1)	(2)	(3)	(4)
<i>A: Holds a secondary degree at age 20</i>				
Immigrant-native	-0.106 (0.005)	-0.049 (0.005)	-0.034 (0.004)	-0.010 (0.004)
Immigrant	-0.313 (0.006)	-0.128 (0.007)	-0.067 (0.007)	-0.008 (0.007)
Age at migration	.	-0.022 (0.001)	-0.015 (0.001)	-0.015 (0.001)
<i>B: Holds a secondary degree at age 23</i>				
Immigrant-native	-0.069 (0.004)	-0.033 (0.004)	-0.020 (0.004)	0.003 (0.004)
Immigrant	-0.210 (0.006)	-0.093 (0.007)	-0.041 (0.006)	0.013 (0.007)
Age at migration	.	-0.014 (0.000)	-0.008 (0.000)	-0.008 (0.000)
<i>C: Enrolled in higher education by age 23</i>				
Immigrant-native	-0.034 (0.005)	0.008 (0.005)	0.021 (0.005)	0.035 (0.005)
Immigrant	-0.174 (0.006)	-0.037 (0.008)	0.048 (0.007)	0.091 (0.007)
Age at migration	.	-0.016 (0.001)	-0.006 (0.001)	-0.006 (0.001)
<i>Controlling for:</i>				
Parental characteristics	no	no	yes	yes
Residence location ZIP-codes	no	no	no	yes

Note: This table reports estimates from regressing indicators of educational attainment on indicators of immigrant background. A person is categorized as a "native" if both of her parents are natives (the omitted category), as an "immigrant-native" if one of her parents is an immigrant and another one a native, and as an "immigrant" if both parents are immigrants. Columns 2–4 also condition on age at migration, column 3 adds controls for background characteristics and column 4 for residential location. Background characteristics are parents' average months of unemployment (14 categories), income decile of parents' combined income (ten categories), mother's and father's age (seven categories) and number of siblings (six categories). Residential location is measured as the zip code of residence. All background characteristics are measured at age 15. The outcomes are an indicator for holding a secondary degree at age 20 (panel A) or at age 23 (panel B) and having been enrolled in a university or a polytechnic by age 23 (panel C).

by age 23. Again, we find a large unconditional difference by parents' immigrant status, which is much larger for children who arrived to Finland at later ages. However, second-generation immigrants are 9.1 percentage points more likely to study in a university or polytechnic than children of natives with similar background characteristics.

4.2 Heterogeneity by region of origin

We next turn to differences in educational attainment across parents' region of origin. Figure 2 reports estimates for region of origin fixed-effects from an extended version of equation (1), where vector I_i now includes separate indicators for 11 country/region of origin fixed-effects. We report both unconditional estimates (corresponding to the first column of Table 3) measuring the overall differences between children of immigrants and natives, and conditional estimates (corresponding to the last column of Table 3).

