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Educational mobility across three generations of Finnish-speaking and Swedish-speaking Finns

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ABSTRACT

Using total population register data that link three generations, this article studies educational mobility in two native ethno-linguistic groups, Finnish speakers and Swedish speakers in Finland. The purpose is to examine how multigenerational educational mobility takes form in a setting with equal constitutional rights, but with relatively more study places in Swedish at the tertiary level. For the cohorts born 1976–1985, the probability of having a tertiary-level education is 5.6 % points higher for Swedish-speaking men than for Finnish-speaking men, while the difference in women is 8.2 % points. The estimated effects of parents' and grandparents' tertiary-level education on offspring educational attainment are largely the same in both ethno-linguistic groups. Compositional differences contribute considerably, however. For men, 41 % of the ethno-linguistic difference in the probability of having tertiary-level education can be attributed to parents' education, and another 13 % to grandparents' education. Corresponding numbers for women are 23 % and 5 %, respectively. In the public debate, it should be highlighted that all study places in Swedish in Finland are open to persons with adequate skills in the language, and that they serve to meet the national needs for a sufficient number of persons proficient in Swedish.

1. Introduction

The past three decades have seen an explosion in research on intergenerational social mobility, that is, mobility in the social strata from childhood to adulthood, or an individual's movements from her social origins. Usually, the phenomenon is studied from the perspective of education, social class, or income. The lower the degree of social mobility, the greater is the chance that a child's future social status is determined by parental social status. More recently, the role of grandparents in the intergenerational transmission of status has been emphasized (Solon, 2018). This has resulted in an increasing number of studies on multigenerational mobility, of which a substantial part has considered the transmission of education across three or even four generations (Anderson, Sheppard, & Monden, 2018). Much of the discussion in this literature has been about whether there is a grandparent effect on grandchildren's education and how strong it is. This paper takes a new approach to the research on multigenerational educational mobility. We study how it takes form in a setting where two native population groups, Finnish speakers and Swedish speakers in Finland, have unequal prerequisites in terms of the relative number of study places at the tertiary level. Thus, we analyse how educational mobility across generations is manifested in this kind of setting, rather than only the intergenerational effects per se.

In contemporary societies, education is the central factor through which social status is transmitted across generations (Song & Mare, 2017; Van Doorn, Pop, & Wolbers, 2011). Although education frequently has been referred to as the "great equalizer" in society (Bernardi & Ballarino, 2016), a considerable amount of literature finds strong social inequalities in educational outcomes across children with differing social background (Hertz et al., 2007; Pfeffer, 2008). Finland provides an informative study case for research on these issues. Due to the constitution act, Finnish speakers and Swedish speakers have parallel school systems, which follow the national core curriculum up to upper secondary level, and tertiary-level education is provided for both ethno-linguistic groups. To meet the national needs of Swedish-speaking expertise in all central areas of the society, five of the universities are responsible for educating an adequate number of persons who are proficient in Swedish. This education is open to all students with sufficient skills in Swedish, irrespective of their ethno-linguistic affiliation. In practice, the taxonomy nevertheless implies that the relative number of

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Table 1
Tertiary-level education by ethno-linguistic affiliation. Per cent admitted of all persons who applied for tertiary-level education that started in the year specified.

	Men		Women		Men and women	
	Finnish speakers	Swedish speakers	Finnish speakers	Swedish speakers	Finnish speakers	Swedish speakers
2015	38.1	49.3	32.2	50.3	34.6	49.8
2017	41.3	54.4	33.8	51.2	36.7	52.7
2019	42.1	53.7	35.5	54.4	37.9	53.8

Source: Finnish National Agency for Education (2020)

study places is larger for Swedish speakers than for Finnish speakers, and Swedish speakers are also more likely to have a tertiary-level education. Since the universities are autonomous and have varying solutions for providing tertiary education in Swedish, the number of available Swedish-speaking study places are not comparable across universities. However, at the aggregate there is a considerable difference. According to the Finnish National Agency for Education (2020), half of the Swedish speakers, but only one third of the Finnish speakers, who apply for tertiary-level education are admitted.

The degree of social mobility in a society is often linked to the concept of equality of opportunity, which is also one of the most central goals for the higher-education policy in Finland (Karhunen & Uusitalo, 2017). When equality of opportunity appears, the positioning of individuals in the social hierarchy is determined by some form of competitive process, in which all members of society are eligible to compete for desirable positions on equal terms (Arneson, 2015). In Finland, competing for tertiary-level education on equal terms does not seemingly correspond with equal prerequisites in practice, since the entry chances differ across the two ethno-linguistic groups.

Against this background, the purpose of this paper is to examine how multigenerational educational mobility is manifested over three generations, in a situation where two groups are subject to equal constitutional rights, but have unequal chances of being accepted into tertiary-level education. First, we ask whether the effects of tertiary-level education of parents and grandparents on the probability of having a tertiary-level education are similar in Finnish speakers and Swedish speakers. Second, we analyse the contribution of the share of parents and grandparents with tertiary-level education to the between-group difference in tertiary-level education in the current generation.

The article contributes to the existing literature on multigenerational educational mobility in several ways. First, it studies a setting where the minority group has the same equal right as the majority, but relatively more study places. It emphasizes group similarities in the effects of previous generations' education, but also shows that compositional differences in ancestors' education matter for the present-day between-group educational gradient. In addition, it studies the influence of paternal and maternal education on both sons and daughters, and includes all four grandparents in the analyses. Including only one parent would fail to capture pathways through which grandparents affect their grandchildren (Anderson et al., 2018). Mothers and the maternal line is often a stronger determinant of daughters' education, while fathers and the paternal line is a stronger determinant of sons' education (Fessler & Schneebaum, 2012; Schneebaum, Rumplmaier, & Altzinger, 2015). By focusing on native groups with equal constitutional rights, we contribute to the previous literature on differences in social mobility between ethnic groups, which generally has emphasized the native-immigrant perspective (Aydemir, Chen, & Corak, 2013; Chen & Hou, 2019; Oberdabernig & Schneebaum, 2017; Schneebaum, Rumplmaier, & Altzinger, 2016; Schnitzlein, 2012).

The amount of literature on social mobility is considerable, covering theoretical and empirical papers on inter- and multigenerational transmission of outcomes related to education, occupation, socio-economic status, earnings, wealth, and economic vulnerability. The theoretical framework of this paper, constituting the next two sections, is therefore restricted to dealing with previous research on multigenerational educational mobility and prior findings of social mobility in Finland, as well as presenting the context and our hypotheses. The fourth section comprises the data and methods and the subsequent section the results, which are summarized and discussed in the final section.

2. Previous research

2.1. Multigenerational educational mobility

Educational mobility has gained considerable interest among studies on the transmission of status across generations. In contemporary societies, education is also the central factor through which social status is transmitted from one generation to another (Song & Mare, 2017; Van Doorn et al., 2011). However, thorough research during several decades, analysing the effects of parental education, class, income, or socio-economic position on children's educational attainment, point to still existing social inequalities in educational outcomes across children with differing social background (Hertz et al., 2007; Pfeffer, 2008). Consequently, the question is not as much about whether there is a relationship, but rather how strong it is.

For a long time, studies on educational mobility as well as other forms of social mobility have focused on the association in status between two generations, with the underlying assumption that any transmission of status is from parent to child with no influence from previous generations. In practice, any advantages or disadvantages of ancestors therefore tend to disappear in only three generations (Becker & Tomes, 1986). Grandparents may nevertheless influence the outcome of their grandchildren, for example by making investments in their grandchildren's human capital, or by contributing to cultural inheritance (Solon, 2014). Hence, the two-generation approach has been questioned by several scholars, among them Mare (2011), who forcefully challenged the traditional intergenerational perspective. The need for considering grandparents' role in the transmission of status between generations was also pointed out by Björklund and Jäntti (2012), who found that conventional intergenerational estimates severely underestimate the role of family background. During the past years, there has consequently been an emergence of studies based on three or even four generations, mainly thanks to better access to appropriate data.

