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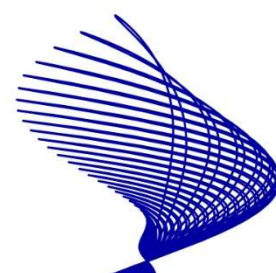
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Abstract

This paper assesses the extent to which the associations between social origins and long-term educational and labor market outcomes are mediated through educational differentiation in secondary education. We compare seven mostly European countries with different secondary education systems. We argue that a simple distinction between comprehensive systems and systems with formal between-school tracking might hide country-specific patterns of educational sorting. Instead, we suggest that even in educational systems that are usually classified as comprehensive, functional equivalents to tracking exist that also mediate the association between social origins and destinations. By drawing on national longitudinal data sets that span over individual life-courses from secondary education to occupational maturity, we provide analyses of each (partial) association in the O-E-D triangle (origins – education – destinations) of social mobility. Even though we find some between-country variation in the strength of the association between social origins and destinations, the relative role of differentiation in secondary education is remarkably similar when we take into account the country-specific approaches to educational sorting.

Keywords: Educational systems; educational tracking; educational differentiation; educational sorting; country comparison; social inequality; social mobility; labor market outcomes.

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Acknowledgments

Introduction

One of the central concerns in research on social mobility and stratification is how institutional settings influence the association between social origins and destinations. In light of the decisive role that education plays in processes of social mobility, the design of educational systems has attracted much attention (Breen and Jonsson, 2005; Hout and DiPrete, 2006). A key variable that has been identified as a relevant feature of educational systems is their level of educational differentiation: the separation of students into different groups, tracks or streams for instructional purposes according to skills or other qualitative criteria (cf. Sørensen, 1970). In almost all educational systems, this separation, often simply referred to as tracking, takes place in secondary education.

Much of the earlier literature on the topic appears to conclude that between-school tracking in secondary education fosters higher levels of social inequality than comprehensive schooling (cf. Esser, 2016). However, this interpretation has been contested. For instance, Brunello and Checchi (2007) argue that much of the research contributing to this conclusion has focused on early educational outcomes (e.g., PISA test results around the age 15), whereas the relevant intergenerational inequalities are observed in the outcomes that are stabilized much later in the life-course. Indeed, in the literature focusing on the long-term outcomes, the results on the importance of tracking are more mixed (Heisig et al., 2019; van de Werfhorst, 2019; Dustmann et al., 2017; Brunello and Checchi, 2007). On the other hand, Triventi et al. (2016) observe that educational differentiation appears in basically all educational systems – no matter whether they are commonly classified as comprehensive or as tracked. Thus, a more detailed consideration of country-specific forms of differentiation in secondary education may reveal more cross-country similarity in the extent to which secondary education determines later-life social inequality than has been assumed.

This paper addresses these two shortcomings of the literature and considers the role of differentiation in secondary education associated with social inequality in later-life outcomes. We make three contributions to the literature. First, we link educational differentiation in secondary education to long-term outcomes, such as final educational attainment and labor market outcomes at occupational maturity. Second, we measure the most salient form of upper secondary educational differentiation within each country. Third, we use a standardized research design, which relies on high-quality life-course data from each country. We examine seven countries that represent different educational differentiation regimes: Denmark, England, Finland, France, Germany, Israel, and Italy. To assess the role of educational differentiation in each country, we provide descriptive analyses for each association in the social mobility triangle between origin (O), education (E) and destination (D).

Previous findings

Research on the relationship between educational stratification and social inequality is heavily influenced by the country-comparative literature on between-school tracking (e.g. Hanushek and Wößmann, 2006; van de Werfhorst and Mijs, 2010). This literature usually compares countries that pursue between-school tracking with countries that have established comprehensive schooling in lower secondary education. The evidence emanating from these studies is that, whereas between-school tracking does not increase average learning outcomes, it is associated with higher levels of social inequality in school achievement (Esser, 2016). A cursory reading of these findings could suggest that tracked school systems go along with more disadvantages compared to comprehensive schooling systems, while they do not provide any advantages. However, recent studies argue that such global conclusions may be premature for at least two reasons.

First, some studies emphasize issues relating to the early measurement of outcomes in these studies (cf. Brunello and Checchi, 2007). Most of the conventional studies base their analyses on PISA data, which include measures of students' competences around the age 15, not their final educational attainment or labor market outcomes. In addition, although many educational systems pursue differentiation in upper secondary education, PISA measures learning outcomes at a point in the educational trajectory when many of these educational systems still are comprehensive. Hence, by relying on early phases of the educational trajectory, these studies run the "risk of not giving tracking enough time to work out its effects" (Brunello and Checchi, 2007: 788). Results from studies considering long-terms outcomes, such as educational attainment or labor market outcomes, are more diverse. While some are in line with results from the conventional literature (Pfeffer, 2008; Reichelt et al., 2019; Brunello and Checchi, 2007; Hadjar and Becker, 2016), others are not (Vogtenhuber, 2018; Ballarino et al., 2016).

Second, some studies argue that the conceptualization of educational differentiation in the conventional literature is too stylized. As Triventi et al. (2016) convincingly demonstrate, varieties of educational differentiation exist in all secondary education systems. A binary distinction that is based on formal between-school tracking in lower secondary education might thus be too crude to uncover cross-national variation in educational sorting. In comparison to previous studies relying on cross-sectional data and crude country-level indicators of educational stratification, Triventi et al. (2016) base their conclusions on a large number of country studies with country-specific life-course data. This allows for more detail and precision in detecting idiosyncratic modes of educational differentiation. Similarly, Blossfeld et al. (2016) conclude that each educational system pursues some sort of educational differentiation in secondary education that determines later-life outcomes and, hence, shapes social reproduction. For instance, a simple differentiation between comprehensive schooling and between-school tracking in secondary education masks a substantial degree of educational differentiation that operates beyond formal categories of stratification (also cf. Lucas and Berends, 2002). However, given a lack of standardized analyses, it remains unclear to what extent the contribution of educational differentiation to long-term inequality differs between the various national types of stratification.

Expected findings

Our study comprises seven countries that represent different educational differentiation regimes. Following the classification by Triventi et al. (2016), these regimes are: (1) the early-tracking model (Germany) with formal and selective between-school tracking in lower secondary education; (2) the Nordic inclusive model (Denmark, Finland) with late tracking and a general formal two-track system for vocational or academic upper secondary education; (3) the individual choice model (England) without formal between-school tracking throughout upper secondary education; and (4) the mixed tracking model (France, Israel, Italy) with more than two options in upper secondary education.

The extent to which educational differentiation in secondary education mediates the association between social origins and destinations depends on two factors. First, the strength of the association between social origins and individuals' upper secondary school track placement. Second, the extent to which upper secondary school track placement predicts social destinations. We analyze the mediating role of educational differentiation in each of the seven countries guided by the following questions:

1) To what extent are social origins associated with upper secondary school track placement?
2) To what extent is upper secondary school track placement predictive of later-life educational and labor market outcomes?
3) To what extent does upper secondary school track placement mediate the association between social origins and later-life educational and labor market outcomes?

Association between social origins and educational differentiation

The common assumption about the association between social origins and educational participation is that educational systems that pursue early between-school tracking produce higher levels of educational inequality than late-tracking or comprehensive school systems. This argument can be derived from the life-course hypothesis (Müller and Karle, 1993), which postulates that influences of the family are stronger at early educational transitions. However, this argument neglects that informal ways of educational sorting can fulfill functional equivalents in those educational systems that do not formally track their students in early phases of secondary education. Following the theory of 'effectively maintained inequality' (EMI, Lucas, 2001), we stipulate that if such alternative channels of differentiation exist, social inequalities may materialize along these lines. Further, even in formally tracked systems, we expect that early track placement is less predictive of long-term outcomes if tracking is not rigid (cf. Sørensen, 1970). Early tracking systems usually allow for correction processes and track mobility in the course of the educational career (Dustmann et al., 2017; Jacob and Tieben, 2009). If such processes are common, then the potential of early tracking to account for educational inequalities is quite limited. To the extent that functional equivalents of sorting exist in late tracking systems and tracking is non-rigid in early tracking countries, we expect that the association between social origins and educational sorting in upper secondary

education is more similar across educational systems than commonly assumed. Thus, insofar as we properly identify the relevant country-specific differentiation schemes in secondary education, we expect the associations between social origin and educational participation to be similar across countries.