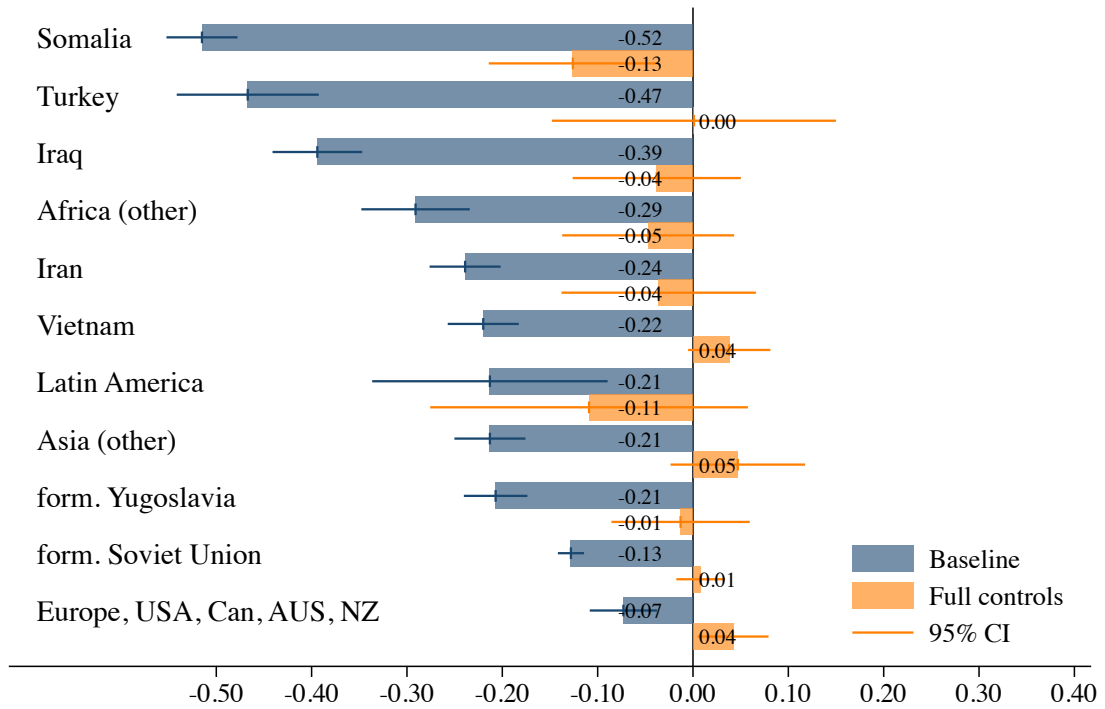
The unconditional estimates reveal substantial heterogeneity by region of origin. For the likelihood of graduating from an upper secondary school (top panel), the unconditional gaps vary between 39 and 52 percentage points among children of immigrants from Somalia, Turkey and Iraq, while the differences are much smaller for the children of immigrants from European countries. The conditional gaps are substantially smaller. In fact, the only statistically significant negative estimate is for the children of immigrants from Somalia. These results suggest that differences in educational attainment between region of origin groups can be largely attributed to their differences in age at arrival, parental characteristics and neighborhoods.

The baseline results for attending college (bottom panel) are qualitatively similar. Interestingly, however, the estimates suggest that Finnish-born children of immigrants from most regions of origin are more likely to have attended higher education by age 23 than are children of natives growing up in similar circumstances. This is the case even among the children of Somalian immigrants, that is, the only group for which we found a statistically negative estimate for secondary education.

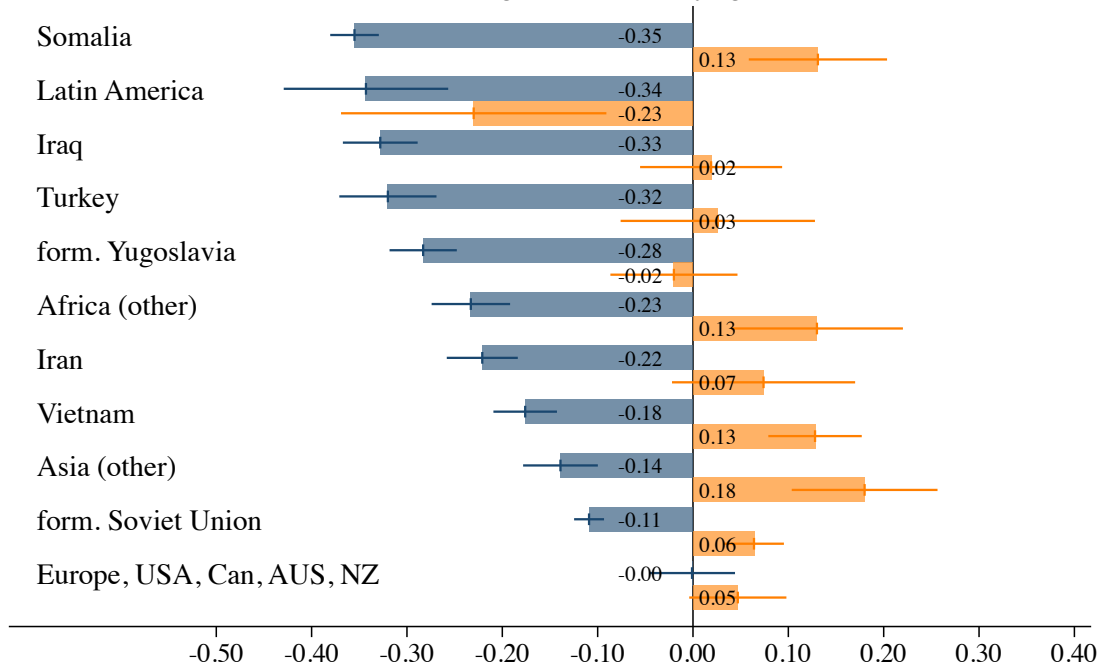
4.3 Sibling comparisons

Above we saw that children of immigrants arriving in Finland at a later age have lower educational attainment than do those born in Finland. Interpreting this association is challenging, because families choosing to migrate with older children might differ from