Table 2
Per cent with tertiary-level education in index persons (G3), parents (G2) and grandparents (G1).

	Men			Women		
	Finnish speakers	Swedish speakers	Both	Finnish speakers	Swedish speakers	Both
Index person	34.6	40.2	34.9	53.6	61.8	54.0
Father	31.7	39.7	32.1	31.2	39.8	31.6
Mother	36.3	43.1	36.6	35.9	42.6	36.2
Paternal grandfather	9.9	18.6	10.4	9.8	19.2	10.2
Maternal grandfather	9.3	18.7	9.8	9.2	19.1	9.6
Paternal grandmother	4.9	8.5	5.1	4.9	8.9	5.1
Maternal grandmother	4.5	8.5	4.7	4.6	8.7	4.8
ego, n	158,340	8,594	166,934	148,499	7,330	155,829

Table 3
Average marginal effects of parents' and grandparents' education on the probability of having tertiary-level education for Finnish-speaking and Swedish-speaking men, in alternative models.

	G3															
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8	
	F	S	F	S	F	S	F	S	F	S	F	S	F	S	F	S
Father's education (ref. not tertiary)																
Tertiary	0.293	0.305			0.226	0.232			0.217	0.210						
Mother's education (ref. not tertiary)																
Tertiary			**0.246**	**0.273**	**0.162**	**0.185**			0.154	0.172						
Father's and mother's joint education (ref. neither tertiary)																
Only mother tertiary							0.160	0.177								
Only father tertiary							0.222	0.219								
Both tertiary							0.395	0.412								
Paternal grandfather's education (ref. not tertiary)																
Tertiary									0.017	0.037						
Maternal grandfather's education (ref. not tertiary)																
Tertiary									0.025	0.041						
Paternal grandmother's education (ref. not tertiary)																
Tertiary									0.034	0.044						
Maternal grandmother's education (ref. not tertiary)																
Tertiary									0.034	0.015 ns						
Father's and paternal grandparents' education (ref. neither tertiary)																
Only father tertiary											0.283	0.286			0.220	0.220
Only paternal grandfather tertiary											0.058	0.106			0.039	0.081
Only paternal grandmother tertiary											0.061	0.112			0.037	0.093 ns
Father and paternal grandfather tertiary											0.319	0.343			0.233	0.240
Paternal grandparents tertiary											0.111	0.119			0.070	0.085 ns
Father and paternal grandmother tertiary											0.366	0.299			0.280	0.241
Father and paternal grandparents tertiary											0.370	0.414			0.262	0.303
Mother's and maternal grandparents' education (ref. neither tertiary)																
													0.231	**0.260**	**0.154**	**0.182**

(*continued on next page*)

Table 3 (*continued*)

	G3															
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8	
	F	S	F	S	F	S	F	S	F	S	F	S	F	S	F	S
Only mother tertiary																
Only maternal grandfather tertiary													**0.054**	**0.113**	0.023	0.071
Only maternal grandmother tertiary													0.061	0.060 ns	0.044	0.012
Mother and maternal grandfather tertiary													0.307	0.342	0.186	0.208
Maternal grandparents tertiary													0.118	0.184	0.061	0.116
Mother and maternal grandmother tertiary													0.306	0.321	0.195	0.214
Mother and maternal grandparents tertiary													0.361	0.359	0.217	0.218

F = Finnish speaker, S = Swedish speaker.
All models are adjusted for index person's birth cohort and index person's region of residence at age 15.
All estimates except those marked ns are statistically significant at the 5 % level.
A bolded estimate means that in the given model, the estimate for Finnish speakers is statistically different from that for Swedish speakers at the 5 % level.

The pioneering literature on multigenerational mobility (Hodge, 1966) suggests that intergenerational transmission occurs independently between two generations. At present, however, the question whether there is an independent association between grandparent's and grandchildren's status is debated. In Swedish studies on multigenerational social mobility, associations in wealth, income, and earnings seem to be related to parental outcomes (Adermon, Lindahl, & Waldenström, 2018; Engzell, Mood, & Jonsson, 2020). Analyses of the transmission of occupation and class, on the other hand, point to grandparent effects (Dribe & Helgertz, 2016). The same applies to the multigenerational transmission of education. Using data based on surveys and registers for four generations in Sweden, Lindahl, Palme, Sandgren Massih, and Sjögren (2015) find significant associations between great--grandparents' and great-grandchildren's educational attainment, and conclude that persistence in outcomes is much greater when measured over several generations than what would be predicted from estimates based on two generations. Adermon, Lindahl, and Palme (2019) use administrative data containing the entire Swedish population to analyse how the extended family influences educational level and other forms of human capital. The results corroborate the ones by Lindahl et al. (2015) and show that the two-generation model underestimates the degree of intergenerational persistence in social position. More than half of the persistence in human capital can be attributed to persistence across several generations. Using data from administrative registers, Hällsten (2013) estimates cousin correlations to assess intergenerational associations in socio-economic outcomes across three and four generations. He finds substantial first-cousin correlations in educational and labour market career. Accounting for parental socio-economic background reduces the correlations by less than a half, which implies that the contribution of grandparents is considerable. Also for second-cousin correlations some correlations are found based on the grade-point average in ninth grade. Moreover, the results show that for cousins of economically wealthy grandparents, the correlation doubles, suggesting that persistence of advantage across generations is extreme in the wealthy elite. Hällsten and Pfeffer (2017) use register data to study the role of grandparent's wealth on children's educational outcome and find substantial associations, partly mediated through parental wealth and socio-economic background. On the contrary, a Danish study based on survey data finds no effects of grandparental economic and social background, but a positive effect of their cultural background, on the probability that their grandchildren choose an academic track in upper secondary education (Møllegard & Jaeger, 2015).

Studies on grandparent effects in educational mobility outside the Scandinavian countries show various results. For rural China, strong direct effects of grandparents' educational level on the grandchildren's educational level are reported, but only if the two generations were co-residing (Zeng & Xie, 2014). In Germany (Braun & Stuhler, 2018), as well as in the US (Kroeger & Thompson, 2016), the persistence of educational attainment across three generations is stronger than what would be expected from estimates based on two generations. On the other hand, in the US few significant effects are found in analyses of schooling, occupational status, and income of grandparents on the educational attainment or occupational status of their grandchildren (Warren & Hauser, 1997). Similarly, there are few direct effects of grandparents', aunts', and uncles' socio-economic characteristics on grandchildren's educational success (Jaeger, 2012). Song and Mare (2017) show that in the short term, grandparents' education is directly associated with grandchildren's education, but that it affects also indirectly through mediation by parental education and behaviour. Initial educational advantages of families may for the long term benefit up to three generations, although low fertility of high-educated individuals later offset the rewards. A quite recent systematic review of the literature on grandparent effects found that, in more than half of the analyses, educational outcomes were associated with grandparents' socioeconomic position, net of parental characteristics (Anderson et al., 2018). Long-term social mobility therefore seems to be lower than what conventional parent-to-child correlations would suggest.

2.2. *Social mobility in Finland*

In general, social mobility in Finland has been fairly high due to relatively low levels of income inequality, universal early-childhood

Table 4
Average marginal effects of parents' and grandparents' education on the probability of having tertiary-level education for Finnish-speaking and Swedish-speaking women, in alternative models.