Association between educational differentiation and social destination

As to the association between education and social destinations, previous research shows that labor market outcomes have a tighter linkage to educational credentials in stratified educational systems (Müller and Gangl, 2003; Shavit and Müller, 1998; DiPrete et al., 2017). Scholars explain this finding in terms of stratified systems providing more vocationally specific training during formal education, while specific skill production largely occurs more in the labor market in less stratified systems. Therefore, formal credentials convey specific human capital in stratified systems, which creates a tighter linkage to labor market opportunities. However, following the idea that every educational system pursues some more or less visible forms of educational differentiation, we expect that even in educational systems that are formally classified as non-tracked, functional equivalents that are predictive of later-life labor market outcomes might exist. Even if in these systems formal credentials do not represent specific human capital to the same extent as in stratified systems, other forms of educational differentiation can still provide signals (e.g. cognitive ability, motivation or trainability) that are decisive for access to different occupational trajectories. Thus, we expect that differences between educational systems are less pronounced than commonly assumed in the literature. We expect that the predictive power of placement in a country's secondary educational differentiation scheme is similar across countries once the relevant dimension of educational sorting is properly identified and measured.

The mediating role of differentiation in secondary education

With regard to the role of educational differentiation in mediating the association between social origins and destinations, we expect that to the extent that the origins-education and education-destinations associations show a high level of similarity among different educational systems, the mediating role of educational differentiation should also show little country variation. We expect that countries do not differ substantially in the role that differentiation in secondary education plays in shaping long-term social inequality once we factor in the relevant dimensions of educational differentiation.

Description of countries and data

Since we analyze long-term labor market outcomes at occupational maturity, we restrict our analyses to birth cohorts for which we can observe such outcomes. Because countries differ slightly with respect to the point in the career when people commonly reach occupational maturity, we follow country-specific definitions, which are also partly dependent on data

availability. The definitions of occupational maturity range between 30 and 42 years. In all countries, the individuals under investigation are born between 1970 and 1980. The only exception is Italy, where – as a result of data availability – analyses can only be conducted based on cohorts born between 1958 and 1967. While we only summarize the key features of these educational systems here, a detailed description can be found in a series of country reports (Birkelund et al., 2019; Casada-Munsech and Boliver, 2019; Facchini et al., 2019; Heiskala and Erola, 2019; Henninges et al., 2019; Herbaut et al., 2019).[2] Table 1 provides a comparative summary of educational differentiation in the various countries, while Table 2 gives an overview of sample sizes and available measurements in the national data sets.

Table 1. Differentiation in lower and upper secondary education, grade and age of enrollment

Country	Start of lower secondary education			Start of upper secondary education		
	type of differentiation	grade	age	type of differentiation	grade	age
Denmark	none	8	14	between and within	10/11	16–17
England	between and within	7	11	between and within	12	16–17
Finland	none	7	13	between and within	10	15–16
France	between and within	6	11	between and within	10	15
Germany	between	5	10	between	10	15–16
Israel	none	7	12	mostly within	10	15–16
Italy	none	6	11	between	9	14–15

Denmark

The Danish educational system does not show any noteworthy differentiation in lower secondary education for the birth cohort studied here (except course-based within-school ability grouping, which was abolished in 1993). Formal differentiation starts with upper secondary education (grade 10), when pupils either leave school or attend an academic or vocational track. The academic track (Gymnasium) is characterized by further within-differentiation: the traditional academic track (STX), the mercantile track (HHX), and the technical track (HTX). In addition, a two-year late-starter track (HF) also exists. Within the traditional academic STX-track, students have some degree of freedom in configuring their courses according to their preferences (social science, science, language, and arts).

We base the empirical analyses of the Danish educational system on population data from the Danish administrative registers, more specifically the entire 1975 birth cohort. We code the differentiation in upper secondary education in accordance with the above-mentioned tracking structure, and distinguish two overall versions of tracking. First, a broad version that differentiates between academic, vocational or no upper secondary education. Second, a detailed version that factors in the tracking structure within the academic track and even distinguishes between math and language dominated configurations of the STX track (cf. Table 2). We measure the track attendance of students both as their enrolment in upper secondary education (one and a half years after ninth grade) and as their track of upper secondary

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[2] All reports are accessible via https://dynamicsofinequality.org/publication_type/country-study/

completion. We use measures of educational and occupational attainment when respondents are 40 years old.

England

The secondary education system in England is a nominally comprehensive one following the phasing out of academic selection at age 11 during the late 1960s and early 1970s. That said, around five percent of all pupils aged 11-15 still attend academically selective grammar schools (Bolton, 2016), a further seven percent attend fee-paying private schools (Green et al., 2017), and many comprehensive schools pursue within-school differentiation through ability grouping in Maths and English (Francis et al., 2017). Pupils who stay on in upper secondary education can choose to pursue academic qualifications known as A-levels (Advanced-levels, KS5) - usually specializing in three curriculum subjects - while others pursue vocational qualifications such as National Vocational Qualifications (NVQs) or Business and Technology Education Council (BTECs) - usually in a single subject – although some pursue a combination of the two (for example, one A-level and a BTEC qualification). Progression to the academic route in upper secondary education tends to be restricted to higher achievers in GCSE and equivalent qualifications, whereas vocational study programs at upper secondary level are more accessible to low achievers at GCSE

The analyses in this paper are based on the British Cohort Study 1970 (BCS70) data, which follows over time a representative sample of people born in the UK in the same week in 1970. We distinguish between those who gained at least two A-level qualifications at upper secondary level in contrast to those with one or no A-levels. Indicators of educational attainment or occupational placement are measured when respondents were 42 years old.

Finland

With comprehensive schooling until grade 9, the Finnish educational system does not comprise any formal differentiation in lower secondary education. In upper secondary education, the Finnish school system follows between-school tracking after grade 9. While about 12 percent of the pupils leave school, roughly equal shares of the rest enter either vocational or general upper secondary schools. In addition to formal within-school tracking in vocational upper secondary education, Finnish lower and general upper secondary schools are also characterized by informal within-school differentiation through course-based subject specialization and electives. All upper secondary degrees give eligibility to apply to universities and universities of applied sciences, so the rigidity of tracking in the Finnish educational system is loose.

The empirical analyses of the Finnish educational system are based on full population data from Finnish administrative registers and relate to the birth cohort 1975. Unfortunately, the data do not contain information on within-school differentiation in upper secondary education. The analyses will distinguish whether pupils left school after lower secondary education or completed upper secondary education either at a vocational or academic school. Indicators for educational and occupational attainment are measured when respondents were 35-40 years old.

France

The French lower secondary educational system is characterized by comprehensive schooling until grade 9. Despite the absence of formal differentiation, there are several channels of informal differentiation that might already pave the way for later sorting. Formal tracking begins in upper secondary education with grade 10 when pupils attend a vocational high school or a general and technological high school. At the end of 10th grade, students in academic and technological high school further choose between an academic or a technological track. The vocational track can either be completed with a vocational qualification or with an upper secondary degree that provides eligibility for higher education. The academic, technological and vocational tracks can lead to upper secondary degrees (*baccalauréat*) granting higher education eligibility. All tracks are characterized by within-differentiation as they provide several streams of subject specialization. In addition to these formal aspects of differentiation, French upper secondary education also shows some informal ways of sorting, such as the divide between public and private schools, elite and standard institutions or urban segregation.

The empirical analyses of the French educational system are based on the survey "Formation et Qualification Professionnelle 2014-2015" (FQP 2015) and cover the birth cohorts 1970–79. Unfortunately, the data do not contain information on informal differentiation in upper secondary education, but they cover detailed aspects of all formal tracks and streams. In a broad version, the analyses distinguish between students who did not attain more than lower secondary education, students who completed a short vocational qualification and students who attained an upper secondary degree in the vocational, technical or general track. In a more detailed version, students who completed the general upper secondary track are further divided according to their stream of specialization: literature, economics and social sciences, scientific or other. Indicators for educational and occupational attainment are measured when respondents were 35–45 years old.

Germany

The German educational system is the prime example of an educational system with early between-school tracking. Formal tracking already starts at the beginning of lower secondary education. Usually at age 10 (grade 5), students either attend one of three hierarchical school tracks or a comprehensive school. While only the academic track (Gymnasium) in the tracked school system or a corresponding stream in the comprehensive school system ends with eligibility for higher education, the German educational system offers opportunities for educational upgrading or track mobility. Beyond formal tracking, there is no noteworthy dimension of informal differentiation.

The analyses of the German educational system are based on the adult cohort (starting cohort 6) of the National Educational Panel Study (NEPS SC6) and cover the birth cohorts 1970–80. Tracking is coded according to the three formal tracks: lower, intermediate and upper secondary. Students in comprehensive schools have been assigned to one of these categories according to their streams or aspired certificates. Two measurement points are provided. The first is track attendance at age 17, which approximates track attendance at the beginning of upper secondary education. The second is the highest track completed at the age of 22.