Figure 2: Immigrant-Native Gaps in Educational Attainment



B. Enrolled in higher education by age 23



Note: This figure reports region of origin fixed-effects from regressions corresponding to specifications (1) and (5) of Table 3, panel B, but replacing the immigrant indicator with region of origin indicators.

Table 4: Cross-Sectional and Within-Family Estimates for Age at Migration

	Immigrants		Immigrant-Natives		Native return migrants	
	(1)	(2)	(3)	(4)	(5)	(6)
Secondary degree at age 20	-0.029 (0.004)	-0.015 (0.006)	-0.027 (0.004)	-0.015 (0.003)	-0.019 (0.000)	0.001 (0.000)
Secondary degree at age 23	-0.014 (0.003)	-0.010 (0.004)	-0.018 (0.003)	-0.010 (0.002)	-0.015 (0.000)	0.002 (0.000)
Enrolled in higher education by age 23	-0.015 (0.003)	-0.004 (0.002)	-0.022 (0.003)	-0.004 (0.002)	-0.019 (0.000)	-0.002 (0.000)
Family FEs	no	yes	no	yes	no	yes

Note: Point estimates and robust standard errors (in parentheses) from regressing indicators for educational outcomes on age at arrival and year indicators. Estimates in columns (2), (4) and (6) control for family fixed-effects, gender and being the first-born child. Each estimate stems from a separate regression. Age at arrival is set to zero for persons born in Finland.

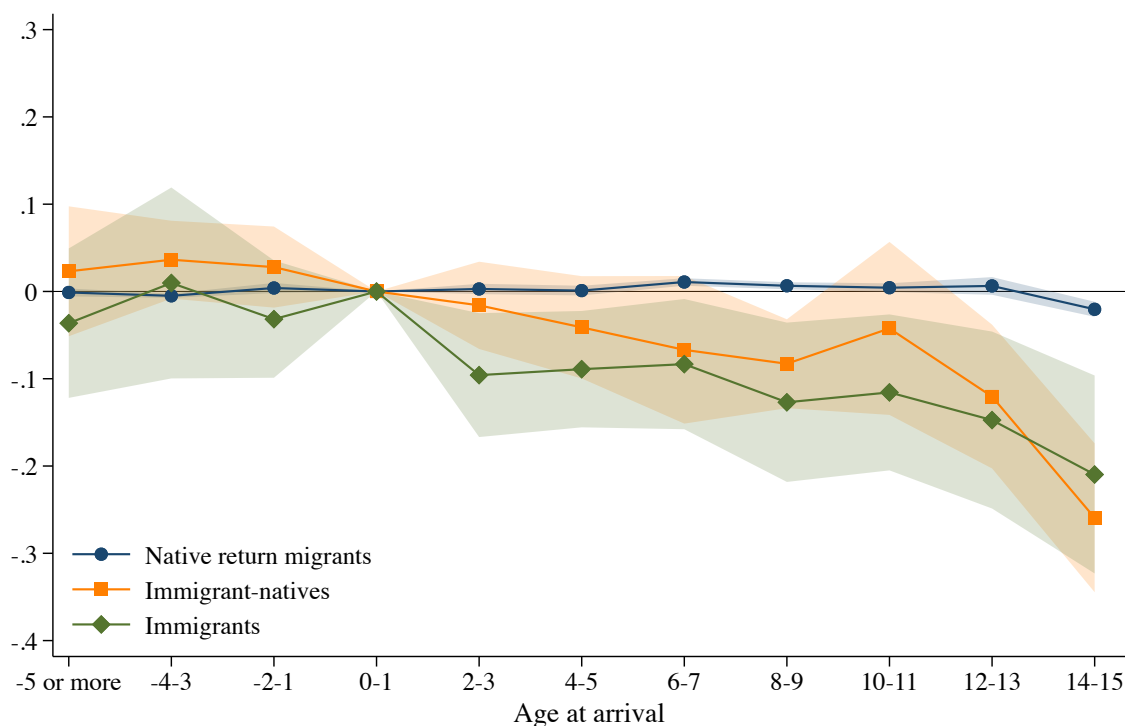
other families along dimensions that also affect children’s educational attainment. In this section, we present comparisons between siblings who grow up in the same families, but arrive in Finland at different ages. Because siblings share time-invariant family-level characteristics, these estimates are less likely to suffer from selection bias and thus are more likely to capture the causal impact of age at migration than are the cross-sectional estimates discussed above.