	G3															
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8	
	F	S	F	S	F	S	F	S	F	S	F	S	F	S	F	S
Father's education (ref. not tertiary)																
Tertiary	0.275	0.259			0.204	0.197			0.197	0.188						
Mother's education (ref. not tertiary)																
Tertiary			0.266	0.246	0.196	0.180			0.190	0.175						
Father's and mother's joint education (ref. neither tertiary)																
Only mother tertiary							0.185	0.170								
Only father tertiary							0.192	0.184								
Both tertiary							**0.358**	**0.330**								
Paternal grandfather's education (ref. not tertiary)																
Tertiary									0.014	0.007 ns						
Maternal grandfather's education (ref. not tertiary)																
Tertiary									**0.020**	**−0.026** ns						
Paternal grandmother's education (ref. not tertiary)																
Tertiary									0.039	0.071						
Maternal grandmother's education (ref. not tertiary)																
Tertiary									0.034	0.051						
Father's and paternal grandparents' education (ref. neither tertiary)																
Only father tertiary											**0.270**	**0.233**			0.201	0.178
Only paternal grandfather tertiary											0.056	0.002 ns			0.029	−0.017 ns
Only paternal grandmother tertiary											0.071	−0.059 ns			0.039	−0.078 ns
Father and paternal grandfather tertiary											0.290	0.266			0.200	0.193
Paternal grandparents tertiary											0.154	0.085 ns			0.100	0.027 ns
Father and paternal grandmother tertiary											0.318	0.325			0.224	0.272
Father and paternal grandparents tertiary											0.343	0.352			0.241	0.279
Mother's and maternal grandparents' education (ref. neither tertiary)																
Only mother tertiary													0.257	0.248	0.190	0.183
Only maternal grandfather tertiary													0.044	0.015 ns	0.016 ns	−0.017 ns
Only maternal grandmother tertiary													0.061	0.043 ns	0.039	0.023 ns
Mother and maternal grandfather tertiary													**0.303**	**0.233**	**0.206**	**0.135**
Maternal grandparents tertiary													0.101	0.127	0.042	0.077 ns
Mother and maternal grandmother tertiary													0.392	0.264	0.200	0.185
Mother and maternal grandparents tertiary													**0.361**	**0.309**	0.257	0.206

F = Finnish speaker, S = Swedish speaker.
All models are adjusted for index person's birth cohort and index person's region of residence at age 15.
All estimates except those marked ns are statistically significant at the 5 % level.
A bolded estimate means that in the given model, the estimate for Finnish speakers is statistically different from that for Swedish speakers at the 5 % level.

Table 5
Average marginal effects of ethno-linguistic affiliaton and parents' and grandparents' education on the probability of having tertiary-level education in men and women, in alternative models.

	Men	Women
Model 1		
Finnish speaker (ref.)		
Swedish speaker	0.051	0.084
Model 2 (father's education)		
Finnish speaker (ref.)		
Swedish speaker	0.035	0.069
Model 3 (mother's education)		
Finnish speaker (ref.)		
Swedish speaker	0.039	0.073
Model 4 (father's and mother's education)		
Finnish speaker (ref.)		
Swedish speaker	0.030	0.065
Model 5 (father's and mother's joint education)		
Finnish speaker (ref.)		
Swedish speaker	0.030	0.065
Model 6 (father's, mother's and all four grandparents' education)		
Finnish speaker (ref.)		
Swedish speaker	0.026	0.062
Model 7 (father's and paternal grandparents' education)		
Finnish speaker (ref.)		
Swedish speaker	0.032	0.066
Model 8 (mother's and maternal grandparents' education)		
Finnish speaker (ref.)		
Swedish speaker	0.032	0.069
Model 9 (father's and paternal grandparents' and mother's and maternal grandparents' education)		
Finnish speaker (ref.)		
Swedish speaker	0.026	0.062

All models are adjusted for index person's birth cohort and index person's region of residence at age 15.
All estimates are statistically significant at the 5 % level.

education of high-quality, and free schooling (Erola, 2009; Eskelinen, Hautala, Lintunen, & Kallio, 2020; Pfeffer, 2008). Despite that, studies on two generations show that children whose parents are low-educated tend to end up with low education themselves (Vauhkonen, Kallio, & Erola, 2017). Parental socio-economic disadvantage is more closely related to lack secondary level education in young men than in young women (Eskelinen et al., 2020). There seems also to be a linear relationship between parents' income and children's bachelor's degree, and a higher probability of master's degree completion among children whose parents are at the top of the income distribution (Suoniemi, 2017). An analysis of the role of educational attainment on intergenerational occupational-class mobility finds considerable variation across cohorts, with stronger associations between social origin and destination in the younger ones, despite changes in educational achievement and greater openness over time (Erola, 2009). The expansion of the higher education system, which enabled tertiary-level education in groups who otherwise would not participate in higher education, played an important role for increasing social mobility in Finland during the second half of the 20th century (Erola, 2009). Previous studies on trends over time have found increased educational mobility, but still a greater probability of children of well-educated parents to participate in higher education as compared to those of lower educated parents (Kivinen, Ahola, & Hedman, 2001; Kivinen, Hedman, & Kaipainen, 2007). A small increase in the probability of attending tertiary education among children with a non-academic background has also been reported (Kivinen, Hedman, & Kaipainen, 2012). More recently, Karhunen and Uusitalo (2017) have found a stable and even somewhat increased relationship between parental background, whether measured based on education or income, and children's' probability to take part in higher education. Increased intergenerational educational persistence seems mainly to be a result of increased inequality in educational transmission and the expansion of academic upper-secondary education (Härkönen & Sirniö, 2020).

With regard to the transmission of income levels across two generations, mobility has been found relatively high (Österbacka, 2001). However, there seems to be strong persistence when effects of parental and personal characteristics on entry into different income quintiles in adulthood are estimated, particularly at the lowest and highest part of the income distribution (Sirniö, Martikainen, & Kauppinen, 2013). Especially men with wealthy parents are found to be less likely to enter the middle-income group than those with low-income parents (Sirniö, Martikainen, & Kauppinen, 2016). The effects of lower educational achievement are compensated for by higher parental income among men, whereas women with higher education are more likely to benefit from higher social origin. In analyses of cohort differences in social mobility, the level of income mobility among those with low- or high-income parents is fairly stable (Sirniö, Kauppinen, & Martikainen, 2017).

Some studies of social mobility in Finland have had a multigenerational approach. No grandparent effects have been reported for the transmission of income (Lucas & Pekkala Kerr, 2013). Neither does a study of social mobility over three generations find any impact of grandparents' occupational attainment on the social status of grandchildren, when controlled for the status of the parents (Erola & Moisio, 2007). However, as these findings do not say that the class position of grandparents and grandchildren are independent of each other, one may argue that there is indeed a net grandparent effect (Chan & Boliver, 2014). Grandparents' education and socioeconomic status are shown to explain grandchildren's educational achievement only marginally, while shared lifetime between grandparents and grandchildren matter more (Erola & Moisio, 2007; Lehti, Erola, & Tanskanen, 2019). Another recent paper has focused on the role of the extended family's education and income for the education and earnings of the youngest generation (Erola, Kilpi-Jakonen, Prix, & Lehti, 2018). The study found that, in both Finland and the United States, aunts' and uncles' resources compensate for nieces' and nephews' low parental resources.

Although quite much is known about social mobility in Finland, little attention has been paid to comparing Swedish speakers and Finnish speakers in this respect. There has been only one study, concerned with the effects of social and regional background on education, with focus on the consequences of the reform of the education system in the 1970s (Saarela & Finnäs, 2003). Social background was measured as the socio-economic position of the head of the household when the child was aged 10–14 years. The paper reported strong effects of social background on the probability to have completed upper secondary general education, but declining background effects with educational level. Swedish speakers were found to be higher educated than Finnish speakers, whereas the effects of social background on education were strikingly similar between the two groups. However, a multigenerational approach on social mobility in these two groups is important. One reason is that social mobility may be under-estimated if analyses are based on two generations only (Adermon et al., 2019; Lindahl et al., 2015). Another motivation is that they differ notably with respect to educational prerequisites and outcomes at the tertiary level in particular. Thus, this paper puts focus on three generations, and in particular the contribution of parental and grandparental tertiary-level education.