Indicators for educational and occupational attainment are measured when respondents were 35 years old.

Israel

In the second half of the twentieth century, the Israeli education system had undergone a series of reforms that aimed at reducing social inequality through structural changes that both expanded learning opportunities and replaced rigid top-down sorting and tracking of students with concepts of curricular differentiation and student choice. Thus, while the Israeli education system was originally created according to the Continental model of specialized schools (i.e. between school tracking), since the 1980's most students attend comprehensive schools that offer a large variety of academic and vocational specializations (i.e. within school tracking).

The analyses of the Israeli education system are based on information from the 1995 Israel population census combined with newer administrative data from the Ministry of Education, tertiary education institutions and Israeli income tax files. It includes a representative sample of 20 percent of all Israelis born between 1978 and 1981. Students in ultra-orthodox schools and first-generation immigrants were excluded from the analysis. Within the informal system of curricular differentiation, we identify five main 'tracks': (1) Advanced STEM –the most prestigious and selective track in Israeli high schools; (2) Regular academic - students in this track can choose from a large variety of advanced subjects from the natural sciences, social sciences, humanities and arts. (3) Basic academic - most students in this track are placed in remedial programs with limited choice of advanced subjects. (4) Advanced technological – similar to the full academic track in regards to future enrollment in an academic institution, but also provides students with technological training with high demand in the labor market. (5) Vocational – provides students with vocational training in various subjects but also enables them to attain a matriculation diploma that allows access to less selective academic degrees. A sixth category includes those who did not matriculate and therefore we do not have information on their track placement. Occupational attainment (income) is measured at age 34.

Italy

The Italian lower secondary educational system comprises comprehensive schooling until grade 8. During that phase, there is hardly any additional source of notable informal differentiation between or within schools. Formal between-school tracking in upper secondary education begins with grade 9, when students attend one of three main branches (academic, technical or vocational), which differ in their curricula and academic requirements. In addition to these main branches, schools also differ in their areas of specialization within tracks. Academic tracks offer multiple streams (e.g. humanistic, scientific, linguistic or artistic). Within the technical and vocational tracks, schools have two main streams, either commercial or industrial, which comprise multiple curricula relating to specific sectors or occupations. In addition to these formal dimensions of between-school sorting, there is also a more informal differentiation through school prestige among the academic upper secondary schools, at least in large cities.

The analyses on the Italian educational system are based on the Italian Household Longitudinal Study (IHLS) and cover the birth cohorts 1958–67. The analyses comprise both

measures of first track enrolment and track completion. Two versions of differentiation in the completion of upper secondary education will be distinguished: a broad version differentiates between vocational, technical and academic schools. A more detailed version adds the curricular streams within these three tracks (cf. Table 2). Within the academic track, scientific, classical and other streams will be distinguished, while in the other school tracks commercial and industrial streams will be differentiated. Indicators for occupational attainment are measured when respondents were 30–40 years old.

Table 2. Description of country-specific data and measurement

Country and data	Cohorts	Educational differentiation in upper secondary education	Measurement points	Age occ. maturity

Denmark
 	
Population data from Danish administrative registers
N=67,214
	1975	▪ No upper secondary
		▪ Vocational
		▪ Academic - STX, Math
		             - STX, Language
		             - HF (2 year progr.)
		             - HHX (Mercantile)
		             - HTX (Technical)
			▪ 1st enrolment (age 17)
			▪ Completion
				40

England
 	
British Cohort Study 1970 (BCS70)
N=6,410 parental class;
N=7,717 parental education
	1970	▪ First sec. school placement
		  - comprehensive school
		  - secondary modern school
		  - grammar school
		  - Independent school
		  - other school
		▪ Upper secondary completion
		  - no or less than 2 A-levels
		  - 2 or more A-levels
			▪ Completion	42

Finland Population data from Finish administrative registers N=64,944	1975	▪ No upper secondary ▪ Vocational ▪ Academic	▪ Completion	35–40

France
 	
Formation et Qualification Professionnelle 2014–2015 (FQP 2015)
N=5,735 parental class;
N=5,199 parental education
	1970–79	▪ Lower secondary or less
		▪ Vocational
		▪ BAC Vocational
		▪ BAC Technical
		▪ BAC General - Literature
		                  - Economics
		                  - Scientific
		                  - other
			▪ Completion	35–45

Germany National Educational Panel Study Starting Cohort 6 (NEPS SC6) N=785 (income N=492)	1970–80	▪ Lower secondary ▪ Intermediate secondary ▪ Upper secondary	▪ 1st enrolment (age 17) ▪ Completion (age 22)	35
Israel 1995 population census, ministry of education files, tax registry, higher education files, N=42,594	1978–81	Upper secondary: ▪ Advance STEM ▪ Regular Academic ▪ Basic Academic (remedial) ▪ Advanced technological ▪ Vocational	▪ Completion	34

Italy
 	
Italian Household Longitudinal Study (IHLS)
N=1,390
	1958–67	▪ Vocational - Commercial
		                - Industrial
		▪ Technical - Commercial
		                - Industrial
		▪ Academic - Scientific
		                - Classical
		                - Other
			▪ Completion	30–40

Analytical approach

In the empirical analyses, we proceed in three sequential steps to compare the role of educational differentiation in the association between social origins and destinations in the seven countries.

The first step examines the association between social origins and placement in upper secondary education. For each country, we estimate multinomial logistic regressions to predict placement in its secondary educational differentiation scheme with social origins. Because we want to compare the extent to which social origin is able to account for placement in secondary education across the countries, we rely on model fit from models without further control variables. In all models with nonlinear outcome variables, we rely on McFadden pseudo-R^2 as a measure of model fit.[3]

The second step analyzes the predictive power of placement in upper secondary education for final educational attainment and labor market outcomes at occupational maturity. Again, we want to know to what extent we can account for variation in later-life outcomes in the different countries just by knowing the placement in secondary education. For binary outcomes, we estimate logistic regressions and for metric outcomes, we estimate linear regressions. As predictors, we use sets of dummy variables indicating the country-specific differentiation schemes in upper secondary education. Depending on the model type, we use McFadden pseudo-R^2 values or conventional coefficients of determination values, R^2, to compare the model fits between countries.

The third step examines the extent to which educational differentiation mediates the association between social origins and longer-term educational and labor market outcomes. For all outcomes, we estimate linear probability models (following Breen et al., 2018). In a baseline model, we use social origins as the only predictor. In the full model, we add a set of dummy variables indicating individuals' upper secondary track placements. We use the relative reductions in the coefficients of the social origin variable between the two models as an indicator of the extent to which placement in upper secondary education mediates the association between social origins and long-term outcomes. All analyses are descriptive and compare the respective gross associations between countries. We do not add any further control variables, because we want to assess the role of differentiation in secondary education in total.

We have harmonized key variables across countries to the best degree possible, and we apply two measures of social origin. The first one is based on the EGP class of origin (Erikson and Goldthorpe, 1992) and distinguishes six classes, following the dominance approach (Erikson, 1984): salariat (I+II), non-manual classes (IIIa+b), self-employed in non-agricultural (IVa+b) and in agricultural occupations (IVc), skilled (V+VI) and unskilled (VIIa+b) working class.[4] The second is based on parents' highest level of education and distinguishes three categories: lower secondary or less, upper secondary and tertiary education.

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[3] We are aware that the McFadden pseudo-R^2 is a very crude measure for the comparison of the predictive power between different samples. Nevertheless, it should be able to point to substantial differences in model fit between countries. We will further test the robustness of the findings in our ongoing research efforts.

[4] In the English dataset, it is not possible to recode EGP classes. Instead, a classification based on Registrar-General's Social Classes is applied: I Professional occupations; II Managerial and technical occupations; IIIN Skilled non-manual occupations; IIIM Skilled manual occupations; IV Partly-skilled occupations; V Unskilled occupations. See an

Educational differentiation in secondary education follows the country-specific recodes described above. For all countries, we are able to measure track placement at the time when students complete upper secondary education. In addition, for some countries (Denmark, England, Germany, and Italy), we are able to measure track placement at the time of upper secondary enrolment. Three countries (Denmark, France, and Italy) present analyses based on both broad and detailed measures of upper secondary differentiation.

We present analyses related to different long-term outcomes. As a measure of final educational attainment, we rely on a dichotomous variable indicating whether the person attained higher education or not. In those countries that have different tiers in higher education, we present additional analyses based on a dichotomous variable indicating whether the person attained a degree from the higher tier (e.g. university). We consider different indicators of labor market outcomes at occupational maturity: 1) social status as measured through ISEI (Ganzeboom et al., 1992), 2) log-annual gross earnings, 3) different dichotomous variables based on EGP: a) higher salariat class (EGP I) vs. others, b) salariat class (EGP I+II) vs. others, c) working class (EGP V+VI+VII) vs. others, d) unskilled working class (EGP VII) vs. others. The EGP-based indicators are available in all countries but Israel. ISEI is available in Denmark, Finland and Germany. Earnings are available for all countries except England and Italy.