Table 3 shows that the cross-sectional estimates are large and negative among immigrant and immigrant-native families. The within-family estimates are somewhat smaller than the cross-sectional estimates, but remain economically and statistically significant. For example, the estimates suggest that children of immigrants arriving at age 15 are 15 percentage points less likely to hold an upper secondary degree, and 6 percentage points less likely to have attended college by age 23 than their Finnish-born siblings are.

In the last columns of Table 3, we report similar estimates for children of native emigrants returning to Finland. The estimates show a strong negative association between age at arrival and educational attainment also for this group. However, conditioning on family fixed-effects yields precisely estimated zeros. Thus the negative association in the cross-section appears to be driven purely by selection among native return migrants.

Figure 3 presents non-parametric versions of the within-family estimates for holding an upper secondary degree at age 23. In this figure, we also examine the role of parents’ time in Finland prior to the birth of the child and thus define age at arrival using parents’

Figure 3: Within-Family Estimates for the Effect of Age at Migration on Holding an Upper Secondary Degree at Age 23



Note: Within-family estimates and 95% confidence intervals for age at arrival.

migration year.¹³ We find no evidence that parents' exposure to Finland prior to the birth of the child would affect the child's later educational attainment. Interestingly, among the children of immigrants, there seems to be a large negative impact of arriving at ages 2–3 (in comparison to being born in Finland), but we find no additional impact between ages 4–7. The point estimates suggest that age at arrival starts to matter more after age 8, but the estimates are too imprecise for drawing strong conclusions. Importantly, given the imprecision of the estimates, we also cannot rule out a linear effect throughout arrival ages. The point estimates for the children of immigrant-natives suggest a roughly linear impact among native-immigrant families up to age 13 and a larger drop for those arriving at ages 14–15. Again, we find little evidence that age at migration would affect educational attainment of the children of native return migrants.

These results suggest that age at migration has a causal impact on the educational attainment of children growing up in immigrant and immigrant-native families. This effect could arise for many reasons and understanding its origins would be important for designing appropriate policy responses. While we do not have a strong research design

¹³For example, an age of arrival of -1 means that the child was born a year after the parent arrived in Finland.

for examining potential mechanisms, we note that the pattern documented above is more consistent with some explanations than with others. For example, it seems unlikely that migration related disruption in social networks and education would be a primary reason behind age at migration effects, because such effects would likely be present also among the children of native return migrants.

One reason for why age at migration may matter is that children arriving after the end of the critical period of language acquisition—typically timed before puberty—are less likely to become fluent in the local language (see Bleakley and Chin (2004, 2010), and references therein). Language deficits could then make school harder for children arriving at later ages and lower their educational attainment. However, this mechanism would yield a pattern, where children arriving in early and middle childhood would cope as well as those born in Finland, while we would see a sharp drop in performance for those arriving as teenagers. In contrast, the clearest pattern present in Figure 3 is a large drop between children of immigrants arriving at age 2–3 in comparison with those born in Finland. Furthermore, we find strong age at arrival effects also for those who have one immigrant and one native parent, even though they are more likely to learn at least some Finnish or Swedish from their native parent.¹⁴

Another potential mechanism is that age at arrival could capture the importance of parents' exposure to Finland. A large body of literature has shown that integration of adult immigrants into the host country's labor market and broader society tends to take time. Thus, children arriving with their parents spend a larger share of their childhood in the period when their parents are more likely to struggle in the labor market than children born after their parents have already settled in Finland. However, if parents' exposure to Finland would be the primary mechanism behind age at migration effects, an additional year in Finland before the birth of the child should have a roughly similar impact as an additional year after the child is born. In contrast, Figure 3 suggests that this is not the case in our data.

