Siblings' educational mobility and the educational stratification of families

Stian A. Uvaag

View supplementary material

Published online: 30 May 2023.

Submit your article to this journal

Article views: 1352

View related articles

View Crossmark data

Citing articles: 1 View citing articles

Routledge
Taylor & Francis Group

Siblings' educational mobility and the educational stratification of families

Stian A. Uvaag 🆔

Department of Sociology, University of Bergen, Bergen, Norway

ABSTRACT

This study examines same-sex siblings' educational mobility using high-quality register data from Norway. The study explores how the educational level of younger siblings varies with the education of parents and firstborn siblings. Younger siblings are generally more likely to attain the same education as the eldest. Even though the distance and direction of educational mobility co-varies between the eldest and younger siblings, the association appears weaker when the firstborn children of highly educated parents only attain compulsory schooling. Furthermore, educational similarity within and across generations is particularly widespread among the families with the least and most educated parents. The study demonstrates how differentials in educational attainment by family background increase when comparing sibling pairs rather than individuals. Accordingly, researchers must also consider family outcomes to understand the stratification that follows intergenerational mobility.

Introduction

Inequality in educational attainment has been extensively researched, but studies have mostly limited their concerns to individual outcomes. Criticism of social mobility and stratification research for its restricted focus on individuals (see, for example, Miller 1998; Thompson 1993) has yet to make much impact on the field. One reason for this is that researchers often attempt to measure inequality of opportunity by analyzing the association between individuals' educational outcomes and their observable traits and family backgrounds (for a discussion, see Erikson and Jonsson 1996). Whereas studies on mobility previously involved concerns about the relationship between social mobility and family and kinship (see, for example, Goldthorpe 1980), researchers have increasingly turned to micro-level models to uncover the mechanisms generating inequality (Breen and Jonsson 2005), leaving the focus increasingly on individuals. At the same time, growing body of literature on the impact of family background on education documenting correlations in siblings' educational attainment has emerged (Björklund and Salvanes 2011; Björklund and

---

Supplemental data for this article can be accessed online at https://doi.org/10.1080/01425692.2023.2208740.

Jäntti 2020; Grätz et al. 2021). However, this literature has paid little attention to siblings' educational mobility and how intergenerational mobility shapes similarity in educational attainment in family units within and across generations.

This article makes a novel empirical contribution by exploring the association between sibling pairs' and parents' education levels to study siblings' educational mobility. Specifically, this study examines the education levels of same-sex sibling pairs in relation to the educational attainment of their parents to answer the following research questions:

1. How do the education levels of younger siblings vary with that of the firstborn in sibling pairs with different parental education?
2. How do the joint educational outcomes of sibling pairs differ between families with different levels of parental education?

Overarchingly, the analysis shows the similarity in education within families given siblings' educational mobility.

Theoretical framework and previous research

The divide between the educated and the non-educated has recently been called upon as a salient social division in contemporary societies in public debate (see Bukodi and Goldthorpe [2021] for a discussion). Sociology has long been interested in social distances as a part of social stratification, including subjective distances on the one hand, and on the other, objective distances – the number of ties between different groups or strata (Laumann 1966). Multiple studies show that social ties are highly structured around educational attainment across all types of close relations. Notably, whom people form social connections with is strongly associated with education. Specifically, partners tend to have similar levels of educational attainment (Domański and Przybysz 2007), and the social positions of friends are strongly associated with an individual's education and more associated with an individual's education than income (Chan and Goldthorpe 2004; Alecu et al. 2022, 525).

This study investigates the similarity in family members' education levels following intergenerational mobility. Research shows a strong correlation between social background and educational attainment (Thomsen et al. 2016; Breen and Müller 2020) and between the educational attainment of parent and child (Hertz et al. 2008). Such intergenerational mobility patterns are considered significant in shaping social stratification, as demographic continuities across generations may foster the formation of distinct social and cultural groupings (Weber 1978; Goldthorpe 1982). Although the literature has paid less attention to social mobility in family units,[1] it is reasonable to assume that similarities between siblings' outcomes increase social and cultural homogeneity within families. Notably, most individuals have at least one sibling,[2] and siblings tend to remain an integral part of personal networks in adulthood as most maintain at least occasional contact with one another, with analyses from the Netherlands showing that almost 50% of people see their siblings monthly (Kalmijn 2006).

While mobility research has primarily examined parent–child associations, the status attainment literature has long been interested in studying siblings to uncover the impact of family background. The rationale is that the eldest sibling's outcome indicates unmeasured characteristics of family background, and consequently, younger siblings' education increases in accordance with the eldest's amount of education (Blau and Duncan 1967, 316–328). Except for some analyses

by Sweetser, who connected sibling associations to social background and discussed sibling mobility as the tendency for siblings to have similar mobility in the occupational structure (for example, Sweetser 1975), the literature on sibling associations does not address mobility in the traditional sense. In recent years, studies have centered on sibling correlations, as they capture everything siblings share, encompassing the family environment, neighborhood, and shared genes (Solon et al. 1991; Björklund and Salvanes 2011; Björklund and Jäntti 2020).

A meta-analysis from 2011 found that sibling correlations in education were usually between 0.4 and 0.6 (Björklund and Salvanes 2011), while newer reports show they are often higher in developing countries (Ahsan et al. 2023). In Norway, sibling correlations in education are between 0.4 and 0.5 for same-sex siblings, with fluctuations and a slight decrease over time (Wiborg and Hansen 2018). In the countries studied, sibling correlations are stronger in education than income, wealth, and occupational status (Hauser and Mossel 1985; Sieben 2001; Wiborg and Hansen 2018), and education largely explains the sibling correlation in occupational status (Conley and Glauber 2005). Consequently, education appears to be an essential source of social differentiation between families.

Sibling correlations provide possibilities for comparison across time and place, as they can be decomposed to see what contributes to the correlation (Björklund, Lindahl, and Lindquist 2010), or compared across parental backgrounds to see where the correlation is strongest (see, for example, Grätz et al. 2021). However, sibling correlations are still only highly abstract correlations in continuous variables. In comparison, a common approach in sociology has involved using categorical mobility tables to portray a more complex reality where intergenerational associations vary between the origin and destination categories (Erikson and Goldthorpe 2002, 31, 36). This methodological choice connects to sociological explanations of how social background shapes actions, such as educational choices. Additionally, understanding how educational similarities in family units differ between different educational strata requires the analysis of categories of education rather than continuous measures of years of schooling.

This study focuses on siblings' categorical educational mobility to provide a more concrete picture of educational attainment across and within generations in family units. The analysis utilizes data on the entire registered population in Norway. These provide more opportunities than older sibling data, which offer few observations and limited statistical power (Hauser and Sewell 1986). Yet a central problem in analyzing educational mobility in families remains in the question of how to include family structure, such as the number of children. Including these variations may lead to methodological intricacy and, subsequently, an inaccessibility for which the social mobility literature has previously been criticized (Savage 2000). More crucial for the current purpose is that the patterns of interest soon would disappear through abstractions. Instead of going down this avenue, this article uses the analytic strategy to study one sibling pair per mother among mothers with two or more children. This approach produces a partial demographic portrayal but demonstrates the main patterns in educational attainment across and within family generations.