Analyses

Association between social origins and placement in the educational differentiation scheme

To what extent can social origins account for the variation in each country's most relevant formal differentiation scheme in upper secondary education? To answer this question, we compare across countries the McFadden's pseudo-R^2 values from a regression of upper secondary track placement on social origins (without any additional control variables).

Table 3 summarizes the results. The upper panel refers to the analyses in which parents' education is our measure of social origin. As all countries provide a measure of track placement when students complete upper secondary education, we first compare the respective pseudo-R^2 values for this outcome variable. In all countries, the values are rather low and range between 0.04 and 0.09. Thus, parents' education is only modestly able to account for the educational stream that students attend when completing upper secondary education. The comparatively higher level in Germany is in line with previous literature, which finds that early tracking enhances educational inequality. However, Italy as a later-tracking country and England as a non-tracking country have similarly high pseudo-R^2 values. The late-tracking countries (Denmark, France and Finland) have the lowest values.

approximate correspondence with NS-SEC at http://www.marketsegmentation.co.uk/downloads/Socio-economic%20Classification%20-%20United%20Kingdom.pdf

Table 3. Percent of variation in upper secondary track attendance accounted for by social background (McFadden Pseudo-R^2)

Indicator of social background timing of track attendance	DK broad	DK detail	ENG[#]	FIN	FRA broad	FRA detail	GER[##]	IL	ITA broad	ITA detail
Parents' education										
first upper secondary track placement	0.05	0.04	0.05	-	-	-	0.08	-	0.07	0.06
track of secondary completion	0.06	0.04	0.09	0.06	0.06	0.05	0.08	0.04	0.08	0.07
Parents' social class										
first upper secondary track placement	0.05	0.04	0.06	-	-	-	0.09	-	0.08	0.07
track of secondary completion	0.05	0.04	0.09	0.04	0.06	0.04	0.10	0.02	0.08	0.07

Notes: [#]values for first upper secondary track in England are measured at age 16; [##]values for Germany are for track attendance/completion at age 17 and 22.

Table 3 also provides additional insights. For the countries that applied both broad and detailed measures of educational differentiation (Denmark, France and Italy) the differences in the pseudo-R^2 values are quite small. Still, the pseudo-R^2 values are always lower in the detailed version. Second, some countries (Denmark, England, Germany and Italy) provide analyses in which track placement is measured when students enroll in upper secondary education. The respective pseudo-R^2 values are quite similar to those of secondary track completion - except for England, where the measurement of educational differentiation deviates from that of secondary completion. This indicates that in England differentiation according to A-levels might be more relevant for social inequality than differentiation by educational institutions.

The lower panel of Table 3 reports results for analyses in which social class is the indicator of social origins. Although the general pattern is quite similar to results based on parental education, we emphasize that the pseudo-R^2 values for Germany are slightly higher, while the values for Finland and Israel are slightly lower.

Given the generally rather low pseudo-R^2-values, we conclude that differences between countries in the extent to which social origins account for selection into upper secondary educational streams are not very pronounced. To formally test for country differences and similarities, we conducted pairwise two-sample t-tests between all countries that are based on bootstrapped standard errors of the pseudo-R^2-values. Most of the differences are indeed statistically significant (cf. appendix, Table A1). However, the pseudo-R^2-values related to the stream of secondary education completion are not significantly different between England, Germany and Italy, which represent completely different approaches to formal tracking. This might be a hint that our more detailed conception of educational differentiation uncovers dimensions educational inequality that remain unnoticed by conventional conceptions of educational stratification.

Association between differentiation in upper secondary education and long-term education and labor market outcomes

As a next step, we consider how predictive differentiation in upper secondary education is for destinations measured in terms of long-term educational and labor market outcomes. As in the previous analysis, we rely on the model fit to evaluate the extent to which the country-specific indicators of educational differentiation account for the variation in the outcome variables. Table 4 presents the results.

The upper panel of the table contains the results from analyses in which we use track placement at the beginning of upper secondary education as a predictor. This indicator is available for Denmark, England, Germany and Italy. The lower panel of the table contains results that emerge when we use the stream to which students belonged when they completed their upper secondary education as predictor. This indicator is available for all countries.

Table 4. Percent of variation in long-term outcomes explained by upper secondary track attendance (R^2 and McFadden Pseudo-R^2)

Timing of track attendance outcome	DK broad	DK detail	ENG[#]	FIN	FRA broad	FRA detail	GER[##]	IL	ITA broad	ITA detail
First upper secondary track										
higher education completion	0.20	0.22	0.08	-	-	-	0.31	-	0.25	0.30
university (or higher-tier) completion	0.19	0.24	0.09	-	-	-	0.34	-	-	-
EGP I	0.10	0.12	0.03	-	-	-	0.08	-	0.08	0.11
EGP I+II	0.12	0.14	0.03	-	-	-	0.09	-	0.11	0.17
EGP V+VI+VII	0.15	0.15	0.02	-	-	-	0.16	-	0.14	0.15
EGP VIIab	0.10	0.10	0.01	-	-	-	0.17	-	0.07	0.09
ISEI	0.20	0.22	-	-	-	-	0.23	-	-	-
earnings	0.06	0.07	-	-	-	-	0.06	-	-	-
Track of secondary completion										
higher education completion	0.27	0.30	0.26	0.20	0.52	###	0.43	0.20	###	###
university (or higher-tier) completion	0.22	0.29	0.27	0.25	0.39	###	0.30	0.21	-	-
EGP I	0.11	0.14	0.07	0.11	0.19	0.22	0.10	-	0.09	0.12
EGP I+II	0.15	0.18	0.08	0.17	0.25	0.26	0.13	-	0.14	0.20
EGP V+VI+VII	0.19	0.19	0.04	0.12	0.12	0.13	0.18	-	0.15	0.16
EGP VIIab	0.14	0.14	0.01	0.07	0.14	0.14	0.16	-	0.08	0.08
ISEI	0.24	0.27	-	0.25	-	-	0.28	-	-	-
earnings	0.08	0.10	-	0.07	0.08	0.09	0.07	0.03	-	-

Notes: R^2 values for ISEI and earnings, pseudo-R^2 values for all other outcomes
[#]values for first upper secondary track in England are for track attendance at age 16, higher-tier relates to 'old' universities;
[##]values for Germany are for track attendance/completion at age 17 and 22;
[###]not possible to estimate models due to collinearity.

We identify five empirical patterns. First, track placement at the beginning of upper secondary education accounts for a substantial part of the variation in higher education attainment in all countries for which we have valid information. A notable exception is England, which generally displays comparatively low pseudo-R^2 values. This deviation likely results from the fact that institutional differentiation is not a relevant dimension of stratification in England. Among the other countries, the pseudo-R^2 values range between 0.20 (Denmark, broad differentiation) and 0.31 (Germany). Second, when we consider track placement at the time of upper secondary education completion, the values are even higher and show more variation between the countries, ranging from 0.20 (Israel) to 0.52 (France). In Italy and for the detailed measurement in France, the track of completion is even collinear with higher education attainment. There are no students in the other tracks who complete higher education, which is why we cannot obtain model fit values in this case. Third, when we turn to the EGP-based measures as indicators for labor market outcomes, the predictive power of educational differentiation is much lower than in the analyses based on educational attainment as an outcome, particularly when we consider track placement at the beginning of upper secondary education. The predictive power also depends on the specific EGP contrast under consideration. For example, in some countries, access to the working classes (EGP V-VII) can be better predicted through secondary track placements than access to the salariat (EGP I+II). This is true for Germany and Denmark, while it is the other way around in Finland, France and Italy. In all countries, the values are higher when we consider track of completion instead of the track at the beginning of upper secondary education. Fourth, for the countries with measures of ISEI or earnings (Denmark, Finland, Israel and Germany) we see identical patterns. While educational differentiation is a fairly good predictor of occupational status (ISEI) with R^2-values between 0.24 and 0.28, it performs less well in predicting earnings (R^2 between 0.03 and 0.10).

We conclude that cross-country differences in the ability of upper secondary educational differentiation to predict longer-term outcomes appear smaller than might have been expected in light of the previous literature in this area. France and Germany stand out as countries where upper secondary track placement is most predictive of higher education completion. However, with respect to occupational outcomes, the predictive power of differentiation in secondary education is much more similar across countries. This may mean that in systems characterized by a tight education-labor market linkage, the predictive power of educational credentials develops in post-secondary or vocational education, while upper secondary schooling is not yet deterministic of occupational outcomes. The t-tests of country differences in pseudo-R^2- and R^2-values are mostly significant for higher education as an outcome, show unsystematic patterns for the EGP-based outcomes and are mostly insignificant for earnings and ISEI (cf. appendix, Tables A2–A5).