Finally, longer exposure to Finnish institutions could improve educational attainment. The importance of this effect is likely to depend on the quality of institutions in the source countries. For example, children of natives living abroad are likely to live in countries resembling Finland in many ways, while children of immigrants may grow up in very

¹⁴Finland is a bilingual country, where roughly 5% of the population speak Swedish as their mother tongue.

different circumstances before arriving to Finland.¹⁵ The patterns presented in Figure 3 are consistent with the institutional explanation. Based on point estimates, one could infer that institutions affecting children of immigrants in early childhood are particularly important. However, given the low precision of our estimates we do not believe one should draw strong conclusions from our results on the relative importance of exposure to Finland at different ages.

5 Other outcomes

We end our analysis with a brief look at being idle (NEET, i.e., not in employment, education or training), criminal sentences and the use of medical services. The motivation for this analysis is to provide a more nuanced picture of the children of immigrants in their early adulthood. A limitation of this analysis is that the data on crime and the use of medical services are less detailed and cover a shorter period than our data on educational attainment do (see Section 3 for details). Nevertheless, we have used as comparable an approach as possible to that for educational attainment. For comparison, Appendix Table A2 reproduces our analysis for educational attainment using these more limited data.

5.1 Idleness

The first panel of Table 5 reports the estimates for an indicator for being outside of employment, education and training at age 23. The structure is similar to that of Table 3, that is, the first column reports the baseline differences controlling only for year of birth indicators and the subsequent columns report estimates from specifications where we gradually add controls for age at arrival, background characteristics and neighborhood fixed-effects. The results closely mirror those for educational attainment. Again, we find a large unconditional gap between children of immigrants and natives, which is largely driven by those immigrating to Finland at older ages. Once we condition on other background characteristics, we find that second-generation immigrants are less likely to be idle at age 23 than children of natives growing up in comparable circumstances. However,

¹⁵The largest destination countries for Finnish emigrants in 2017 were Sweden, the United Kingdom, the United States, Germany and Spain.

Table 5: Idleness and Criminal Sentences by Age 23 in Comparison to the Children of Natives

	(1)	(2)	(3)	(4)
<i>A: Not in employment, education or training at age 23</i>				
Immigrant-native	0.028 (0.003)	0.004 (0.003)	-0.004 (0.003)	-0.003 (0.003)
Immigrant	0.099 (0.004)	0.022 (0.006)	-0.016 (0.006)	-0.020 (0.006)
Age at migration	.	0.009 (0.000)	0.005 (0.000)	0.005 (0.000)
<i>B: Sentenced to fines by age 23</i>				
Immigrant-native	0.036 (0.009)	0.020 (0.008)	0.020 (0.007)	0.013 (0.008)
Immigrant	0.097 (0.009)	0.035 (0.019)	0.017 (0.016)	0.008 (0.015)
Age at migration	.	0.006 (0.001)	0.002 (0.001)	0.002 (0.001)
<i>C: Sentenced to imprisonment or community service by age 23</i>				
Immigrant-native	0.011 (0.006)	-0.001 (0.006)	-0.002 (0.006)	-0.005 (0.006)
Immigrant	0.052 (0.013)	0.006 (0.015)	-0.007 (0.013)	-0.012 (0.013)
Age at migration	.	0.004 (0.001)	0.002 (0.001)	0.002 (0.001)
<i>D: Sentenced to unconditional imprisonment by age 23</i>				
Immigrant-native	0.001 (0.003)	-0.001 (0.003)	-0.001 (0.003)	-0.003 (0.003)
Immigrant	0.012 (0.003)	0.006 (0.004)	0.002 (0.004)	-0.001 (0.004)
Age at migration	.	0.001 (0.000)	0.000 (0.000)	0.000 (0.000)
<i>Controlling for:</i>				
Parental characteristics	no	no	yes	yes
Residence location	no	no	no	yes