Family differences in educational attainment

Several sociological theories explain intergenerational association in educational attainment. Some theories focus on how different social groups value education differently or have different horizons for career decisions. Drawing on Bourdieu's (1984; Bourdieu and

Wacquant 1992) work on how individuals' dispositions form in their social and cultural surroundings, Hodkinson and Sparkes (1997) stress how the family background and life histories of the actor shape 'horizons of action' for career and educational decisions. Relatedly, research shows that parents have different perceptions and strategies concerning education. For example, parents often acknowledge the importance of education for opportunities in the labor market, yet while the university-educated middle class takes university education for granted, parents without higher education in the intermediate class view education in terms of the costs and benefits and are more changeable regarding their ideas about their children going to university (Irwin 2018). Multiple studies also stress how resourceful parents often use their superior resources to provide their children with opportunities, support their offspring in doing what they want, and intervene if their children struggle at school or in general (Conley 2004; Devine 2004; Gillies 2005).

According to social position theory (Boudon 1974), individuals try to reproduce their relative position in the structure of inequality. Undertaking education is consequently viewed as a strategic action to secure this relative position, and a higher social origin involves aspirations toward higher education. Building on this, the theory of relative risk aversion claims that individuals try to avoid social degradation and posits that those of different class backgrounds, even with the same grades, will have different costs of education depending on their relative position (Erikson and Jonsson 1996; Goldthorpe 2000). The effectively maintained inequality perspective stresses that 'advantaged actors secure for themselves and their children some degree of advantages as commonly possible' (Lucas 2001, 1652) either through gaining more or qualitatively better education (Lucas 2001, 2017).

Variations between families in educational outcomes go beyond that captured by parental education. Parental class, status, income, and wealth are all correlated with children's education (Bukodi and Goldthorpe 2013; Hällsten and Thaning 2022), and while, for example, economic resources may directly affect educational possibilities, they may be correlated with educational attainment because they convey relative social position. Research has recently documented previously little-recognized variations within classes (Irwin and Elley 2011) and shown, for example, that some first-generation students describe their families as 'better yourself' ones (Mallman 2017). Variations between families also extend to parents' practices, attitudes, and involvement in schoolwork, which have large independent effects on sibling correlations in income (Björklund, Lindahl, and Lindquist 2010).

While the works discussed above document family background differentials in education, most do not consider differences and similarities within families. To a large extent, similarities are expected to originate from the shared family background. However, several studies also consider sibling influences (see, for example, Whiteman, McHale, and Crouter 2007), with some focusing on education (Benin and Johnson 1984; Joensen and Nielsen 2018; van der Vleuten, Weesie, and Maas 2020). The literature suggests siblings learn from their siblings and that older ones function as role models and tutors for the younger ones. Additionally, sibling competition, for example in educational achievement, may cause within-family resemblances. Although siblings likely influence each other, such influences are difficult to separate from the unmeasured effects of family background (Benin and Johnson 1984).

On the other hand, social mechanisms can also make siblings different. Siblings usually grow up under different circumstances and can be treated unequally (Conley 2004). Through unequal treatment, parents can either increase or decrease the similarities of the outcome of their children (Conley 2008), depending on whether they invest in the more vulnerable or

promising sibling(s). Additionally, psychological theories propose that siblings seek to develop different qualities to differentiate themselves from their siblings (see Whiteman, McHale, and Crouter 2007). Finally, younger siblings systematically attain less education than older siblings, but educational expansion can outweigh the negative birth order effect (Barclay 2018). Research has also documented a negative correlation between family size and educational attainment (see, for example, Downey 1995). However, the negative effect of family size is mitigated when controlling for birth order (Black, Devereux, and Salvanes 2005). Furthermore, family structure, such as the number of siblings, seems to explain little of sibling correlations beyond what social background accounts for (Björklund, Lindahl, and Lindquist 2010).

In line with previous literature, the individuals' educational attainment is expected to differ by parental education. Furthermore, offspring will likely attain more education than their parents to reproduce relative positions during educational expansion. As the educational attainment of the firstborn reflects all relevant sides of family background, younger siblings will, on average, attain more education the higher amount of education the firstborn has acquired. Meanwhile, the literature says little about how the joint educational outcomes of sibling pairs differ between families with different levels of parental education. However, differentials by parental education should become larger as, generally speaking, one adds multiple individuals with the chances associated with their educational backgrounds.

The Norwegian context

In Norway, upper secondary and higher education is generally free, although private educational institutions charge tuition costs (e.g. business academies). Furthermore, the state provides generous public education support through student loans and grants. Social inequality in higher education might thus be considered less determined by the purchasing function of parental wealth (see Pfeffer and Hällsten 2012), but follows social inequality in school achievement and educational choices. Notably, students compete for admission into tertiary education programs based on the grade point average achieved during upper secondary education.

Norway and the Nordic countries appear to have a lower intergenerational correlation in educational attainment than other nations (Hertz et al. 2008). However, Norway ranks below the international average in educational mobility in 19 mainly European countries (Pfeffer 2008). Even with the same data, the rankings of countries vary according to how intergenerational associations are measured. Although Norway is often categorized with other Nordic countries, these, for example, have different trends in the social gap in who pursues higher education (Thomsen et al. 2016).

The Norwegian educational system has two main tracks in upper secondary education: general/academic upper secondary (which qualifies students for tertiary education) and vocational education (which leads to certification as a skilled worker). Historically, it has been reasonable to see vocational education as leading away from tertiary education (Hansen 1997). However, in 1996–97 it became possible to qualify for tertiary education with an extra year of schooling following vocational studies. This analysis separates the academic and vocational tracks to also capture stratification within the upper secondary level of education.

Finally, in Norway, female-dominated professionalized occupations such as nurses, kindergarten teachers, and social workers require education at the lower tertiary level at universities of applied sciences. Consequently, women's participation in lower tertiary education is high.

Data and methods

The data come from population-wide administrative registers covering all registered inhabitants in Norway. These anonymized data contain links between individuals and their siblings and parents.

This study focuses on firstborn children born between 1975 and 1984. These firstborns were paired with their closest in age, a maximum of six years younger, maternal same-sex siblings with registered education. The sample encompasses maternal half-siblings but excludes twins. The procedure resulted in 40,114 male and 36,269 female same-sex sibling pairs, with a birth year distribution as shown in Figure 1. As presented in Table 1, individuals with more than one sibling are overrepresented. This is because the sample includes the thirdborn sibling if the secondborn was not of the same sex as the firstborn, and so on. The analysis was limited to same-sex siblings due to space. However, the Supplementary data includes analyses of a separate sample of mixed-sex siblings.

The data used in the project include information on an individual's highest level of education, measured annually between 1980 and 2020. From this, the educational attainment of each sibling at age 30 years was extracted. Furthermore, the data include variables on the highest completed education of an individual's parents when the individual was aged 16. As both parents matter for social mobility (Beller 2009), the analysis includes the education of both parents. In all cases, the analysis uses the parental education recorded for the firstborn. Immigrants and individuals with immigrant parents were excluded from the study because the registers lack information on the highest completed level of education of many immigrants.[3] A total 0.3% of individuals with non-immigrant parents lack information on education, and the numbers are even lower for individuals with siblings.