Mediation of the association between social origins and long-term outcomes through differentiation in secondary education

In the final step of our analyses, we assess the extent to which track placements in upper secondary education account for the association between social origins and long-term education and labor market outcomes. This mediation analysis is an analysis of the relative contribution of track placements to intergenerational social inequality in each of the seven countries. Hence, to provide a reference for the mediation analyses, we start by describing the gross associations between social origins and long-term educational and labor market outcomes in each country. Table 5 displays the respective figures (t-tests of country differences can be found in the appendix, Tables A6–A13).

Table 5. Association between social background and long-term outcomes (R^2 and McFadden Pseudo-R^2)

Indicator of social background outcome	DK	ENG	FIN	FRA	GER	IL	ITA
Parents' education (tert. vs. compuls.)							
higher education completion	0.09	0.09	0.05	0.09	0.15	0.12	0.12
university (or higher-tier) completion	0.08	0.09	0.08	0.09	0.15	0.12	-
EGP I	0.05	0.04	0.04	0.07	0.04	-	0.06
EGP I+II	0.06	0.05	0.04	0.07	0.06	-	0.08
EGP V+VI+VII	0.04	0.03	0.03	0.03	0.03	-	0.06
EGP VIIab	0.04	0.01	0.02	0.03	0.01	-	0.04
ISEI	0.09	-	0.09	-	0.09	-	-
earnings	0.03	-	0.02	0.02	0.01	0.02	-
Parents' EGP class (I vs. VIIab)							
higher education completion	0.08	0.09	0.03	0.10	0.11	0.09	0.10
university (or higher-tier) completion	0.06	0.09	0.05	0.09	0.12	0.09	-
EGP I	0.04	0.04	0.03	0.07	0.09	-	0.05
EGP I+II	0.05	0.05	0.03	0.08	0.10	-	0.07
EGP V+VI+VII	0.04	0.04	0.03	0.04	0.07	-	0.08
EGP VIIab	0.04	0.02	0.02	0.05	0.04	-	0.05
ISEI	0.08	-	0.07	-	0.14	-	-
earnings	0.03	-	0.02	0.03	0.03	0.02	-

Note: R^2 values for ISEI and earnings, pseudo-R^2 values for all other outcomes.

The associations between social origins and higher education attainment show some between-country variability. In line with previous country-comparative literature, the associations are highest for Germany, irrespective of whether we use EGP class or parents' education as a measure of social origins. In Finland, in contrast, social inequality in access to higher education is particularly low.

The associations between social origins and class destinations also show between-country variation, although on a lower level than for higher education attainment. For access to the salariat, France and Italy show the strongest and England and Finland the weakest associations when parents' education is the indicator of social origin. When we consider parents' class as the indicator of social origin, Germany shows the strongest association with access to the salariat and Finland the weakest. For access to the working class, Germany and Italy show the strongest associations when we use EGP class as indicator of social origin, while only Italy

shows a stronger association than the other countries when we measure social origin through parents' education.

For those countries that have information on ISEI (Denmark, Finland, Germany), the level of inequality is the same when we consider parents' education as indicator of social origin, but varies considerably when we rely on social class of origin. Here, Germany shows the highest R^2 value (0.14), which is twice as large as the one for Finland (0.07). Finally, for the countries that have measures of earnings (Denmark, Finland, France, Israel, Germany), the predictive power of social origin is very low, ranging between 0.02 and 0.03, which does not leave much room for country differences.

In light of these differences in the absolute amount of social reproduction, we now proceed with the mediation analyses. For each country, we estimate the extent to which the gross associations between social origins and long-term educational or labor market outcomes are mediated through sorting in upper secondary education. For reasons of comparability, we present the results that relate to track placement when students complete upper secondary education. For the sake of clarity, we only present analyses for selected indicators of long-term outcomes. The full tables with all indicators are available in our appendix. We base our mediation analyses on the procedure described previously and all rely on linear regression models both for continuous outcomes and for binary outcomes. Table 6 displays the results of the analyses with parents' education and Table 7 the results with social class as indicators of social origins.

We first examine higher education attainment as an outcome. When we consider each country's most detailed measurement of differentiation in upper secondary education, the relative reduction of the coefficients shows a remarkable similarity across countries. In the continental European countries, reductions are between 60 and 80 percent for parents' education as indicator of social origin and between 66 and 80 percent for parents' class. For England, the values are around 50 percent and in Israel they are even lower if we consider social class as indicator of social origin.

When we consider access to the salariat (EGP I+II) as outcome variable, the mediation percentages are somewhat lower and mostly range between 40 and 70 percent. Yet, in all countries (except England and some EGP-based values for Finland and Germany) the most detailed measurement of educational differentiation in upper secondary education accounts for at least half of the social origins effects.

For the three countries that have information on ISEI (Denmark, Finland, Germany), educational differentiation accounts for between 40 and 60 percent of the social origin effects in most cases (with some outliers). For four of the five countries with information on earnings (Denmark, Finland, France, Germany), the mediating role of upper secondary differentiation is quite similar (around 50 percent in most cases) when we use EGP class as our measure of social origin. We see some differences when we use on parents' education as our social origins indicator. In this case, the percent mediated varies between 50 (Finland) and 80 percent (Germany). With values around 20 percent, Israel describes an outlier in this analysis.

Although we identify some between-country variation in the mediating role of differentiation in upper secondary education for some of the indicators, the overall analyses

reveal a substantial degree of similarity if we disregard the outlier case of Israel: Educational differentiation appears to be a very strong mediator of social reproduction in all countries.

Table 6. Percent of association between parents' education and long-term outcomes explained by track of upper secondary completion

Outcome	DK		ENG	FRA		FIN	GER#	IL	ITA	
parents' education	broad	detail		broad	detail				broad	detail
HE completion										
upper secondary	51	66	55	78	78	68	64	25	41	63
comp./lower sec.	56	66	50	80	80	69	67	55	50	67
EGP I+II										
upper secondary	45	59	47	67	67	56	83	-	ns	ns
comp./lower sec.	47	56	35	68	70	58	54	-	33	57
ISEI										
upper secondary	45	59	-	-	-	50	68	-	-	-
comp./lower sec.	47	56	-	-	-	51	58	-	-	-
Earnings										
upper secondary	46	57	-	58	65	52	83	25	-	-
comp./lower sec.	47	54	-	60	65	54	78	23	-	-

Notes: tertiary education is the reference category for parents' education; ns=not statistically significant at 0.05 level; #values for Germany are for track attendance/completion at age 22.

Table 7. Percent of association between parents' EGP class and long-term outcomes explained by track of upper secondary completion

Outcome	DK		ENG#	FRA		FIN	GER##	IL	ITA	
parents' class	broad	detail		broad	detail				broad	Detail
HE completion										
IIIab	56	71	94	77	77	74	79	29	ns	ns
IVab	57	69	49	71	74	69	62	28	57	78
IVc	68	85	48	79	79	76	66	39	76	95
V+VI	58	70	45	78	78	73	75	34	57	75
VIIab	59	68	49	80	80	66	74	32	60	77
EGP I+II										
IIIab	45	58	39	64	64	50	57		ns	ns
IVab	47	59	42	65	65	56	ns		33	56
IVc	41	51	33	50	53	38	42		41	60
V+VI	48	59	31	64	67	53	50		39	61
VIIab	47	55	36	64	67	54	43		40	59
ISEI										
IIIab	47	61	-	-	-	48	61	-	-	-
IVab	51	62	-	-	-	59	53	-	-	-
IVc	50	63	-	-	-	37	37	-	-	-
V+VI	50	61	-	-	-	49	60	-	-	-
VIIab	48	56	-	-	-	50	54	-	-	-
Earnings										
IIIab	46	58	-	56	60	48	52	24	-	-
IVab	46	54	-	48	56	45	ns	17	-	-
IVc	45	55	-	44	47	25	ns	18	-	-
V+VI	46	55	-	56	59	47	ns	17	-	-
VIIab	46	55	-	49	51	43	54	15	-	-

Notes: EGP I+II is the reference category; ns=not statistically significant at 0.05 level; #class categories for England follow NS-SEC coding; ##values for Germany are for track attendance/completion at age 22.