3. Context and hypotheses

In the Constitution Act of 1919, Finnish and Swedish were given equal status as official languages of Finland. This means that the two ethno-linguistic population groups have equal constitutional rights, and their cultural and societal needs are to be provided for by public authorities on an equal basis. The unique ethno-linguistic affiliation, or mother tongue of each citizen, is registered. At present, Swedish speakers amount to 5.2 per cent, or roughly 290,000 persons of the total population of five and a half million persons in Finland. Finnish speakers amount to 87.3 per cent. Thus, the Swedish speakers constitute a clear minority in number, of which a vast majority is settled at the southern

and western coastline of the country. Their internal mobility is low as compared to that of Finnish speakers (Saarela & Finnäs, 2006). Intermarriage is common. Roughly 40 per cent of the Swedish-speaking men and just over one third of the Swedish-speaking women marry a Finnish speaker. Approximately two thirds of all new-born children in intermarried families are registered as Swedish speakers (Saarela, 2021). Swedish-registered persons are highly likely to have remote kin who are Swedish-registered, while most Finnish-registered persons have unilingual Finnish background (Saarela, Kolk, & Obucina, 2020). Being registered as a Swedish speaker is also a good indicator for identifying oneself as part of the Swedish-speaking community in Finland (Saarela & Finnäs, 2016). Finnish speakers and Swedish speakers are similar in appearance but can be separated based on the features that characterize an ethnic group (cf. Barth, 1969). For example, a Swedish-speaking brigade of the Finnish Army, and several Swedish-speaking organizations and societies for culture, politics, media, science, agriculture and sports, represent important elements of the Swedish-speaking society. The differences are also manifested in the Swedish speakers' extensive cultural life that exists in parallel to the one of Finnish speakers. Some examples are the Swedish-speaking population's celebration of the Saint Lucia's day on the 13th of December and the sporting-event Stafettkarnevalen aimed at Swedish-speaking schoolchildren every spring.

One of the key principles of education in Finland is that it must be available to all citizens. The education system in Finland consists of compulsory pre-primary education for children under the age of seven, compulsory basic education for children aged 7–16, post-compulsory general and vocational upper-secondary education, and higher education. The higher education system has undergone a radical regional expansion since the 1950s, and now comprises both regular universities and universities of applied sciences (Finnish National Agency for Education, 2017; Karhunen & Uusitalo, 2017). In 2017, 35 per cent of the women and 27 per cent of the men in Finland had completed an educational qualification above the upper secondary level. The average age of master's graduates is 28 and in the past two decades, around 60 per cent of those graduating with a master's degree are women (Opetus- ja kulttuuriministeriö, 2019; Statistics Finland, 2018).

Since Finnish and Swedish have equal status as official languages, there are parallel school systems in the Finnish language and the Swedish language. Both follow the national core curriculum up to the upper secondary level, and there is tertiary-level education in each language. Education is free at all levels, and there is a well-established system of study grants and loans to ensure study opportunities for everyone (Ministry of Education & Culture & Finnish National Agency for Education, 2017).

Hence, we have a setting in which the key principle is equality of educational opportunity, and where both ethno-linguistic groups have equal constitutional rights. Given these underpinnings, and that, already some decade ago, parental socio-economic position had a similar effect on children's educational attainment in both groups (Saarela & Finnäs, 2003), we propose that:

(H1). *Effects of parents' and grandparents' tertiary-level education on offspring's tertiary-level education are similar in Finnish speakers and Swedish speakers*.

Five of the universities in Finland – Åbo Akademi University, Hanken School of Economics, the University of Helsinki, the University of the Arts Helsinki, and Aalto University – are responsible for educating a sufficient number of persons proficient in Swedish (Universities Act 558/2009, 2021). These study places are available for all students with adequate skills in Swedish, irrespective of their registered mother tongue (ethno-linguistic affiliation). The number of available study places in Swedish are not comparable across universities, because the universities are autonomous and vary in their solutions for providing tertiary education in Swedish. However, statistics for accepted applications by mother tongue shows that half of the Swedish speakers, but only one third of the Finnish speakers, who apply for tertiary-level education are admitted (Table 1). In 2015, for example, 50.3 per cent of the Swedish-speaking women who applied for entry into higher education were admitted, while the percentage in their Finnish-speaking counterparts was 32.2. For men, the percentages were 49.3 and 38.1, respectively.

Of particular importance for the present study is that Swedish speakers have, across periods and cohorts consistently been higher educated than Finnish speakers (McRae, 1999; Saarela & Finnäs, 2003). This brings up the question how ethno-linguistic group differences in educational structure in previous generations contribute to the educational gradient between Swedish speakers and Finnish speakers in the present-day generation.

Several register-based studies from the neighbouring country Sweden, and more than half of all international studies on multigenerational educational mobility, have found evidence for grandparent effects on children's educational attainment (Adermon et al., 2019; Anderson et al., 2018; Hällsten & Pfeffer, 2017; Hällsten, 2013; Lindahl et al., 2015). In Finland, education is highly influenced by parent's status (Eskelinen et al., 2020; Suoniemi, 2017; Vauhkonen et al., 2017), and to a limited extent by grandparents' status (Lehti et al., 2019). Irrespective of the strength of the associations, and whether they are similar in Finnish speakers and Swedish speakers, compositional differences should play a role. Thus, Swedish speakers are expected to have more parents and grandparents who are higher-educated as compared to Finnish speakers. As long as there is some correlation in the probability of having tertiary-level education across two or three generations, ethno-linguistic differences in ancestors' educational level will be important. Based on these considerations, we assume that structural differences matter, and propose that:

(H2). *Differences in the share of parents and grandparents with tertiary-level education contribute to the ethno-linguistic gradient in tertiary-level education, and the contribution of parents is stronger than that of grandparents*.

4. Data and methods

The analyses are based on register data of the total population, provided by Statistics Finland and used with permission TK-53-1370-17. They contain all individuals who lived in Finland in 1971-2015. Each person can be observed longitudinally, and linked to the mother and the father, subject to that the parent was alive at the end of 1970. To have reasonably many persons who have completed their studies and who can be linked across generations, we restrict the analyses to three generations and to index persons in the grandchild generation (hereafter G3) who were born in 1976-1985. We report results for index persons with information on all ancestors in the two previous generations (hereafter G2 refers to parents and G1 to grandparents). All analyses are restricted to index persons and ancestors who are either Swedish- or Finnish-registered. In the multigenerational perspective, the proportion of persons with some other ethno-linguistic affiliation is low, because Finland has had little immigration until the past three decades. Index persons who emigrated before age 29 are excluded from analyses. In total, there are 322,763 study persons in G3, with links to both parents and all four grandparents. Separate models are estimated for men and women in G3.

The outcome variable for educational mobility is based on the information of a person's highest level of education and separates those with a tertiary-level education (ISCED-level 5 or higher) from all others. A similar measure has been used in studies by, for example, Kivinen et al. (2001) and Saarela and Finnäs (2003). We measure educational mobility across the three generations with logistic regression models. Of primary interest is to see how the probability of having tertiary-level education in G3 relates to tertiary-level education in G2 and G1, and in particular to assess ethno-linguistic differences. All results are reported in terms of average marginal effects, which can be straightforwardly interpreted as probability differences. Since we use data for the entire population,

statistical significance reported in the tables should be seen as providing an overview of the spread of the estimates, rather than serving as a means for statistical hypothesis testing. We control for the birth year of index persons, and their region of residence in the year they turned 15. At that age, young persons in Finland finish compulsory basic education and choose either general upper-secondary education, which has been a prerequisite for entrance into university studies, or some other form of secondary education.