Note: This table reports estimates from regressing indicators of NEET status (panel A) and criminal convictions (panels B–D) on indicators of immigrant background. A person is categorized as a "native" if both of her parents are natives (the omitted category), as an "immigrant-native" if one of her parents is an immigrant and another one a native, and as an "immigrant" if both parents are immigrants. Columns 2–4 also condition on age at migration, column 3 adds controls for background characteristics and column 4 for residential location. In Panel A, residential location is measured as the zip code of residence. In the remaining panels, residential location is measured as the interaction of province of residence and the level of urbanization of the residence municipality. All background characteristics are measured at age 15. See the note to Table 3 and the Data Appendix for variable definitions.

the gap remains large for those immigrating to Finland at age 15.

5.2 Criminal sentences

The remainder of Table 5 reports the results for criminal sentences. Similar to educational attainment, we document a statistically and economically significant difference between immigrants' and natives' children. Children of immigrants are 10 percentage points more likely to have been sentenced to fines than are children of natives. These sentences are given predominantly due to traffic violations such as aggravated endangering of traffic safety or drunk driving. We also find large differences in the likelihood of being sentenced for more serious crimes. The difference is 5 percentage points for having been sentenced to imprisonment or community service, and 1 percentage point for having served prison time. In relative terms, children of immigrants are roughly twice as likely to have received a conviction than are the children of natives.

Again, however, the differences are largely driven by those arriving to Finland at a later age.¹⁶ As shown in column 2 of Table 5, we find no difference between second-generation immigrants and children of natives (nor those with one immigrant and one native parent) in the likelihood of having been sentenced to community service or to imprisonment. A significant difference remains for being sentenced to fines, but also this difference disappears once we condition on other background characteristics.

To interpret the results correctly, it is important to note that the differences in sentence prevalence might capture differences in both the underlying crime rates and/or differential treatment within the justice system. In their overview, for example, Junger-Tas and Marshall (1999) point out that for some immigrant groups, studies of self-reported crime often do not display equally large differences in the prevalence of crime between immigrants and natives as conviction rates do. On the other hand, the validity of self-reported data might also vary across ethnic groups (e.g., van Batenburg-Eddes et al. 2012).

One way to assess this issue in our context is to contrast our findings to earlier work on self-reported crime. Salmi et al. (2015) find that teenagers of immigrant background self-report more delinquency, violent behaviour and, in particular, drug use than teenagers of native origin in Finland. While we cannot directly compare our results to this earlier

¹⁶Unfortunately, as we have only a 20% sample at our disposal, we cannot execute a detailed analysis for the age at migration for these outcomes. The small sample size also limits our possibility to examine heterogeneity by country of origin.

work, their results suggest that the differences in criminal sentences are not, at least entirely, driven by differential treatment for children of immigrants and natives in the Finnish justice system.

5.3 Medical services

Table 6 reports the results for our measures of the use of medical services by age 23. Panel A shows that children of immigrants are 1.5 percentage points less likely to have a diagnosis of severe illness than native children do. This is a large difference given that 4% of the children of natives have been prescribed medication for a severe illness. Unlike for our other outcomes, the immigrant-native gap remains stable when we condition for age at migration and other background characteristics.

Panel B of Table 6 shows that children of immigrants are also less likely to have been reimbursed for purchasing psychotropic medication than children of natives. Again, the difference is large at 4.4 percentage points in comparison to 11% baseline among children of natives. Those arriving at later ages seem to be more likely to be treated for psychological problems than children of immigrants born in Finland, although the estimate for age at migration loses statistical significance once we condition on other background characteristics. Furthermore, the gap between second-generation immigrants and natives increases when we control for other background variables. The estimate from the full specification suggests that native children are more than twice as likely to have been reimbursed a drug primarily designed for mental health problems than second-generation immigrants growing up in similar circumstances.

It is important to note that these results do not necessarily measure differences in underlying health, but rather the combination of health and the capability (or willingness) to make one's way through the health care system. Indeed, in large-scale surveys conducted in Finnish middle-schools, children of immigrants report more adverse health symptoms (e.g. fatigue, headaches and anxiety) and difficulties in getting access to a school nurse or social worker than children of natives do (Matikka et al. 2015).¹⁷ Nevertheless, immigrants are less likely to use primary health care services or to visit a hospital than natives of the same age and gender (Gissler et al. 2006). Thus, a reasonable working

¹⁷Castaneda et al. (2012) also report that adult immigrants from selected source countries demonstrate more symptoms of depression and anxiety than do members of the native population.