The predefined variables concerning mothers' and fathers' education have imputed the other parent's education when information is lacking on one parent's education. Less than 1% of native-born mothers and fathers lack information on the highest completed education. Analyses with non-imputed information on parents' education were run to control the robustness of the results. The individuals with imputed information on parents have significantly lower educational attainment for every level of parental education than their
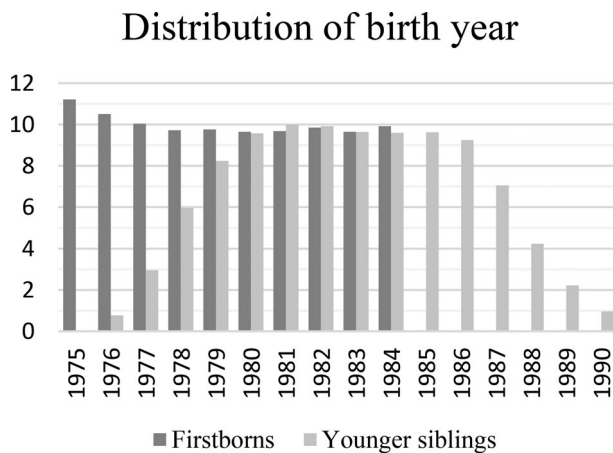

Figure 1. The distribution of birth year in the sample.

Table 1. Descriptive statistics (%).

Characteristic	1975–85 birth cohorts	Individuals with siblings	In sample
Number of maternal siblings among firstborns			
0	15	–	–
1	47	55	47
2	28	33	38
3	8	9	12
4+	2	3	4
Total	100	100	100
Birth order of younger siblings			
2	91.3		
3	8.3		
4+	0.4		
Total	100		

non-imputed counterparts. However, only slight changes in the results were observed when applying imputed or non-imputed data. In the end, the predefined imputed variables were used.

In the second part of the analysis, multinomial logistic regression was used to estimate the probabilities of the joint educational outcome of sibling pairs. Separate models were run for male and female same-sex siblings. The dependent variable is the combination of educational outcomes for both siblings. Parental education, the birth year of the firstborn, and an interaction term are included as independent variables. The full models are included in the Supplementary data.

Coding of education

The highest level of attained education was re-coded from the Norwegian classification of education (NUS) into four categories of highest completed level of education, including compulsory, upper secondary (and post-secondary non-tertiary), lower tertiary, and higher tertiary education. For younger birth cohorts, the data includes variables which show the year of first completing vocational or general upper secondary education. These variables were used to differentiate whether the siblings, but not the parents, have vocational or general upper secondary education.

To account for the changing educational system and the distribution of individuals within it, the category of upper secondary spans different tracks in the two generations. Upper secondary basic education is the most common education level among the parents. It includes many shorter vocational tracks and *Realskolen*, the step between primary and general upper secondary education before the 1970s. In the offspring generation, basic education primarily covers incomplete upper secondary education. Table 2 presents the applied categorization of education in the two generations, with correspondence to the NUS, while Table 3 presents the joint categorization of parents' education.

Descriptive statistics

Figure 2a and b shows the trend in educational attainment at age 30 years for all men and women across birth years. While a large educational expansion in upper secondary education in Norway occurred in the post-war cohorts, this had slowed down by the 1975–1984

Table 2. Coding of the highest completed level of education.

NUS category		Education of siblings	Education of parents
0	No education and pre-school education	Missing	Missing
1	Primary education	Compulsory education	Lower secondary education
2	Lower secondary education		
3	Upper secondary education, basic education		Upper secondary education
4	Upper secondary, final year	Vocational or general upper secondary education	
5	Post-secondary non-tertiary education		
6	Tertiary education, undergraduate level	Lower tertiary education	Lower tertiary education
7	Tertiary education, graduate level	Higher tertiary education	Higher tertiary education
8	Postgraduate education		
9	Unspecified	Missing	Missing

Table 3. Educational categories of parents.

Category	Education of parents
Lower secondary	Both parents have lower secondary education
Lower + upper secondary	One parent has lower secondary education and one has upper secondary education
Upper secondary	Both parents have upper secondary education
Secondary + tertiary	One parent has secondary education and the other has tertiary education
Lower tertiary	Both parents have lower tertiary education
Higher tertiary	Both parents have tertiary education and at least one has higher tertiary education

birth cohorts. Between 1975 and 1984, the share who had completed higher education by age 30 years only increased by around 1 percentage point, but there was a shift from the lower to the higher level within tertiary education. Among women, tertiary education expanded in the 10-year period, with an increase of almost 8 percentage points between the youngest and the oldest birth cohort. The percentage with higher tertiary education at age 30 years increased from 9.3% to 16.6%.

Table 4 presents educational attainment at age 30 years for the entire 1975–1984 birth cohorts, the firstborns in the sample, and the younger siblings (born between 1976 and 1990). In the 1975–1984 cohorts, women had bypassed men and had the highest educational attainment. Women were far more likely to have completed shorter tertiary education, while men were overrepresented in lower secondary and vocational education. Firstborns tended to have higher education than their younger same-sex siblings, as expected due to the well-established birth order effect (Black, Devereux, and Salvanes 2005). However, younger sisters acquired higher tertiary education slightly more often than their eldest sisters. This is most likely because educational expansion outweighed the birth order effect for females (see Barclay 2018).

Results

Before the analysis of the educational attainment of siblings, the first results recount individual educational mobility in Norway for the 1975–1984 birth cohorts. Tables 5 and 6 show the education levels at age 30 years of men and women by parents' education. These tables show one of the most well-established empirical patterns in sociology, the unequal attainment of individuals' education by parents' education. Individuals seldom move from the bottom to the top of the educational system, or vice versa, between generations. Only
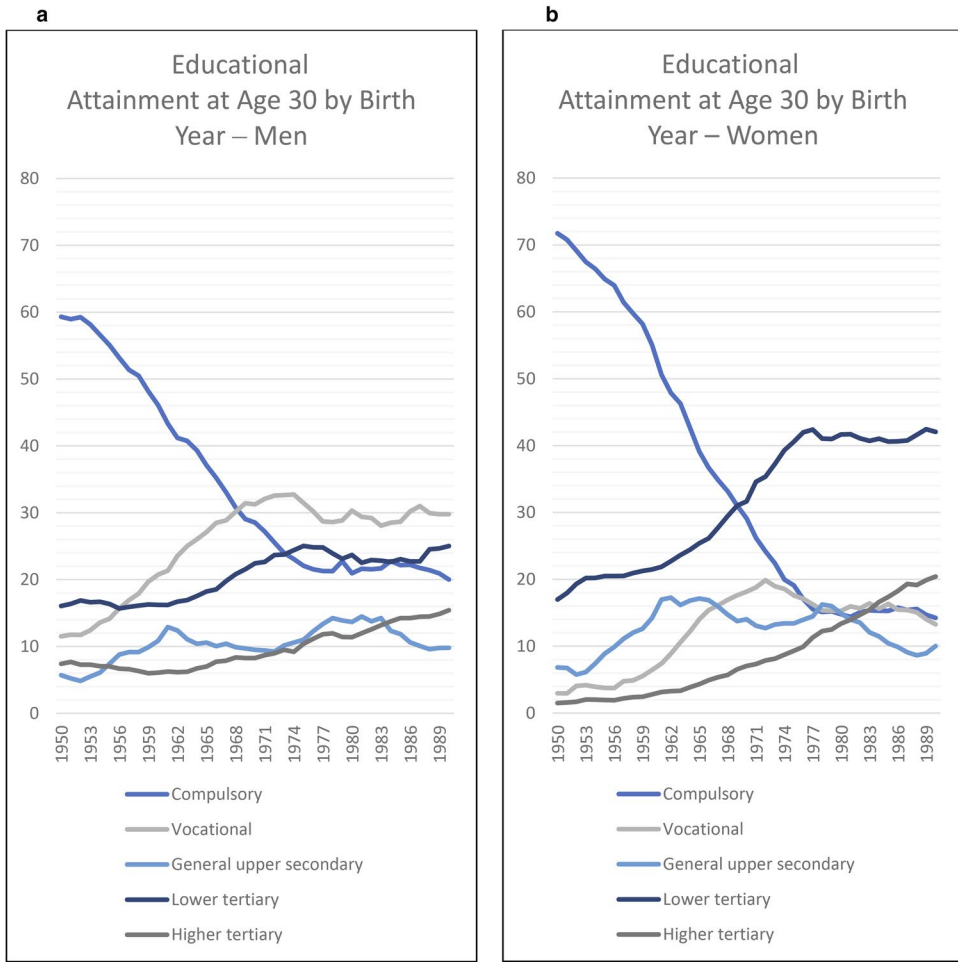
Figure 2. Educational attainment at age 30 years over time by birth year (%): (a) men and (b) women.