The 1970 census is the first that enables linkage between parents and children at the total population level. There is no linkage in the data between parents and children who did not live in the same household at that time. For the linkage between G3 and G2 this is not a problem, because the analyses are restricted to G3 born 1976-1985. However, the linkage between G2 and G1 may be missing, because G2 persons who were born before 1953 were no longer minor in 1970. To ensure that the results when including all three generations in the analyses are reliable, we performed tests with two generations (G3 and G2) in which the index person has linkage to both parents. These results (not shown) were close to identical to those reported for three generations. We repeated also the two-generation analyses without restricting the data to G3 persons who have linkage to both parents, in order to ensure that our data are representative for the total population, that is, also to those with linkage to one parent only. The results did not change to any noteworthy degree (not shown). Finally, we performed separate analyses for G3 persons born in 1976–1980 and 1981–1985. The estimates were highly similar for these two groups (Tables A1–A4, A6 and A7 in the Appendix A).

5. Results

In accordance with previous research (Saarela & Finnäs, 2003), we see that Swedish speakers are more likely to have tertiary-level education than Finnish speakers (Table 2). This applies to all three generations. In percentage points, the difference between Swedish speakers and Finnish speakers is 5.6 (40.2-34.6) for male index persons, and 8.2 (61.8-53.6) for female index persons. More than half of all female index persons have tertiary-level education, but just above one third of the male index persons. Tertiary-level education is more common among the mothers than among the fathers, but less common among the grandmothers than among the grandfathers. Within each ethno-linguistic group, there is no difference between men and women with respect to the share with tertiary-level education in parents or grandparents. About 32 per cent of the fathers of (male and female) Finnish speakers have tertiary-level education, 36 per cent of the mothers, 10 per cent of the paternal grandfathers, 9 per cent of the maternal grandfathers, 5 per cent of the paternal grandmother, and 4.5 per cent of the maternal grandmothers. Corresponding shares for the Swedish speakers are 40, 43, 19, 19, 9, and 8.5.

To see if effects of parents' and grandparents' tertiary-level education on offspring's tertiary-level education propensity are similar in Finnish speakers and Swedish speakers, the two ethno-linguistic groups are analysed separately, and pairwise tests are undertaken to evaluate if the estimates differ statistically. We report average marginal effects based on logistic regression models that estimate odds ratios of tertiary-level education between children whose parents/grandparents have tertiary-level education and children whose parents/grandparents do not have tertiary-level education.

Tables 3 and 4 summarise the results of the estimations and the pairwise tests for men and women, respectively. The first model (Model 1) includes father's educational level, plus the index persons' birth year and region of residence. Thereafter, we include the educational level of the mother (Model 2), the father and the mother (Model 3), the father and the mother jointly (Model 4), both parents and all four grandparents (Model 5), the father and his parents jointly (Model 6), the mother and her parents jointly (Model 7), and finally, the educational levels of both the father and his parents jointly and the mother and her parents jointly (Model 8).

Practically all these estimates are statistically significant, which is expected, considering that we use data on the total population, with a population size of about 150,000 persons of each sex. More noteworthy is that most of the estimates do not differ statistically between Finnish speakers and Swedish speakers. For instance, for both Finnish- and Swedish-speaking men, the probability of having tertiary-level education is about 21 percentage points higher if the father has tertiary-level education, as compared to if the father does not have tertiary-level education (Model 5). The corresponding probability difference in women is slightly smaller, but there is no significant difference in the estimated effect size between female Finnish and Swedish speakers either. In the fully adjusted model (Model 8), the corresponding probability difference when only the father has tertiary-level education is 22 percentage points in men, and slightly lower in women, but there is no difference in the effect between Finnish and Swedish speakers. In the few instances where the estimates differ between the two ethno-linguistic groups they are not consistent, indicating a larger effect size in Swedish speakers among men, but a larger effect size in Finnish speakers among women. Hence, we conclude that effects of parental and grandparental tertiary-level education on offspring's tertiary-level education propensity are almost consistently the same in Finnish speakers and Swedish speakers

In the following step, we turn to compositional differences, in order to study how the differences in the share of parents and grandparents with tertiary-level education contribute to the ethno-linguistic gradient in tertiary-level education. The results are summarised in Table 5. Each number refers to the difference between Swedish speakers and Finnish speakers in the probability of having tertiary-level education. For each sex, models are estimated jointly for both ethno-linguistic groups, while the stepwise set-up of variables included is similar to what was described above. Table A5 in the Appendix A contains estimates of all variables of the regressions.

As could be seen in Table 2, the difference between Swedish speakers and Finnish speakers in the probability of having tertiary-level education is 5.6 percentage points in men and 8.2 percentage points in women. When we control for index persons' year of birth and region of residence, the percentage points difference is 5.1 and 8.4, respectively (Model 1 in Table 5). Including both father's and mother's educational level (Model 4) it reduces to 3.0 percentage points for men and 6.5 for women. This corresponds to a 41 per cent reduction for men ([0.030/0.051] - 1), and a 23 per cent reduction for women ([0.065/0.084] - 1). When also educational level of all four grandparents is included (Model 9), the probability difference reduces to 2.6 percentage points for men and 6.2 for women. This corresponds to an additional 13 per cent reduction for men ([0.026/0.030] - 1), and five per cent for women ([0.062/0.065] - 1).

This part of the analysis consequently shows that there is a considerable contribution of ancestors' educational level on the ethno-linguistic difference in tertiary-level educational attainment, and that parental education matters more than grandparental education. Furthermore, the contribution of educational level of both parents and grandparents were much more pronounced in men than in women, in spite that the ethno-linguistic gradient in educational attainment is larger in women.

As reported in Table A5 in the Appendix A, and in line with much previous research (Eskelinen et al., 2020; Lehti et al., 2019; Suoniemi, 2017; Vauhkonen et al., 2017), we also find that having high-educated parents and grandparents notably increases grandchildren's probability of having a tertiary education, and that there are some, albeit rather small, grandparent effects net of the parental effects.

6. Discussion

Using register data with linkage across three generations, this paper contributes to the literature on multigenerational mobility by examining the transmission of education in two native ethno-linguistic groups, Finnish speakers and Swedish speakers in Finland. Given that there are

relatively more study places in Swedish than in Finnish at the tertiary level, the setting provided an opportunity to analyse how educational mobility takes form when otherwise equal groups have unequal entry chances to higher education.

First, we analysed whether Finnish speakers and Swedish speakers are differently influenced by their ancestors' educational level, and found largely similar effects of parental and grandparental education in both groups. Swedish speakers and Finnish speakers are consequently found to be remarkably similar in the extent to which having a tertiary education is affected by the tertiary-level education of parents and grandparents. The results corroborate the two-generation study by Saarela and Finnäs (2003), who found similar effects of social background on educational attainment in the two ethno-linguistic groups. Thus, being native and having equal rights outweigh any variation in the effects of parental and grandparental education at the individual level.

This does not mean, however, that structural differences cannot matter. Second, we therefore analysed how the different shares of parents and grandparents with tertiary-level education contribute to the ethno-linguistic difference in the probability of having a tertiary-level education. The role of these compositional differences was found to be considerable. The ethno-linguistic difference was reduced by 41 per cent in men when we controlled for parental education, and further by 13 per cent when grandparental education was accounted for. In women, controlling for parental education reduced the difference by 23 per cent and accounting for all four grandparents' education with another five per cent.

Higher education has been more common in Swedish speakers than in Finnish speakers for decades. In correspondence, we thus see that compositional differences in terms of the share of ancestors with tertiary-level education underlies part of the ethno-linguistic gradient in tertiary-level education in the current generation. Structural differences of this kind are, therefore, to a considerable extent transmitted across generations. According to our analyses, approximately half of the difference in men, and a quarter of the difference in women, can be attributed to parental and grandparental tertiary-level education, together with birth cohort and region of residence.

The unexplained part, that is, the 2.6 percentage point difference in the probability of having higher education in men and 6.2 percentage point in women, can presumably be attributed to a more privileged situation for Swedish speakers. Thus, the unequal tertiary-level educational attainment is influenced not only by compositional differences in previous generations' education, but also by relatively more study places for Swedish speakers.