Parents' education: tertiary vs. compulsory/lower

Outcome: Higher education completion

Outcome: EGP I+II

Parents' social class: EGP I vs. EGP VIIab

Outcome: Higher education completion

Outcome: EGP I+II
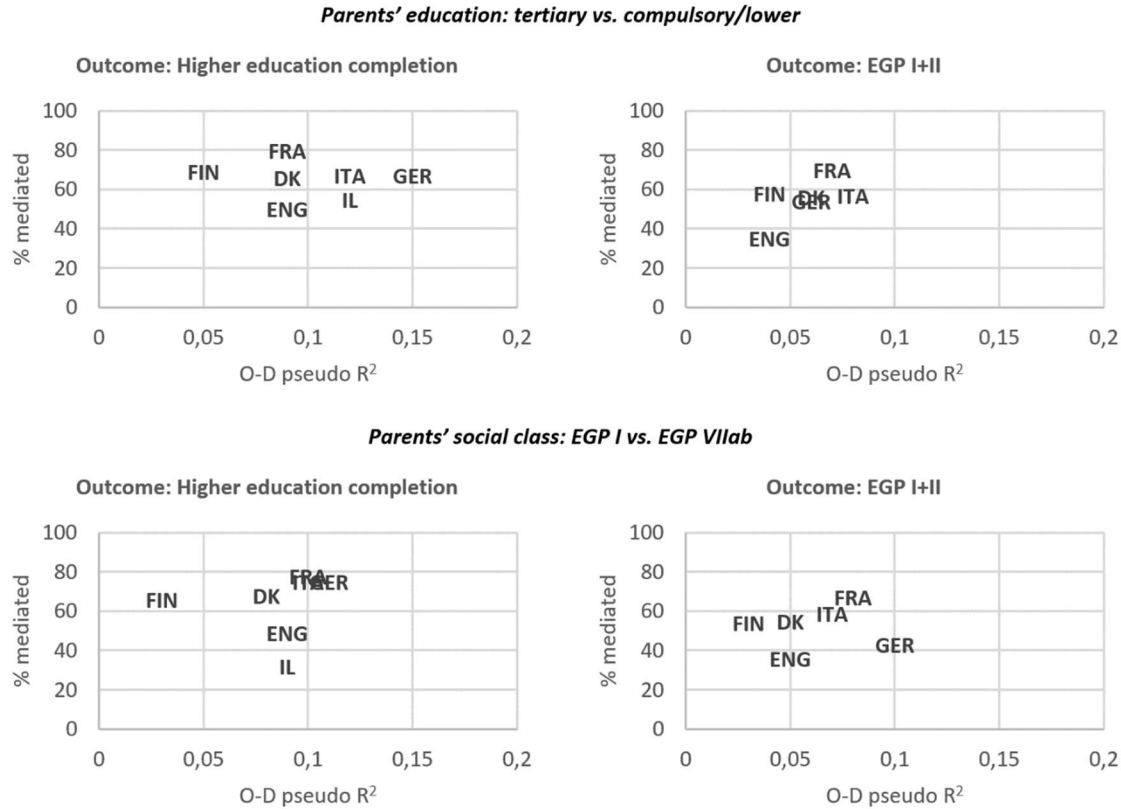
Figure 1. Association between overall level of social reproduction (O-D) and mediating role of educational differentiation in secondary education

To contextualize the country-variation in the mediating role of educational differentiation in upper secondary education, we provide some examples in which we display the figures with reference to the overall association between social origins and long-term outcomes. Figure 1 displays scatter plots for two selected outcomes: higher education attainment and access to the salariat. As indicators for parental background influences, we show the contrasts between tertiary and compulsory education on the one hand and upper salariat (EGP I) and unskilled working classes (EGP VIIab) on the other. The graphs suggest that the extent to which differentiation in upper secondary education mediates the association between social origin and long-term outcomes is unrelated to the strength of this association. In the graphs, it becomes again apparent that – when we use social class as indicator of social origin – Israel constitutes an outlier case in our selection of countries due to its comparatively low value of the mediation percentage. As a further note, the differences in overall inequality levels between the countries are predominantly a result of differences in the strength of the associations between secondary educational sorting and social destinations and less so to differences in the strength of the association between social origin and secondary educational sorting (cf. Figure A1 in the appendix). The latter association shows hardly any country variation. Further analyses (not shown) indicate that a substantial part of the association between secondary educational sorting and social destinations might be due to the connection between educational sorting in secondary education and access to higher education.

Discussion and conclusion

This paper assesses the extent to which the associations between social origins and destinations are mediated through educational differentiation in secondary education in our set of countries. We provide analyses of each (partial) association in the O-E-D triangle (origins – education – destinations) of social mobility. We deviate from the common framework of the triangle in that we consider placement in secondary education instead of final educational attainment as mediator of the O-D association. This approach allows us to assess how predictive educational sorting in secondary education is in the process of inequality formation. With our national life-course data, we are thus in a position to assess the role of educational differentiation for social inequality in long-term outcomes.

We find that differentiation in secondary education plays a similar role in shaping social reproduction processes, once the country-specific model of differentiation is properly identified and measured. In line with previous research, our analyses show that the overall levels in the gross associations between social origins and destinations display some country-differences, ranging from the lowest levels of social reproduction in Finland to the highest levels in Germany. If we link this pattern to the conventional classifications of educational tracking in secondary education, we observe the expected correspondence as the German early-tracking model shows the most pronounced association between origins and destinations, while the Nordic inclusive models show the weakest associations.

Yet, our analyses show that in relative terms, the role of differentiation in upper secondary education in mediating this association is both substantial and strikingly similar across countries. Even though our empirical conceptualizations of the country-specific differentiation schemes do not capture each single aspect of informal sorting, our findings stress the importance of considering the sorting mechanisms that are idiosyncratic to specific countries. Our results support the claim of Triventi et al. (2016) that a too simplistic typology of educational systems, such as the one between early-tracking and comprehensive systems, does not adequately consider the variety of sorting mechanisms that shape later-life outcomes.

While we observe some country differences in the association between social origins and placement in different streams of secondary education, the strength of the association is not very pronounced in any of the countries. The between-country similarity of the association is striking. In contrast, the association between track placement in secondary education and social destinations shows both much more between-country heterogeneity and is stronger compared to the O-E association. While these country differences do not translate into substantial differences in the mediating role of educational differentiation, our results reveal some noteworthy observations. First, in those countries that commonly are considered having a strong vocational training sector (Germany and Denmark), placement in secondary education is more predictive of access to working class positions than of service class positions. Second, in those countries that apply both a broad and a detailed measurement of educational differentiation, the latter adds more predictive power in explaining long-term outcomes. This supports our contention that research needs to factor in fine-grained, rather than crude, measures of country-specific differentiation schemes.

One limitation of this study is that, even though the analyses are mainly descriptive, our research question imposes very high demands on the data. As we require life-course data that spans from secondary education to occupational maturity, the set of countries with such data available is rather restricted. Even in our set of countries, differences in the availability of measures and indicators result in a compromise between standardized analyses and detail of measurement. While our measure of educational differentiation refers to completion of upper secondary education, it would certainly have been preferable to compare differentiation at the time of upper secondary enrolment. Furthermore, as we have pointed out in more detail in our set of country reports reports (Birkelund et al., 2019; Casada-Munsech and Boliver, 2019; Facchini et al., 2019; Heiskala and Erola, 2019; Henninges et al., 2019; Herbaut et al., 2019), many countries pursue additional hidden and informal forms of educational differentiation – most of which take effect in lower secondary education and might therefore create path dependencies throughout the educational career. Given that we cannot measure these forms of informal sorting in this study, we may very likely underestimate the role of secondary de facto sorting in shaping social reproduction processes.

Moreover, if we take into account that measurement error is less likely to bias the pseudo-R^2 values in downward direction in those countries that base their analyses on register data, the differences between the Nordic countries and the other countries might be even more pronounced than what we report in this study.

Despite these limitations, we find that, although sorting processes in secondary education come in a different shape in different countries, they are remarkably similarly relevant in mediating the influence of social origins on long-term social destinations. To conclude, although social origin does not account for much of the variation in track placement or long-term outcomes, the indirect effect of social origin to long-term outcomes is largely explained by tracking placement at upper secondary education, regardless of the differentiation regime. Tracking maintains the importance of family background in adult socioeconomic and educational attainment, independently of the way how that takes place. Likewise, it seems that if one wants to reduce the role of family background in different forms of attainment, a wise policy maker would reduce the occasions and extent of differentiation rather than would try to change its type, timing or form.