Table 4. Educational attainment at age 30 years (%).

	Men			Women		
Educational attainment	1975–1984 birth cohorts	Firstborn men in sample	Younger brothers in sample	1975–1984 birth cohorts	Firstborn women in sample	Younger sisters in sample
Compulsory education	21.8	18.5	20.4	15.7	12.8	14.5
Vocational education	29.4	27.6	30.7	16.1	14.0	16.8
General upper secondary	13.3	13.8	12.1	14.0	13.6	12.0
Lower tertiary	23.7	25.7	23.7	41.3	44.2	41.1
Higher tertiary	11.9	14.4	13.2	12.9	15.4	15.7
Total	100	100	100	100	100	100

1.7% of men and 2.3% of women acquire higher tertiary education by age 30 years if their parents have not completed education beyond the compulsory level. In comparison, those with the most educated parents are over 20 times more likely to have attained higher tertiary education and are the least likely to stop their schooling at the compulsory level. On average, women more often obtain higher education than men and are more likely to be upwardly educationally mobile. While individuals with highly educated parents tend to choose general

Table 5. Men's education at age 30 years by parental education: 1975–1984 birth cohorts (*N* = 239,037).

| | Education at age 30 years (%) | | | | | |
| | Compulsory education | Vocational education | General upper secondary | Lower tertiary | Higher tertiary | Total |
Education of parents						
Lower secondary	44.7	35.9	9.1	8.6	1.7	100
Lower + upper secondary	29.7	39.4	12.1	14.8	4.0	100
Upper secondary	18.2	34.5	14.5	24.2	8.7	100
Secondary + tertiary	13.0	20.4	15.9	33.2	17.6	100
Lower tertiary	7.3	10.7	14.3	40.6	27.2	100
Higher tertiary	5.0	4.5	11.1	36.6	42.8	100
Total	21.4	29.4	13.3	23.8	12.1	100

Table 6. Women's education at age 30 years by parental education: 1975–1984 birth cohorts (*N* = 227,748).

| | Education at age 30 years (%) | | | | | |
| | Compulsory education | Vocational education | General upper secondary | Lower tertiary | Higher tertiary | Total |
Education of parents						
Lower secondary	35.7	25.7	14.7	21.7	2.3	100
Lower + upper secondary	22.5	23.6	16.3	33.2	4.4	100
Upper secondary	12.4	17.1	15.7	45.5	9.2	100
Secondary + tertiary	7.7	8.5	12.6	52.3	18.9	100
Lower tertiary	4.1	3.5	8.8	54.4	29.2	100
Higher tertiary	2.6	1.7	6.0	43.5	46.2	100
Total	15.4	16.0	14.0	41.6	13.0	100

rather than vocational education, those with less educated parents are more likely to have taken the vocational track. Vocational education is the least likely highest completed education among those with highly educated parents.

The educational attainment of sibling pairs

The following analysis shows how the educational attainment of younger siblings varies with the education of the firstborns in same-sex sibling pairs. Figure 3a and b shows educational attainment at age 30 years for brothers and sisters by parental education. Each panel demonstrates siblings' educational attainment in one category of parental education. The rightmost field presents the association in siblings' educational attainment across all levels of parental education.

As expected, the distribution of younger siblings' education is associated with that of parents and firstborns. More educated firstborns tend to have more educated younger siblings. However, some patterns in families where the parents have tertiary education diverge slightly from this trend. First, when a firstborn son has vocational education, the younger brother is either as or less likely to attain tertiary education than when the firstborn has compulsory education, as many younger brothers follow the eldest into vocational education. Second, when the firstborn daughters of highly educated parents do not go beyond compulsory education, the younger sister is either as or more likely to continue schooling as those with a firstborn sister with upper secondary education.[4] A similar pattern is discernable among men with higher tertiary educated parents, where the chance of younger brothers having only compulsory education increases only slightly if the firstborns have compulsory rather than general upper secondary education. With higher parental
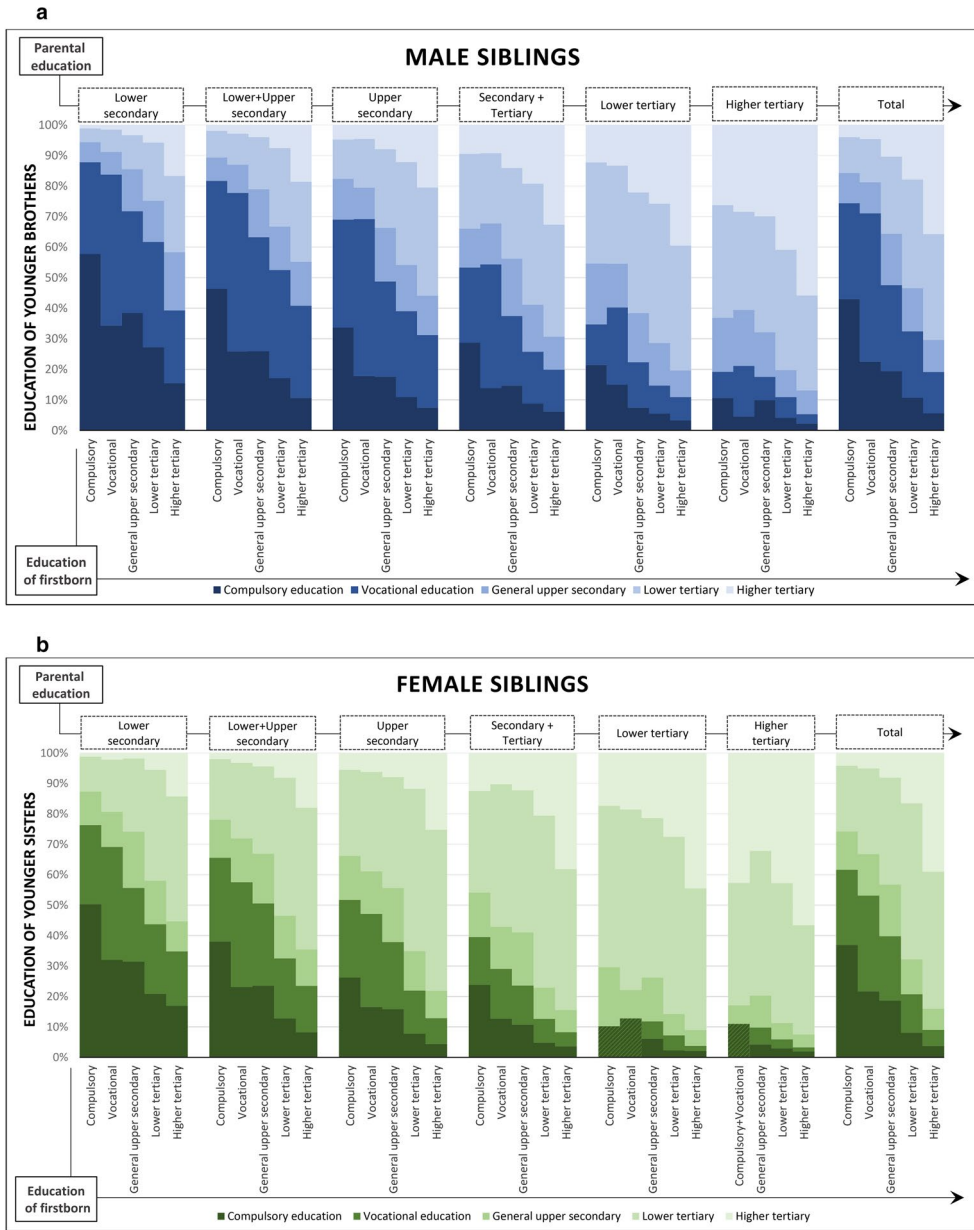
Figure 3. Education of younger siblings by education of parents and same-sex firstborn sibling: (a) men and (b) women. Each figure has seven panels. Each panel shows sibling pairs for one category of parental education, and the rightmost panel shows the total. Each column in the panels shows the stacked distribution of younger siblings' education by the education of the firstborn. Because of few observations, compulsory and vocational education are combined for female siblings with parents with tertiary education.