From here, parallels could be drawn to the educational expansion that took place in industrialized countries in the 20th century and implied overall easier access to secondary and tertiary education. Yet, educational inequalities persist, which has resulted in attempts to explain the relationship between educational expansion and educational inequality (Boliver, 2011). Raftery and Hout (1993), who found that the educational reform in Ireland in the 1960s had no effect on equality of educational opportunity, presented the influential hypothesis of maximally maintained inequality. The hypothesis proposes that educational inequalities will decrease only once the educational enrolment of upper-class youth reaches saturation (Hout, 2006; Raftery & Hout, 1993). At that point, new educational opportunities will open up for the less privileged youth.

In our case, part of the ethno-linguistic educational disparity is due to the educational expansion in terms of relatively more tertiary-level study places in Swedish. These places are open to all persons with enough skills in Swedish, but apparently those whose mother tongue is Swedish fill up the places (to be compared with "the privileged" according to the maximally maintained inequality hypothesis). As long as the Swedish speakers' demand for study places in higher education in Swedish is not satisfied, those with some other mother tongue are presumably less able to take advantage of the opportunity offered by this kind of educational expansion.

Other aspects may also be relevant for the ethno-linguistic difference in the probability of having higher education. It has, for instance, been argued that Swedish speakers are more active in local associations and communities (Hyyppä & Mäki, 2001; McRae, 1999), and may therefore benefit from some ethnic capital, which is believed to have influences that last over generations (Borjas, 1992). It would nevertheless be hard to empirically prove that such mechanisms are at play.

The maximally maintained inequality hypothesis refers explicitly to educational (im)mobility at specific transitions, and assumes that students together with their parents base the decision to continue in education on evaluations of the associated costs and returns (Raftery & Hout, 1993). A person's ethno-linguistic background and its relation to educational transmission has been beyond the scope of this paper. It is nevertheless plausible that families evaluate the costs and returns of tertiary education in Swedish depending on "how Swedish they are", i.e., according to how many ancestors, or whom of the ancestors, are/-were Swedish-registered. We have studied educational mobility in a setting where a person's entry chances at tertiary level is dependent on his or her mother tongue. Ethno-linguistic affiliation was therefore measured only at the level of the index person. We have not separated between individuals with mixed background and those with uniform Finnish and Swedish background. Swedish-registered individuals with mixed ancestry may nevertheless be assumed as positioned close to Swedish-registered individuals with uniform background, whereas Finnish-registered individuals with mixed ancestry closer to Finnish-registered individuals with uniform background (Saarela et al., 2020). Notwithstanding our emphasis on the index persons' affiliation, the increasing number of persons with mixed heritage call for future analyses. Due to the Swedish-speaking persons' higher chances of being accepted into tertiary education, a worthwhile progression of this work would be to examine whether intermarried parents' choice of ethno-linguistic registration for their children relates to the educational attainment of the children.

The educational choices that are made after elementary school are to some extent dependent on educational performance. However, social factors that underlie inequality in educational outcomes may differ from those that explain inequalities in educational performance (Jackson, Jonsson, & Rudolphi, 2012). In the present case, the difference in the relative number of available study places at tertiary level is of the size that variation in grade performance cannot reasonably explain why Swedish speakers are higher educated than Finnish speakers. Yet, research based on data that include performance, such as school grades, are encouraged in future studies of educational mobility. We also suggest that further studies on educational mobility in the two ethno-linguistic groups take the field of study into account, as it clearly varies across Swedish-speaking and Finnish-speaking tertiary-level students (Oker-Blom, 2021).

This study has shown that the ethno-linguistic differences in tertiary-level educational attainment in Finland are partly explained by multigenerational transmission of higher education, although the relative number of study places, and thus the admission rate, certainly matters as well. However, the study places in Swedish ensure that reasonably many persons are educated to maintain the breadth and depth needed to guarantee Swedish-speaking expertise in all central areas of society (Oker-Blom, 2021; Universities Act 558/2009, 2021Universities Act 558/2009, 2021). The lack of Swedish-speaking expertise is nevertheless evident in many sectors, such as in the fields of medical science and public administration. The problem relates to a scarcity of Swedish-speaking applicants in some fields of study, and to a shortage of Swedish-speaking study places in some specific areas. A policy priority in the future should therefore be to both ensure that there are enough Swedish-speaking study places in all essential fields of study at the tertiary level, and to emphasize that the places are open to everyone proficient in the Swedish language.

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Declaration of Competing Interest

The authors report no declarations of interest.

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Appendix A

Table A1
Average marginal effects of parents' and grandparents' education on the probability of having tertiary-level education for Finnish-speaking and Swedish-speaking men born in 1976–1980 in alternative models.

	G3															
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8	
	F	S	F	S	F	S	F	S	F	S	F	S	F	S	F	S
Father's education (ref. not tertiary)																
Tertiary	0.301	0.306			0.237	0.236			0.227	0.216						
Mother's education (ref. not tertiary)																
Tertiary			0.248	0.270	0.158	0.132			0.150	0.169						
Father's and mother's joint education (ref. neither tertiary)																
Only mother tertiary							0.163	0.172								
Only father tertiary							0.237	0.220								
Both tertiary							0.388	0.406								
Paternal grandfather's education (ref. not tertiary)																
Tertiary									0.013 ns	0.016 ns						
Maternal grandfather's education (ref. not tertiary)																
Tertiary									0.034	0.031 ns						
Paternal grandmother's education (ref. not tertiary)																
Tertiary									**0.037**	**0.105**						
Maternal grandmother's education (ref. not tertiary)																
Tertiary									0.030	0.018 ns						
Father's and paternal grandparents' education (ref. neither tertiary)																
Only father tertiary											0.294	0.290			0.232	0.224
Only paternal grandfather tertiary											0.059	0.061 ns			0.037	0.027 ns
Only paternal grandmother tertiary											**0.080**	**0.273**			0.055	0.224
Father and paternal											0.323	0.336			0.237	0.235

(*continued on next page*)

Table A1 (*continued*)

	G3															
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8	
	F	S	F	S	F	S	F	S	F	S	F	S	F	S	F	S
grandfather tertiary																
Paternal grandparents tertiary											0.160	0.250			0.111	0.195
Father and paternal grandmother tertiary											0.370	0.293			0.283	0.243
Father and parental grandparents tertiary											0.365	0.436			0.259	0.334
Mother's and maternal grandparents' education (ref. neither tertiary)																
Only mother tertiary													0.234	0.257	0.150	0.175
Only maternal grandfather tertiary													0.062	0.122	0.024	0.067 ns
Only maternal grandmother tertiary													0.088	0.177	0.068	0.107 ns
Mother and maternal grandfather tertiary													0.325	0.352	0.196	0.219
Maternal grandparents tertiary													0.159	0.231	0.090	0.121 ns
Mother and maternal grandmother tertiary													**0.293**	**0.422**	**0.174**	**0.319**
Mother and maternal grandparents tertiary													0.358	0.300	0.208	0.146

F = Finnish speaker, S = Swedish speaker.
All models are adjusted for index person's birth cohort and index person's region of residence at age 15.
All estimates except those marked ns are statistically significant at the 5 % level.
A bolded estimate means that in the given model, the estimate for Finnish speakers is statistically different from that for Swedish speakers at the 5 % level.

Table A2
Average marginal effects of parents' and grandparents' education on the probability of having tertiary-level education for Finnish-speaking and Swedish-speaking men born in 1981–1985 in alternative models.