Table 6: Use of Medical Services by Age 23 in Comparison to that of Children of Natives

	(1)	(2)	(3)	(4)
<i>A: Prescribed medication for severe illness</i>				
Native-immigrant	-0.006 (0.006)	-0.005 (0.005)	-0.005 (0.005)	-0.006 (0.005)
Immigrant	-0.015 (0.004)	-0.011 (0.007)	-0.013 (0.007)	-0.014 (0.007)
Age at migration	.	0.000 (0.001)	-0.001 (0.001)	-0.001 (0.001)
<i>B: Used psychotropic medication</i>				
Native-immigrant	0.009 (0.009)	0.002 (0.008)	-0.001 (0.007)	-0.009 (0.008)
Immigrant	-0.044 (0.009)	-0.068 (0.013)	-0.076 (0.013)	-0.094 (0.013)
Age at migration	.	0.002 (0.001)	0.001 (0.001)	0.001 (0.001)
<i>Controlling for:</i>				
Year of birth	yes	yes	yes	yes
Parental characteristics	no	no	yes	yes
Residential location	no	no	no	yes

Note: This table reports estimates from regressing indicators of the use of medical services on immigrant background. A person is categorized as a "native" if both of her parents are natives (the omitted category), as "immigrant-native" if one of her parents is an immigrant and another one a native, and as an "immigrant" if both parents are immigrants. Columns 2-4 also condition on age at migration, column 3 adds controls for background characteristics and column 4 for residential location. Residential location is measured as the interaction of province of residence and the level of urbanization of residence municipality. All background characteristics are measured at age 15. See note to Table 3 and the Data Appendix for variable definitions.

hypothesis seems to be that immigrants use fewer medical services than do natives with similar underlying health problems.

6 Conclusions

We examined children of immigrants in early adulthood in Finland with the aim to document a set of policy-relevant facts that also provide a basis for future research. Our starting point was the strikingly low educational attainment of immigrants' children. Less than half of them hold an upper secondary degree at age 23 and are thus at a high risk of struggling in the Finnish labor market. Therefore, policies that increase their educational attainment would likely yield high returns to the public investment. While a descriptive analysis like ours cannot directly show which policies would be most efficient, our results provide insight into where policy experimentation and further research could be most fruitful.

Three results deserve particular attention. First, our estimates suggest that Finnish-born children of immigrants obtain at least as much education as children of natives growing up in similar circumstances in terms of family income, family structure and residential neighborhood. This finding is consistent with the hypothesis that the low educational attainment of second-generation immigrants largely reflects lower childhood resources rather than immigrant background in itself. In this case, general policies targeted to all disadvantaged children—as well as policies improving the labor market performance of first-generation immigrants—may be an efficient way to help also second-generation immigrants. We believe that examining this hypothesis more closely using appropriate research designs is an important topic for future research.

Second, we document large heterogeneity in educational attainment across immigrant groups. Differences between region of origin can be largely attributed to differences in family resources and neighborhoods, but sibling comparisons suggest that age at migration has a strong causal impact on educational attainment. Thus those arriving as children or adolescents could benefit from interventions that target their specific needs. Rigorous testing of alternative interventions would be relatively easy to implement and thus a valuable direction for policy experimentation.

Finally, we show that while the results for idleness and criminal convictions are very

similar to those for educational attainment, the patterns are very different for the use of medical services. Given that immigrants and their children have lower self-reported health than children of natives in Finland, the fact that they use less psychotropic medication and have fewer diagnoses for a severe illness is likely to arise either from lower institutional knowledge or from lower willingness to seek help through formal medical services. Importantly—and in contrast to the other outcomes we examine—the differences remain stable or even increase when we compare Finnish-born children of immigrants with natives' children growing up in similar circumstances. Thus, addressing the potential underuse of medical services by immigrants' children might require different kinds of policy interventions than those targeting education and crime.

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