education, firstborns' downward educational mobility into compulsory education appears less determined by the shared family background.

Younger siblings most often attain a level of education when their eldest siblings have already obtained that level of education. This extends to all levels of parental education for

upper tertiary and vocational education. For compulsory education, the exception is the aforementioned case for firstborn women with highly educated parents. In contrast, the middle categories of general upper secondary and lower tertiary are, at multiple levels of parental education, slightly more often attained by younger siblings of firstborns with different levels of education. Although younger siblings are more likely to have the same level of education as the firstborn, siblings usually have similar but not necessarily the same educational attainment.

In sum, younger siblings' education is different when the eldest sibling has vocational education and when the eldest sibling has academic upper secondary education. Thus, there is a clear differentiation between families' education at the upper secondary level. The results suggest a stronger family component in attaining vocational education than obtaining and remaining in general upper secondary education. The youngest siblings are likelier to attain higher education when firstborns have general upper secondary. Furthermore, the probability of younger brothers completing higher tertiary education only slightly differs when firstborn brothers have compulsory or vocational education.

Overall, siblings are more alike in their educational mobility than if all individuals with the same parental education had the same likelihood of being mobile. Younger siblings' education varies considerably according to whether the firstborn attained compulsory or higher tertiary education. Consequently, younger siblings with parents with lower levels of education are unlikely to reproduce their parents' level of education when the firstborn acquires higher tertiary education.

As already stated, tertiary educational expansion mainly concerns women in these cohorts. Following the gender difference in education, the educational profiles of younger male and female siblings change differently between the firstborn's education. A larger difference in the educational outcomes of younger sisters is observed for whether the eldest sister attains higher education. For male siblings, the change in the profiles of younger siblings is more affected by the eldest brother's outcome at the secondary level.

The following analysis shows sibling pairs' combined educational outcomes. Table 7 presents the educational attainment of sibling pairs by parental education and distinguishes between whether both siblings have secondary education, both have tertiary education, or one sibling has secondary while the other has tertiary education. The probabilities are predictions from

Table 7. Educational outcomes of sibling pairs by parental background.

Educational outcomes	Parental education (%)					
	Lower secondary	Lower + upper secondary	Upper secondary	Secondary + tertiary	Lower tertiary	Higher tertiary
Male same-sex sibling pairs						
Both secondary	80.9	67.6	49.1	28.9	13.5	5.9
Mixed	15.8	24.5	33.2	37.1	33.0	24.4
Both tertiary	3.3	7.9	17.7	34.0	53.5	69.7
Total	100	100	100	100	100	100
Female same-sex sibling pairs						
Both secondary	58.5	41.3	23.5	10.6	3.5	1.6
Mixed	29.1	35.3	35.3	29.2	20.5	15.0
Both tertiary	12.4	23.5	41.1	60.3	76.0	83.4
Total	100	100	100	100	100	100

Predictions based on multinominal logit models.

multinomial logistic regression models that control for parents' education and the firstborn's birth year. The complete models are available in the Supplementary data.

Compared to models of individual outcomes, family outcomes include multiple individuals with educational chances associated with individuals with similar parental education, although modified by a further family component.

In families with low parental education, both siblings typically remain at the secondary level, while both commonly attain tertiary education in families with highly educated parents. Sisters are six to seven times more likely, and brothers over 20 times more likely, to both attain tertiary education if they have the highest versus lowest educational origin. On the other hand, sisters with the lowest compared to the highest educational origin are over 30 times more likely, and brothers 12 times more likely, to both stop their education at the secondary level. Siblings with highly educated parents seldom both end schooling at the secondary level. This occurs in 5.9% of brother pairs and 1.6% of sister pairs. On the other hand, among those with the lowest educational origin, only 3.3% of brothers both attain higher education.

When differentiating between secondary and tertiary education, most sibling pairs are at the same education level, mainly due to shared immobility. Intergenerational mobility between secondary and tertiary education occurs more commonly for one than for both siblings, particularly in families with the highest and lowest educated parents. Thus, first-generation students in higher education with parents with compulsory education are often the sole members of their families undertaking higher education. The picture differs in families where parents have upper secondary education, where both daughters, rather than one, tend to acquire tertiary education. Whereas parents with upper secondary education tend to see at least one of their daughters obtaining higher education, highly educated parents commonly experience one son not attaining tertiary education by age 30 years. In addition, whereas 20% of men with parents with higher tertiary education have secondary education, this concerns at least one of the male siblings in approximately 30% of families where parents have higher tertiary education and slightly under 50% of families where parents have lower tertiary education.

Tables 8 and 9 present a more detailed breakdown of the combinations of the five educational categories in the sibling pairs. Only combinations where both siblings have

Table 8. Combinations of education in male same-sex sibling pairs by parental education.