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Appendix

Table A1. T-test for country differences in pseudo-R^2 values (social origin as predictor of track placement)

OE			Parents' education									
			DK		ENG	FIN	FRA		GER	IL	ITA	
			broad	detail			broad	detail			broad	detail
Parents' EGP class	DK	broad	-	13.87	−4.22	0.00	0.00	3.09	−1.99	12.80	−1.99	−0.99
		detail	6.93	-	−7.10	−15.62	−4.90	−3.22	−3.99	0.00	−3.99	−2.99
	ENG		−5.63	−7.10	-	4.24	3.72	5.25	0.82	7.07	0.82	1.64
	FIN		6.40	0.00	7.07	-	0.00	3.16	−1.99	14.14	−1.99	−1.00
	FRA	broad	−3.09	−6.44	3.94	−6.32	-	2.00	−1.86	4.85	−1.86	−0.93
		detail	3.09	0.00	6.57	0.00	4.71	-	−2.87	3.16	−2.87	−1.92
	GER		−4.96	−5.98	−0.82	−5.97	−3.83	−5.75	-	3.98	0.00	0.71
	IL		19.21	15.62	9.90	14.14	12.65	6.32	7.96	-	−3.98	−2.99
	ITA	broad	−2.98	−3.99	0.82	−3.98	−1.92	−3.83	1.41	−5.97	-	0.71
		detail	−12.80	−23.43	2.83	−21.21	−3.16	−9.49	2.99	−35.36	1.00	-

Note: t-values from two-sample t-tests, based on bootstrapped standard errors of pseudo-R^2 values.

Table A2. T-test for country differences in pseudo-R^2 values (secondary track completion as predictor)

			Higher education completion									
			DK		ENG	FIN	FRA		GER	IL	ITA	
			broad	detail			broad	detail			broad	detail
University completion	DK	broad	-	−6.73	0.96	16.23	−21.88		−3.99	6.69		
		detail	−16.35	-	3.81	22.80	−19.20		−3.24	9.52		
	ENG		−4.42	1.74	-	5.75	−17.49		−4.12	4.24		
	FIN		−7.56	8.82	1.75	-	−28.07		−5.73	0.00		
	FRA	broad	−6.76	−3.96	−4.39	−5.56	-		2.17	21.53		
		detail						-				
	GER		−2.66	−0.33	−0.94	−1.66	2.30		-	5.58		
	IL		0.25	1.99	1.45	1.00	3.82		1.80	-		
	ITA	broad									-	
		detail										-

Note: t-values from two-sample t-tests, based on bootstrapped standard errors of pseudo-R^2 values.

Table A3. T-test for country differences in pseudo-R² values (secondary track completion as predictor)

<table>
<tr><td colspan="2"></td><td></td><td colspan="10" align="center">EGP I</td></tr>
<tr><td colspan="2"></td><td></td><td colspan="2" align="center">DK</td><td>ENG</td><td>FIN</td><td colspan="2" align="center">FRA</td><td>GER</td><td>IL</td><td colspan="2" align="center">ITA</td></tr>
<tr><td colspan="2"></td><td></td><td>broad</td><td>detail</td><td></td><td></td><td>broad</td><td>detail</td><td></td><td></td><td>broad</td><td>detail</td></tr>
<tr><td rowspan="11">EGP I+II</td><td rowspan="2">DK</td><td>broad</td><td>-</td><td>−8.13</td><td>5.41</td><td>0.00</td><td>−7.78</td><td>−9.77</td><td>0.33</td><td></td><td>0.99</td><td>−0.50</td></tr>
<tr><td>detail</td><td>−8.00</td><td>-</td><td>9.28</td><td>8.72</td><td>−4.81</td><td>−7.05</td><td>1.33</td><td></td><td>2.48</td><td>0.99</td></tr>
<tr><td>ENG</td><td></td><td>−12.42</td><td>17.60</td><td>-</td><td>−5.49</td><td>−9.83</td><td>−11.50</td><td>−0.97</td><td></td><td>−0.94</td><td>−2.36</td></tr>
<tr><td>FIN</td><td></td><td>−6.10</td><td>2.98</td><td>−16.71</td><td>-</td><td>−7.84</td><td>−9.84</td><td>0.33</td><td></td><td>1.00</td><td>−0.50</td></tr>
<tr><td rowspan="2">FRA</td><td>broad</td><td>−9.68</td><td>−6.76</td><td>−15.21</td><td>−7.84</td><td>-</td><td>−2.02</td><td>2.85</td><td></td><td>4.47</td><td>3.13</td></tr>
<tr><td>detail</td><td>−10.65</td><td>−7.72</td><td>−16.10</td><td>−8.83</td><td>−0.71</td><td>-</td><td>3.76</td><td></td><td>5.70</td><td>4.38</td></tr>
<tr><td>GER</td><td></td><td>0.66</td><td>1.66</td><td>−1.64</td><td>1.33</td><td>3.79</td><td>4.11</td><td>-</td><td></td><td>0.28</td><td>−0.55</td></tr>
<tr><td>IL</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>-</td><td></td><td></td></tr>
<tr><td rowspan="2">ITA</td><td>broad</td><td>0.50</td><td>1.98</td><td>−2.91</td><td>1.49</td><td>4.92</td><td>5.37</td><td>−0.28</td><td></td><td>-</td><td>−1.06</td></tr>
<tr><td>detail</td><td>−2.48</td><td>−0.99</td><td>−5.82</td><td>−1.49</td><td>2.24</td><td>2.68</td><td>−1.94</td><td></td><td>−2.12</td><td>-</td></tr>
</table>

Note: t-values from two-sample t-tests, based on bootstrapped standard errors of pseudo-R² values.

Table A4. T-test for country differences in pseudo-R² values (secondary track completion as predictor)

<table>
<tr><td colspan="2"></td><td></td><td colspan="10" align="center">EGP V-VII</td></tr>
<tr><td colspan="2"></td><td></td><td colspan="2" align="center">DK</td><td>ENG</td><td>FIN</td><td colspan="2" align="center">FRA</td><td>GER</td><td>IL</td><td colspan="2" align="center">ITA</td></tr>
<tr><td colspan="2"></td><td></td><td>broad</td><td>detail</td><td></td><td></td><td>broad</td><td>detail</td><td></td><td></td><td>broad</td><td>detail</td></tr>
<tr><td rowspan="11">EGP VII</td><td rowspan="2">DK</td><td>broad</td><td>-</td><td>0.00</td><td>33.29</td><td></td><td></td><td></td><td>−0.33</td><td></td><td>0.50</td><td>0.00</td></tr>
<tr><td>detail</td><td>0.00</td><td>-</td><td>33.29</td><td></td><td></td><td></td><td>−0.33</td><td></td><td>0.50</td><td>0.00</td></tr>
<tr><td>ENG</td><td></td><td>41.11</td><td>41.11</td><td>-</td><td></td><td></td><td></td><td>−4.64</td><td></td><td>−5.93</td><td>−6.43</td></tr>
<tr><td>FIN</td><td></td><td>19.41</td><td>19.41</td><td>−26.83</td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">FRA</td><td>broad</td><td>0.00</td><td>0.00</td><td>−11.77</td><td>−6.26</td><td>-</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>detail</td><td>0.00</td><td>0.00</td><td>−11.77</td><td>−6.26</td><td>0.00</td><td>-</td><td></td><td></td><td></td><td></td></tr>
<tr><td>GER</td><td></td><td>−0.40</td><td>−0.40</td><td>−3.00</td><td>−1.80</td><td>−0.39</td><td>−0.39</td><td>-</td><td></td><td>0.55</td><td>0.28</td></tr>
<tr><td>IL</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>-</td><td></td><td></td></tr>
<tr><td rowspan="2">ITA</td><td>broad</td><td>5.75</td><td>5.75</td><td>−6.97</td><td>−0.98</td><td>4.04</td><td>4.04</td><td>1.57</td><td></td><td>-</td><td>−0.35</td></tr>
<tr><td>detail</td><td>2.97</td><td>2.97</td><td>−3.50</td><td>−0.50</td><td>2.63</td><td>2.63</td><td>1.49</td><td></td><td>0.00</td><td>-</td></tr>
</table>

Note: t-values from two-sample t-tests, based on bootstrapped standard errors of pseudo-R² values.

Table A5. T-test for country differences in R^2 values (secondary track completion as predictor)

| | | | ISEI | | | | | | | | | |
| | | | DK | | ENG | FIN | FRA | | GER | IL | ITA | |
			broad	detail			broad	detail			broad	detail
earnings	DK	broad	-	−6.53		−2.28			−1.33			
		detail	−4.94	-		4.48			−0.33			
	ENG				-							
	FIN		3.05	8.13		-			−1.00			
	FRA	broad	0.00	2.33		−1.21	-					
		detail	−1.19	1.17		−2.43	−0.88	-				
	GER		0.50	1.48			0.46	0.93	-			
	IL		17.95	21.49		17.89	6.20	7.44	2.00	-		
	ITA	broad									-	
		detail										-

Note: t-values from two-sample t-tests, based on bootstrapped standard errors of R^2 values.