	G3															
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8	
	F	S	F	S	F	S	F	S	F	S	F	S	F	S	F	S
Father's education (ref. not tertiary)																
Tertiary	0.288	0.305			0.220	0.229			0.210	0.206						
Mother's education (ref. not tertiary)																
Tertiary			**0.244**	**0.274**	0.164	0.186			0.157	0.173						
Father's and mother's joint education (ref. neither tertiary)																
Only mother tertiary							0.159	0.180								
Only father tertiary							0.211	0.220								
Both tertiary							0.400	0.416								
Paternal grandfather's education (ref. not tertiary)																
Tertiary									0.020	0.055						
Maternal grandfather's education (ref. not tertiary)																
Tertiary									0.020	0.047						
Paternal grandmother's education (ref. not tertiary)																
Tertiary									0.031	0.008 ns						
Maternal grandmother's education (ref. not tertiary)																
Tertiary									0.035	0.012 ns						
Father's and paternal grandparents' education (ref. neither tertiary)																
Only father tertiary											0.275	0.283			0.211	0.215
Only paternal grandfather tertiary											0.058	0.143			0.040	0.127
Only paternal grandmother tertiary											0.050	−0.012 ns			0.027 ns	−0.011 ns
Father and paternal grandfather tertiary											0.317	0.351			0.229	0.248
Paternal grandparents tertiary											0.082	0.031 ns			0.046	0.015 ns
Father and paternal grandmother tertiary											0.364	0.303			0.277	0.243
Father and parental grandparents tertiary											0.372	0.399			0.262	0.287
Mother's and maternal grandparents' education (ref. neither tertiary)																
Only mother tertiary													**0.229**	**0.261**	0.156	0.183
Only maternal grandfather tertiary													0.048	0.106	0.021	0.074
Only maternal grandmother tertiary													0.046	−0.007 ns	0.031 ns	−0.044 ns
Mother and maternal grandfather tertiary													0.295	0.332	0.180	0.195
Maternal grandparents tertiary													0.093	0.149	0.045	0.103 ns
Mother and maternal grandmother tertiary													0.312	0.264	0.205	0.162
Mother and maternal grandparents tertiary													0.362	0.391	0.220	0.254

F = Finnish speaker, S = Swedish speaker.
All models are adjusted for index person's birth cohort and index person's region of residence at age 15.
All estimates except those marked ns are statistically significant at the 5 % level.
A bolded estimate means that in the given model, the estimate for Finnish speakers is statistically different from that for Swedish speakers at the 5 % level.

Table A3
Average marginal effects of parents' and grandparents' education on the probability of having tertiary-level education for Finnish-speaking and Swedish-speaking women born in 1976–1980 in alternative models.

	G3															
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8	
	F	S	F	S	F	S	F	S	F	S	F	S	F	S	F	S
Father's education (ref. not tertiary)																
Tertiary	0.265	0.250			0.198	0.194			0.193	0.189						
Mother's education (ref. not tertiary)																
Tertiary			0.255	0.230	0.186	0.163			0.182	0.161						
Father's and mother's joint education (ref. neither tertiary)																
Only mother tertiary							0.179	0.139								
Only father tertiary							0.190	0.165								
Both tertiary							0.335	0.315								
Paternal grandfather's education (ref. not tertiary)																
Tertiary									0.007 ns	0.017 ns						
Maternal grandfather's education (ref. not tertiary)																
Tertiary									0.01 ns	−0.030 ns						
Paternal grandmother's education (ref. not tertiary)																
Tertiary									0.034	0.031 ns						
Maternal grandmother's education (ref. not tertiary)																
Tertiary									0.032	0.036 ns						
Father's and paternal grandparents' education (ref. neither tertiary)																
Only father tertiary											0.260	0.234			0.197	0.186
Only paternal grandfather tertiary											0.054	0.035 ns			0.025 ns	0.022 ns
Only paternal grandmother tertiary											0.081	0.046 ns			0.045 ns	0.037 ns
Father and paternal grandfather tertiary											0.277	0.269			0.192	0.203
Paternal grandparents tertiary											0.111	0.01 ns			0.058	−0.031 ns
Father and paternal grandmother tertiary											0.310	0.277			0.222	0.221
Father and parental grandparents tertiary											0.322	0.318			0.225	0.244
Mother's and maternal grandparents' education (ref. neither tertiary)																
Only mother tertiary													0.247	0.229	0.181	0.164
Only maternal grandfather tertiary													0.038	0.012 ns	0.009 ns	−0.024 ns
Only maternal grandmother tertiary													0.034 ns	0.010 ns	0.014 ns	−0.011 ns
Mother and maternal grandfather tertiary													0.284	0.223	0.189	0.128
Maternal grandparents tertiary													0.090	0.117 ns	0.026 ns	0.068 ns
Mother and maternal grandmother tertiary													0.301	0.304	0.212	0.214
Mother and maternal grandparents tertiary													0.331	0.258	0.231	0.148

F = Finnish speaker, S = Swedish speaker.
All models are adjusted for index person's birth cohort and index person's region of residence at age 15.
All estimates except those marked ns are statistically significant at the 5 % level.
A bolded estimate means that in the given model, the estimate for Finnish speakers is statistically different from that for Swedish speakers at the 5 % level.

Table A4
Average marginal effects of parents' and grandparents' education on the probability of having tertiary-level education for Finnish-speaking women and Swedish-speaking women born in 1981–1985 in alternative models.

	G3															
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8	
	F	S	F	S	F	S	F	S	F	S	F	S	F	S	F	S
Father's education (ref. not tertiary)																
Tertiary	0.283	0.266			0.208	0.201			0.199	0.188						
Mother's education (ref. not tertiary)																
Tertiary			0.274	0.259	0.203	0.192			0.195	0.186						
Father's and mother's joint education (ref. neither tertiary)																
Only mother tertiary							0.19	0.189								
Only father tertiary							0.194	0.199								
Both tertiary							**0.375**	**0.343**								
Paternal grandfather's education (ref. not tertiary)																
Tertiary									0.018	0.001 ns						
Maternal grandfather's education (ref. not tertiary)																
Tertiary									**0.026**	**−0.024ns**						
Paternal grandmother's education (ref. not tertiary)																
Tertiary									0.041	0.099						
Maternal grandmother's education (ref. not tertiary)																
Tertiary									0.035	0.060						
Father's and paternal grandparents' education (ref. neither tertiary)																
Only father tertiary											**0.277**	**0.232**			0.204	0.171
Only paternal grandfather tertiary											0.057	−0.018 ns			0.032	−0.041 ns
Only paternal grandmother tertiary											**0.066**	**−0.181**			**0.035**	**−0.220**
Father and paternal grandfather tertiary											0.299	0.264			0.205	0.185
Paternal grandparents tertiary											0.177	0.128 ns			0.116	0.059 ns
Father and paternal grandmother tertiary											0.325	0.363			0.227	0.310
Father and parental grandparents tertiary											0.357	0.376			0.250	0.302
Mother's and maternal grandparents' education (ref. neither tertiary)																
Only mother tertiary													0.264	0.262	0.196	0.198
Only maternal grandfather tertiary													0.049	0.017 ns	0.021 ns	−0.010 ns
Only maternal grandmother tertiary													0.076	0.062 ns	0.054	0.049 ns
Mother and maternal grandfather tertiary													**0.32**	**0.242**	**0.218**	**0.141**
Maternal grandparents tertiary													0.106	0.135	0.051	0.086 ns
Mother and maternal grandmother tertiary													0.290	0.242	0.195	0.172
Mother and maternal grandparents tertiary													0.380	0.342	0.273	0.242

F = Finnish speaker, S = Swedish speaker.
All models are adjusted for index person's birth cohort and index person's region of residence at age 15.
All estimates except those marked ns are statistically significant at the 5 % level.
A bolded estimate means that in the given model, the estimate for Finnish speakers is statistically different from that for Swedish speakers at the 5 % level.

Table A5
Average marginal effects of ethno-linguistic affiliation and parents' and grandparents' education on the probability of having tertiary-level education in men and women, in alternative models.