Sibling education	Parental education (%)			
	Lower secondary	Upper secondary	Lower tertiary	Higher tertiary
Both siblings have secondary education				
CO + CO	23.5	5.3	1.2	0.5
CO + VO	25.0	11.0	2.1	0.6
CO + GU	6.6	4.8	2.2	1.7
VO + VO	18.4	17.2	2.3	0.6
VO + GU	6.0	8.2	3.3	1.3
GU + GU	1.4	2.6	2.2	1.2
Both siblings have tertiary education				
LT + LT	1.9	8.7	18.5	13.9
LT + HT	1.1	6.9	23.0	29.2
HT + HT	0.3	2.1	12.1	26.8

Predictions based on multinominal logit models given for firstborns born in 1980 and their younger siblings. CO, compulsory education; GU, general upper secondary; HT, higher tertiary; LT, lower tertiary; VO, vocational education.

Table 9. Combinations of education in female same-sex sibling pairs by parental education.

Sibling education	Parental education (%)			
	Lower secondary	Upper secondary	Lower tertiary	Higher tertiary
Both siblings have secondary education				
CO/VO + CO/VO	40.9	12.2	0.7	0.3
CO + GU	8.2	3.8	1.1	0.3
VO + GU	6.7	5.2	0.7	0.4
GU + GU	2.9	2.5	0.9	0.6
Both siblings have tertiary education				
LT + LT	9.3	26.0	30.8	18.5
LT + HT	2.6	12.1	30.5	36.0
HT + HT	0.4	2.9	14.6	29.1

Predictions based on multinominal logit models given for firstborns born in 1980 and their younger siblings. CO, compulsory education; GU, general upper secondary; HT, higher tertiary; LT, lower tertiary; VO, vocational education.

secondary or tertiary education are displayed to prevent the tables from becoming excessively detailed. These tables underscore the educational disparities between siblings with low and high parental education, emphasizing the extent of educational inequality. The differences by parental education are more prominent between the lowest and highest educational outcomes of sibling pairs than individuals.

Although younger siblings of firstborns who experience long-distance educational mobility are more likely to move in the same direction, intergenerational mobility between the top and bottom of the educational hierarchy is already infrequent among firstborns, making it rare for multiple family members to be long-distance educationally mobile. When both children of parents with tertiary education remain in secondary education, at least one most likely completed general upper secondary education. On the other hand, the children of parents with compulsory education tend to have non-academic secondary education as their highest completed education. Overall, combinations at the secondary level that includes general upper secondary education are much more evenly distributed by parental education than the other forms of secondary education.

Significant differences exist in sibling pairs' educational outcomes by parental education. Notably, 40.9% of sisters with the lowest parental education both have either compulsory or vocational education. The same applies to an estimated 0.3% of the sisters from the most educated families and 0.7% of the sisters with parents with lower tertiary education. These numbers underscore the extreme unlikelihood of shared mobility of sisters from the highest educational background into the two lowest categories of educational attainment, which includes 30% of women (without an immigrant background) in the studied birth cohorts. Although the difference by parents' education in the probability of both siblings attaining the lowest educational level is less extreme among the brothers, it is still markedly high. On the other hand, both siblings have higher tertiary education in 0.3% of brother pairs and 0.4% of sister pairs from families with the least educated parents, compared to 26.8% of brother pairs and 29.1% of sister pairs with parents with the highest level of education.

Concluding discussion

While mobility research has mainly been limited to the mobility of individuals (Miller 1998), this article documents how intergenerational mobility shapes educational similarity

in families within and across generations by outlining patterns in the educational mobility of siblings.

The association in siblings' outcomes has long been recognized to capture all relevant sides of shared family background (Blau and Duncan 1967; Solon et al. 1991; Björklund and Salvanes 2011). Because firstborns' educational attainment reflects relevant aspects of the family, younger siblings should tend to have similar educational outcomes to their eldest siblings. As expected, the level of education of younger siblings varies with the level of education of firstborn siblings. More educated firstborns tend to have more educated younger siblings. Accordingly, the distance and direction of younger siblings' educational mobility are positively associated with the distance and direction of first-borns' educational mobility. Furthermore, there is a noticeable family effect in siblings' tendency to attain the same education, which is especially apparent for vocational education.

In some instances, the share of younger siblings with higher levels of education does not decrease substantially with the distance of firstborns' downward educational mobility. An emerging question relates to how the same educational outcomes have different social explanations depending on individuals' backgrounds. While this has been a central issue in sociological explanations of educational attainment (Boudon 1974; Erikson and Jonsson 1996; Hodkinson and Sparkes 1997; Goldthorpe 2000), it has not been addressed in the sibling association literature. Sibling correlations have proved fruitful in uncovering family-level factors correlated with sibling similarities (Björklund, Lindahl, and Lindquist 2010). Still, the results suggest that future contributions to the study of sibling associations could benefit from ongoing dialogue with traditional sociological approaches to educational attainment.

A central issue in the social stratification literature relates to understanding how mobility shapes the social and cultural structure in which individuals are embedded (Weber 1978; Goldthorpe 1982). Previous research has shown how intergenerational (im)mobility causes educational similarity across generations (for example, Hertz et al. 2008). On the other hand, the similarity between siblings' and parents' education has received little attention. This study filled this gap in the literature by exploring the differentials in the joint educational attainment of sibling pairs by parental education. Mostly due to immobility, sibling pairs are at the same level when differentiating between secondary and tertiary education.[5] Furthermore, educational similarity within and across generations in family units is pronounced in families with the highest and lowest parental education, where the siblings commonly attain similar levels of education as their parents.

Exploring the educational outcome of more than one descendant in a family produces a broader picture of the educational stratification of families. The joint educational outcomes of siblings show more variation in the educational attainment of family units, from the least to most educated offspring groups. Future studies could use this variation to determine, for example, traits associated with the highest educational attainment of families. Furthermore, the educational attainment differences between families with the most and least educated parents increase when comparing the lowest and highest possible outcomes in sibling pairs rather than individuals. In conclusion, analyses of individual outcomes do not show the full magnitude of social inequality in the educational attainment of families.

Because sibling outcomes reflect a shared, difficult-to-capture family factor (Blau and Duncan 1967; Solon et al. 1991; Björklund and Salvanes 2011), we can expect a further undocumented status similarity in siblings' educational attainment when considering that the social position of the family determines educational aspirations and choices (for example, Boudon 1974; Hodkinson and Sparkes 1997; Goldthorpe 2000; Lucas 2001), specifically that those with higher social positions tend to choose better and higher-status programs and schools. For example, the few women with highly educated parents who attained vocational education are probably likelier to have taken higher-status tracks, such as art programs. Because shared family background, including relative social position and educational aspirations, affects siblings' outcomes beyond what was captured, the status of one sibling's education program should tend to increase with the length of the other siblings' educational attainment. Consequently, the educational stratification of families presumably extends beyond what the current analysis has shown, underlining how the educational careers of offspring in families with the highest and lowest levels of parental education are 'worlds apart'.

Finally, previous research documented that sibling correlations in education are lower in Norway than in other countries (Björklund and Salvanes 2011; Ahsan et al. 2023), indicating larger differences between families and more similarity between siblings elsewhere. Future research could compare siblings' educational mobility across countries to gain greater insight into the cross-national differences in intergenerational educational mobility in families.

Notes

1. See LeMasters (1954) for an older discussion and qualitative study on the social mobility of entire family units versus differential mobility within the family.
2. For example, see Table 1 for the number of firstborns with maternal siblings in Norway.
3. A total 91.4% of the firstborns in the sibling pairs with information on educational attainment are born in Norway to Norwegian-born parents, 1.3% are born in Norway to two immigrant parents, and 4.5% are born in Norway to one immigrant parent. There is a weaker association between individuals' own and parents' education amongst those with immigrant parents than those with non-immigrant parents. The descendants of immigrants are much more likely to be intergenerationally mobile from the lower to the highest level of education. They are also more likely to be long-distance, downwardly educationally mobile, although few are so. The low numbers of siblings with immigrant parents limit the possibility of analyzing these siblings in greater detail.
4. There are few observations of women with highly educated parents attaining lower education, and the mentioned pattern might be peculiar to families in these cohorts. This is likely partially due to the fact that women with highly educated parents rarely stop at the compulsory level, which causes a higher ratio of individuals with specific conditions that hinder further schooling.
5. The sibling correlation in education has declined for mixed-sex siblings (Wiborg and Hansen 2018) as the gap between men's and women's educational attainment has increased. The results presented in the Supplementary data show that mixed-sex siblings are more often split between secondary and tertiary education. However, the statements extend to mixed-sex siblings.

Acknowledgements

Disclosure statement

Funding

ORCID

Stian A. Uvaag   http://orcid.org/0000-0003-2246-9689

References

Ahsan, Md Nazmul, M. Shahe Emran, Hanchen Jiang, Qingyang Han, and Forhad J. Shilpi. 2023. "Growing Up Together: Sibling Correlation, Parental Influence, and Intergenerational Educational Mobility in Developing Countries." Policy Research Working Paper 10285. The World Bank.

Alecu, Andreea, Håvard Helland, Johs Hjellbrekke, and Vegard Jarness. 2022. "Who You Know: The Classed Structure of Social Capital." *The British Journal of Sociology* 73 (3): 505–535. doi:10.1111/1468-4446.12945.

Barclay, Kieron J. 2018. "The Birth Order Paradox: Sibling Differences in Educational Attainment." *Research in Social Stratification and Mobility* 54: 56–65. doi:10.1016/j.rssm.2018.02.001.

Beller, Emily. 2009. "Bringing Intergenerational Social Mobility Research into the Twenty-First Century: Why Mothers Matter." *American Sociological Review* 74 (4): 507–528. doi:10.1177/000312240907400401.

Benin, Mary H., and David R. Johnson. 1984. "Sibling Similarities in Educational Attainment: A Comparison of Like-Sex and Cross-Sex Sibling Pairs." *Sociology of Education* 57 (1): 11–21. doi:10.2307/2112464.

Björklund, Anders, and Markus Jäntti. 2020. "Intergenerational Mobility, Intergenerational Effects, Sibling Correlations, and Equality of Opportunity: A Comparison of Four Approaches." *Research in Social Stratification and Mobility* 70: 100455. doi:10.1016/j.rssm.2019.100455.

Björklund, Anders, Lena Lindahl, and Matthew J. Lindquist. 2010. "What More Than Parental Income, Education and Occupation? An Exploration of What Swedish Siblings Get from Their Parents." *B.E. Journal of Economic Analysis & Policy* 10 (1): 1–40. doi:10.2202/1935-1682.2449.

Björklund, Anders, and Kjell G. Salvanes. 2011. "Education and Family Background: Mechanisms and Policies." In *Handbook of the Economics of Education*, edited by Eric A. Hanushek, Stephen Machin and Ludger Woessmann, 201–247. North-Holland, Amsterdam: Elsevier.

Black, Sandra E., Paul J. Devereux, and Kjell G. Salvanes. 2005. "The More the Merrier?: The Effect of Family Size and Birth Order on Children's Education." *The Quarterly Journal of Economics* 120 (2): 669–700. doi:10.1093/qje/120.2.669.

Blau, Peter M., and Otis Dudley Duncan. 1967. *The American Occupational Structure*. New York: John Wiley & Sons.

Boudon, Raymond. 1974. *Education, Opportunity, and Social Inequality: Changing Prospects in Western Society*. New York: Wiley.

Bourdieu, Pierre. 1984. *Distinction: A Social Critique of the Judgement of Taste*. London: Routledge & Kegan Paul.

Bourdieu, Pierre, and Loïc J. D. Wacquant. 1992. *An Invitation to Reflexive Sociology*. Cambridge: Polity Press.

Breen, Richard, and Jan O. Jonsson. 2005. "Inequality of Opportunity in Comparative Perspective: Recent Research on Educational Attainment and Social Mobility." *Annual Review of Sociology* 31 (1): 223–243. https://www.jstor.org/stable/29737718.

Breen, Richard, and Walter Müller. 2020. *Education and Intergenerational Social Mobility in Europe and the United States*. Stanford, CA: Stanford University Press.

Bukodi, Erzsébet, and John H. Goldthorpe. 2013. "Decomposing 'Social Origins': The Effects of Parents' Class, Status, and Education on the Educational Attainment of Their Children." *European Sociological Review* 29 (5): 1024–1039. doi:10.1093/esr/jcs079.

Bukodi, Erzsébet, and John H. Goldthorpe. 2021. "Meritocracy and Populism: Is There a Connection?." In *UKICE working paper 01/2021*.

Chan, Tak Wing, and John H. Goldthorpe. 2004. "Is There a Status Order in Contemporary British Society?" *European Sociological Review* 20 (5): 383–401. doi:10.1093/esr/jch033.

Conley, Dalton. 2004. *The Pecking Order: Which Siblings Succeed and Why*. New York: Pantheon Books.

Conley, Dalton. 2008. "What Do Low (or High) Sibling Correlations Tell Us About Social Ascription?" In *Social Stratification: Class, Race, and Gender in Sociological Perspective*, edited by David B. Grusky and (in collaboration with Manwai C. Ku and Szonja Szelényi), 3rd ed., 569–609. Boulder, CO: Westview Press.

Conley, Dalton, and Rebecca Glauber. 2005. "Sibling Similarity and Difference in Socioeconomic Status: Life Course and Family Resource Effects." In *NBER Working Papers 11320*. Cambridge, MA: National Bureau of Economic Research.

Devine, Fiona. 2004. *Class Practices: How Parents Help Their Children Get Good Jobs*. Cambridge: Cambridge University Press.

Domański, Henryk, and Dariusz Przybysz. 2007. "Educational Homogamy in 22 European Countries." *European Societies* 9 (4): 495–526. doi:10.1080/14616690701314119.

Downey, Douglas B. 1995. "When Bigger Is Not Better: Family Size, Parental Resources, and Children's Educational Performance." *American Sociological Review* 60 (5): 746–761. doi:10.2307/2096320.

Erikson, Robert, and John H. Goldthorpe. 2002. "Intergenerational Inequality: A Sociological Perspective." *Journal of Economic Perspectives* 16 (3): 31–44. doi:10.1257/089533002760278695.

Erikson, Robert, and Jan O. Jonsson. 1996. *Can Education Be Equalized? The Swedish Case in Comparative Perspective*. Boulder, CO: Westview Press.