	Men									Women								
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Ethno-linguistic affiliation																		
Finnish speaker (ref.)																		
Swedish speaker	0.051	0.035	0.039	0.030	0.030	0.026	0.032	0.032	0.026	0.084	0.069	0.073	0.065	0.065	0.062	0.066	0.069	0.062
Father's education																		
Not tertiary (ref.)																		
Tertiary		0.294		0.227		0.217					0.274		0.203		0.196			
Mother's education																		
Not tertiary (ref.)																		
Tertiary			0.246	0.163		0.155						0.265	0.195		0.189			
Father's and mother's joint education																		
No one tertiary (ref.)																		
Only mother tertiary					0.161									0.184				
Only father tertiary					0.222									0.192				
Both tertiary					0.396									0.357				
Paternal grandfather's education																		
Not tertiary (ref.)																		
Tertiary						0.018									0.013			
Maternal grandfather's education																		
Not tertiary (ref.)																		
Tertiary						0.026									0.016			
Paternal grandmother's education																		
Not tertiary (ref.)																		
Tertiary						0.035									0.016			
Maternal grandmother's education																		
Not tertiary (ref.)																		
Tertiary						0.032									0.036			
Father's and paternal grandparents' education																		
No one tertiary (ref.)																		
Only father tertiary							0.283		0.220							0.268		0.200
Only paternal grandfather tertiary							0.061		0.041							0.051		0.025
Only paternal grandmother tertiary							0.064		0.041							0.065		0.033
Father and paternal grandfather tertiary							0.321		0.233							0.288		0.199
Paternal grandparents tertiary							0.111		0.071							0.149		0.091
Father and paternal grandmother tertiary							0.362		0.277							0.320		0.229
Father and paternal grandparents tertiary							0.374		0.266							0.345		0.245
Mother's and maternal grandparents' education																		
No one tertiary (ref.)																		
Only mother tertiary								0.233	0.155								0.256	0.190

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Table A5 (*continued*)

	Men									Women								
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Only maternal grandfather tertiary								0.058	0.025								0.041	0.012 ns
Only maternal grandmother tertiary								0.060	0.041								0.060	0.039
Mother and maternal grandfather tertiary								0.309	0.188								0.297	0.200
Maternal grandparents tertiary								0.124	0.067								0.104	0.046
Mother and maternal grandmother tertiary								0.307	0.196								0.290	0.199
Mother and maternal grandparents tertiary								0.360	0.216								0.357	0.254

All models are adjusted for index person's birth cohort and index person's region of residence at age 15.
All estimates except those marked ns are statistically significant at the 5 % level.

Table A6
Average marginal effects of ethno-linguistic affiliation and parents' and grandparents' education on the probability of having tertiary-level education in men born 1976–1980 and 1981–1985, in alternative models.

	1976–1980									1981–1985								
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Ethno-linguistic affiliation																		
Finnish speaker (ref.)																		
Swedish speaker	0.042	0.027	0.030	0.023	0.023	0.018	0.024	0.023	0.018	0.058	0.041	0.045	0.036	0.036	0.032	0.038	0.039	0.032
Father's education																		
Not tertiary (ref.)																		
Tertiary		0.301		0.236		0.227					0.289		0.220		0.210			
Mother's education																		
Not tertiary (ref.)																		
Tertiary			0.249	0.159		0.151						0.246	0.165		0.158			
Father's and mother's joint education																		
No one tertiary (ref.)																		
Only mother tertiary					0.163									0.160				
Only father tertiary					0.236									0.212				
Both tertiary					0.389									0.401				
Paternal grandfather's education																		
Not tertiary (ref.)																		
Tertiary						0.013 ns									0.022			
Maternal grandfather's education																		
Not tertiary (ref.)																		
Tertiary						0.033									0.022			
Paternal grandmother's education																		
Not tertiary (ref.)																		
Tertiary						0.043									0.030			
Maternal grandmother's education																		
Not tertiary (ref.)																		
Tertiary						0.029									0.034			
Father's and paternal grandparents' education																		
No one tertiary (ref.)																		
Only father tertiary							0.294		0.232							0.276		0.211
Only paternal grandfather tertiary							0.059		0.036							0.063		0.045
Only paternal grandmother tertiary							0.093		0.067							0.047		0.027 ns
Father and paternal grandfather tertiary							0.323		0.236							0.319		0.230
Paternal grandparents tertiary							0.166		0.116							0.078		0.043
Father and paternal grandmother tertiary							0.364		0.280							0.359		0.276
Father and paternal grandparents tertiary							0.372		0.267							0.374		0.264
Mother's and maternal grandparents' education																		
No one tertiary (ref.)																		

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Table A6 (*continued*)

	1976–1980									1981–1985								
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Only mother tertiary								0.235	0.151								0.231	0.156
Only maternal grandfather tertiary								0.067	0.026								0.053	0.025
Only maternal grandmother tertiary								0.095	0.070								0.041	0.025 ns
Mother and maternal grandfather tertiary								0.327	0.198								0.297	0.181
Maternal grandparents tertiary								0.166	0.092								0.099	0.051
Mother and maternal grandmother tertiary								0.302	0.183								0.306	0.201
Mother and maternal grandparents tertiary								0.350	0.200								0.364	0.223

All models are adjusted for index person's birth cohort and index person's region of residence at age 15.
All estimates except those marked ns are statistically significant at the 5 % level.

Table A7
Average marginal effects of ethno-linguistic affiliation and parents' and grandparents' education on the probability of having tertiary-level education in women born 1976–1980 and 1981–1985, in alternative models.

	1976–1980									1981–1985								
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Ethno-linguistic affiliation																		
Finnish speaker (ref.)																		
Swedish speaker	0.070	0.055	0.060	0.052	0.052	0.050	0.053	0.057	0.050	0.095	0.079	0.083	0.074	0.074	0.070	0.076	0.078	0.071
Father's education																		
Not tertiary (ref.)																		
Tertiary		0.264		0.198		0.193					0.282		0.207		0.198			
Mother's education																		
Not tertiary (ref.)																		
Tertiary			0.254	0.185		0.181						0.274	0.202		0.195			
Father's and mother's joint education																		
No one tertiary (ref.)																		
Only mother tertiary					0.177									0.190				
Only father tertiary					0.189									0.194				
Both tertiary					0.334									0.373				
Paternal grandfather's education																		
Not tertiary (ref.)																		
Tertiary						0.007 ns									0.016			
Maternal grandfather's education																		
Not tertiary (ref.)																		
Tertiary						0.006 ns									0.022			
Paternal grandmother's education																		
Not tertiary (ref.)																		
Tertiary						0.035									0.045			
Maternal grandmother's education																		
Not tertiary (ref.)																		
Tertiary						0.032									0.037			
Father's and paternal grandparents' education																		
No one tertiary (ref.)																		
Only father tertiary							0.259		0.196							0.274		0.203
Only paternal grandfather tertiary							0.051		0.024 ns							0.051		0.026
Only paternal grandmother tertiary							0.079		0.046							0.057		0.027 ns
Father and paternal grandfather tertiary							0.277		0.193							0.296		0.203
Paternal grandparents tertiary							0.103		0.051							0.174		0.112
Father and paternal grandmother tertiary							0.308		0.224							0.328		0.233
Father and paternal grandparents tertiary							0.322		0.227							0.360		0.255
Mother's and maternal grandparents' education																		

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Table A7 (*continued*)

	1976–1980									1981–1985								
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
No one tertiary (ref.)																		
Only mother tertiary								0.246	0.180								0.264	0.196
Only maternal grandfather tertiary								0.035	0.005 ns								0.046	0.018 ns
Only maternal grandmother tertiary								0.032 ns	0.013 ns								0.075	0.054
Mother and maternal grandfather tertiary								0.279	0.184								0.310	0.211
Maternal grandparents tertiary								0.094	0.03 ns								0.110	0.054
Mother and maternal grandmother tertiary								0.301	0.213								0.287	0.194
Mother and maternal grandparents tertiary								0.325	0.224								0.378	0.271

All models are adjusted for index person's birth cohort and index person's region of residence at age 15.
All estimates except those marked ns are statistically significant at the 5 % level.

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