Gillies, Val. 2005. "Raising the 'Meritocracy': Parenting and the Individualization of Social Class." *Sociology* 39 (5): 835–853. doi:10.1177/0038038505058368.

Goldthorpe, John H. 1980. *Social Mobility and Class Structure in Modern Britain*. Oxford: Clarendon Press.

Goldthorpe, John H. 1982. "On the Service Class, Its Formation and Future." In *Social Class and the Division of Labour: Essays in Honour of Ilya Neustadt*, edited by Anthony Giddens and Gavin Mackenzie, 162–185. Cambridge: Cambridge University Press.

Goldthorpe, John H. 2000. *On Sociology: Numbers, Narratives, and the Integration of Research and Theory*. Oxford: Oxford University Press.

Grätz, Michael, Kieron J. Barclay, Øyvind N. Wiborg, Torkild H. Lyngstad, Aleksi Karhula, Jani Erola, Patrick Präg, Thomas Laidley, and Dalton Conley. 2021. "Sibling Similarity in Education Across and Within Societies." *Demography* 58 (3): 1011–1037. doi:10.1215/00703370-9164021.

Hansen, Marianne Nordli. 1997. "Social and Economic Inequality in the Educational Career: Do the Effects of Social Background Characteristics Decline?" *European Sociological Review* 13 (3): 305–321. doi:10.1093/oxfordjournals.esr.a018220.

Hauser, Robert M., and Peter A. Mossel. 1985. "Fraternal Resemblance in Educational Attainment and Occupational Status." *American Journal of Sociology* 91 (3): 650–673. doi:10.1086/228317.

Hauser, Robert M., and William H. Sewell. 1986. "Family Effects in Simple Models of Education, Occupational Status, and Earnings: Findings from the Wisconsin and Kalamazoo Studies." *Journal of Labor Economics* 4 (3, Part 2): S83–S115. doi:10.1086/298122.

Hertz, Tom., Tamara Jayasundera, Patrizio Piraino, Sibel Selcuk, Nicole Smith, and Alina Verashchagina. 2008. "The Inheritance of Educational Inequality: International Comparisons and Fifty-Year Trends." *The B.E. Journal of Economic Analysis & Policy* 7 (2): 1–48. doi:10.2202/1935-1682.1775.

Hodkinson, Phil, and Andrew C. Sparkes. 1997. "Careership: A Sociological Theory of Career Decision Making." *British Journal of Sociology of Education* 18 (1): 29–44. doi:10.1080/0142569970180102.

Hällsten, Martin, and Max Thaning. 2022. "Wealth as One of the "Big Four" SES Dimensions in Intergenerational Transmissions." *Social Forces* 100 (4): 1533–1560. doi:10.1093/sf/soab080.

Irwin, Sarah. 2018. "Parenting Teenagers as They Grow up: Values, Practices and Young People's Pathways beyond School in England." *The Sociological Review* 66 (1): 241–256. doi:10.1177/0038026117691718.

Irwin, Sarah, and Sharon Elley. 2011. "Concerted Cultivation? Parenting Values, Education and Class Diversity." *Sociology* 45 (3): 480–495. doi:10.1177/0038038511399618.

Joensen, Juanna Schrøter, and Helena Skyt Nielsen. 2018. "Spillovers in Education Choice." *Journal of Public Economics* 157: 158–183. doi:10.1016/j.jpubeco.2017.10.006.

Kalmijn, Matthijs. 2006. "Educational Inequality and Family Relationships: Influences on Contact and Proximity." *European Sociological Review* 22 (1): 1–16. doi:10.1093/esr/jci036.

Laumann, Edward O. 1966. *Prestige and Association in an Urban Community: An Analysis of an Urban Stratification System*. Indianapolis, IN: Bobbs-Merrill.

LeMasters, Ersel E. 1954. "Social Class Mobility and Family Integration." *Marriage and Family Living* 16 (3): 226–232. doi:10.2307/348495.

Lucas, Samuel R. 2001. "Effectively Maintained Inequality: Education Transitions, Track Mobility, and Social Background Effects." *American Journal of Sociology* 106 (6): 1642–1690. doi:10.1086/321300.

Lucas, Samuel R. 2017. "An Archaeology of Effectively Maintained Inequality Theory." *American Behavioral Scientist* 61 (1): 8–29. doi:10.1177/0002764216682989.

Mallman, Mark. 2017. "Not Entirely at Home: Upward Social Mobility and Early Family Life." *Journal of Sociology* 53 (1): 18–31. doi:10.1177/1440783315601294.

Miller, Robert. 1998. "The Limited Concerns of Social Mobility Research." *Current Sociology* 46 (4): 145–163. doi:10.1177/0011392198046004010.

Pfeffer, Fabian T. 2008. "Persistent Inequality in Educational Attainment and Its Institutional Context." *European Sociological Review* 24 (5): 543–565. doi:10.1093/esr/jcn026.

Pfeffer, Fabian T., and Martin Hällsten. 2012. *Mobility Regimes and Parental Wealth: The United States, Germany, and Sweden in Comparison.* St. Louis: Federal Reserve Bank of St Louis.

Savage, Mike. 2000. *Class Analysis and Social Transformation*. Buckingham: Open University.

Sieben, Inge. 2001. "Sibling Similarities and Social Stratification: The Impact of Family Background Across Countries and Cohorts." ICS diss., Radboud University, Nijmegen.

Solon, Gary, Mary Corcoran, Roger Gordon, and Deborah Laren. 1991. "A Longitudinal Analysis of Sibling Correlations in Economic Status." *The Journal of Human Resources* 26 (3): 509–534. doi:10.2307/146023.

Sweetser, Dorrian A. 1975. "Education and Privilege: Analysis of Sibling Occupational Mobility." *Acta Sociologica* 18 (1): 23–35.

Thompson, Paul. 1993. "Family Myth, Models, and Denials in the Shaping of Individual Life Paths." In *Between Generations: Family Models, Myths and Memories*, edited by Daniel Bertaux and Paul Thompson, 13–38. Oxford: Oxford University Press.

Thomsen, Jens-Peter, Emil Bertilsson, Tobias Dalberg, Juha Hedman, and Håvard Helland. 2016. "Higher Education Participation in the Nordic Countries 1985–2010—A Comparative Perspective." *European Sociological Review* 33 (1): jcw051. doi:10.1093/esr/jcw051.

van der Vleuten, Maaike, Jeroen Weesie, and Ineke Maas. 2020. "Sibling Influence in Field of Study Choices." *Research in Social Stratification and Mobility* 68: 100525. doi:10.1016/j.rssm.2020.100525.

Weber, Max. 1978. *Economy and Society: An Outline of Interpretive Sociology*. Berkeley, CA: University of California Press.

Whiteman, Shawn D., Susan M. McHale, and Ann C. Crouter. 2007. "Competing Processes of Sibling Influence: Observational Learning and Sibling Deidentification." *Social Development* 16 (4): 642–661. doi:10.1111/j.1467-9507.2007.00409.x.

Wiborg, Øyvind N., and Marianne N. Hansen. 2018. "The Scandinavian Model during Increasing Inequality: Recent Trends in Educational Attainment, Earnings and Wealth among Norwegian Siblings." *Research in Social Stratification and Mobility* 56: 53–63. doi:10.1016/j.rssm.2018.06.006.