Table A6. T-test for country differences in pseudo-R^2 values (parents' education as predictor)

| | | Higher education completion | | | | | | |
		DK	ENG	FIN	FRA	GER	IL	ITA
University completion	DK	-	0.00	19.43	0.00	−2.99	−8.57	−1.49
	ENG	−1.34	-	5.66	0.00	−2.83	−3.94	−1.42
	FIN	0.00	1.37	-	−5.66	−4.99	−22.14	−3.50
	FRA	−1.19	0.00	−1.21	-	−2.83	−3.94	−1.42
	GER	−3.47	−2.83	−3.48	−2.79	-	1.48	1.06
	IL	−10.08	−3.94	−11.09	−3.51	1.48	-	0.00
	ITA							-

Note: t-values from two-sample t-tests, based on bootstrapped standard errors of pseudo-R^2 values.

Table A7. T-test for country differences in pseudo-R² values (parents' education as predictor)

		EGP I						
		DK	ENG	FIN	FRA	GER	IL	ITA
EGP I+II	DK	-	1.60	3.72	−2.44	0.98		−0.50
	ENG	1.90	-	0.00	−3.00	0.00		−0.96
	FIN	10.60	1.96	-	−3.64	0.00		−1.00
	FRA	−1.61	−2.56	−4.93	-	2.34		0.46
	GER	0.00	−0.49	−1.00	0.48	-		−0.89
	IL						-	
	ITA	−1.00	−1.46	−2.00	−0.48	−0.71		-

Note: t-values from two-sample t-tests, based on bootstrapped standard errors of pseudo-R² values.

Table A8. T-test for country differences in pseudo-R² values (parents' education as predictor)

		EGP V-VII						
		DK	ENG	FIN	FRA	GER	IL	ITA
EGP VII	DK	-	2.34	5.55	2.34	0.99		−1.98
	ENG	12.95	-	0.00	0.00	0.00		−2.79
	FIN	10.14	−6.26	-	0.00	0.00		−2.99
	FRA	1.60	−3.79	−1.64	-	0.00		−2.79
	GER	2.96	−0.39	1.00	1.71	-		−2.12
	IL						-	
	ITA	0.00	−3.33	−1.99	−0.86	−2.12		-

Note: t-values from two-sample t-tests, based on bootstrapped standard errors of pseudo-R² values.

Table A9. T-test for country differences in pseudo-R² values (parents' education as predictor)

	ISEI						
	DK	ENG	FIN	FRA	GER	IL	ITA
earnings — DK	-		0.00		0.00		
earnings — ENG		-					
earnings — FIN	5.81		-		0.00		
earnings — FRA	1.93		0.00	-			
earnings — GER	14.29		10.00	2.00	-		
earnings — IL	5.81		0.00	0.00	−10.00	-	
earnings — ITA							-

Note: t-values from two-sample t-tests, based on bootstrapped standard errors of R^2 values.

Table A10. T-test for country differences in pseudo-R² values (parents' class as predictor)

	Higher education completion						
	DK	ENG	FIN	FRA	GER	IL	ITA
University completion — DK	-	−1.39	26.50	−2.79	−1.50	−2.94	−1.00
University completion — ENG	−4.05	-	8.49	−1.01	−0.94	0.00	−0.47
University completion — FIN	3.20	5.49	-	−9.90	−4.00	−18.97	−3.50
University completion — FRA	−4.05	0.00	−5.49	-	−0.47	1.31	0.00
University completion — GER	−2.98	−1.42	−3.48	−1.42	-	0.99	0.35
University completion — IL	−7.81	0.00	−11.09	0.00	1.48	-	−0.49
University completion — ITA							-

Note: t-values from two-sample t-tests, based on bootstrapped standard errors of pseudo-R^2 values.

Table A11. T-test for country differences in pseudo-R^2 values (parents' class as predictor)

		EGP I						
		DK	ENG	FIN	FRA	GER	IL	ITA
EGP I+II	DK	-	0.00	5.07	−4.16	−2.49		−5.00
	ENG	0.00	-	1.64	−3.25	−2.39		−0.48
	FIN	10.60	3.29	-	−5.66	−3.00		−1.00
	FRA	−4.83	−3.54	−8.22	-	−0.94		0.94
	GER	−2.49	−2.39	−3.50	−0.96	-		1.41
	IL						-	
	ITA	−1.00	−0.96	−2.00	0.48	1.06		-

Note: t-values from two-sample t-tests, based on bootstrapped standard errors of pseudo-R^2 values.

Table A12: T-test for country differences in pseudo-R^2 values (parents' class as predictor)

		EGP V-VII						
		DK	ENG	FIN	FRA	GER	IL	ITA
EGP VII	DK	-	0.00	5.55	0.00	−1.50		−3.96
	ENG	5.80	-	1.96	0.00	−1.46		−3.58
	FIN	10.14	0.00	-	−1.96	−2.00		−4.98
	FRA	−1.39	−3.94	−4.24	-	−1.46		−3.58
	GER	0.00	−0.66	−0.67	0.32	−		−0.45
	IL						−	
	ITA	−0.99	−2.87	−2.99	0.00	−0.32		-

Note: t-values from two-sample t-tests, based on bootstrapped standard errors of pseudo-R^2 values.

Table A13. *T-test for country differences in pseudo-R^2 values (parents' class as predictor)*

		ISEI						
		DK	ENG	FIN	FRA	GER	IL	ITA
earnings	DK	-		3.28		−1.99		
	ENG		-					
	FIN	5.81		-		−2.33		
	FRA	0.00		−1.96	-			
	GER	0.00		−10.00	0.00	-		
	IL	4.10		0.00	1.86	5.00	-	
	ITA							-

Note: t-values from two-sample t-tests, based on bootstrapped standard errors of R^2 values.

Table A14. *Percent of association between parents' education and long-term outcomes explained by educational differentiation (first upper secondary track)*

Outcome parents' education	DK		ENG[#]	FIN	FRA		GER[##]	IL	ITA	
	broad	detail			broad	detail			broad	detail
Higher education completion										
upper secondary	40	52	24	-	-	-	57	-	31	52
compulsory/lower sec	44	52	19	-	-	-	57	-	40	58
University completion										
upper secondary	29	48	27	-	-	-	48	-	-	-
compulsory/lower sec	38	53	22	-	-	-	57	-	-	-
EGP I										
upper secondary	32	45	18	-	-	-	50	-	-	-
compulsory/lower sec	37	47	19	-	-	-	43	-	25	43
EGP I+II										
upper secondary	37	49	27	-	-	-	64	-	-	-
compulsory/lower sec	38	45	17	-	-	-	42	-	28	51
EGP V+VI+VII										
upper secondary	55	55	26	-	-	-	92	-	45	63
compulsory/lower sec	48	49	17	-	-	-	75	-	54	63
EGP VIIab										
upper secondary	48	48	45	-	-	-	91	-	26	53
compulsory/lower sec	38	38	21	-	-	-	-	-	44	60
ISEI										
upper secondary	37	48	-	-	-	-	58	-	-	-
compulsory/lower sec	38	44	-	-	-	-	49	-	-	-
Earnings										
upper secondary	38	43	-	-	-	-	75	-	-	-
compulsory/lower sec	37	39	-	-	-	-	100	-	-	-

Notes: tertiary education is the reference category for parents' education; ns=not statistically significant at 0.05 level; [#]values for England are for track attendance at age 16; [##]values for Germany are for track attendance/completion at age 17.

Table A15. Percent of association between parents' education and long-term outcomes explained by educational differentiation (track of secondary completion)

Outcome parents' education	DK		ENG	FIN	FRA		GER#	IL	ITA	
	broad	detail			broad	detail			broad	detail
Higher education completion										
upper secondary	51	66	55	68	78	78	64	25	41	63
compulsory/lower sec	56	66	50	69	80	80	67	55	50	67
University completion										
upper secondary	32	55	65	46	61	61	48	-	-	-
compulsory/lower sec	42	61	59	53	68	70	59	-	-	-
EGP I										
upper secondary	36	53	36	43	43	48	60	-	ns	ns
compulsory/lower sec	42	55	42	47	54	61	49	-	24	41
EGP I+II										
upper secondary	45	59	47	56	67	67	83	-	ns	ns
compulsory/lower sec	47	56	35	58	68	70	54	-	33	57
EGP V+VI+VII										
upper secondary	68	70	49	58	73	73	107	-	47	66
compulsory/lower sec	62	63	37	58	81	76	86	-	60	68
EGP VIIab										
upper secondary	61	63	85	54	100	100	ns		29	52
compulsory/lower sec	52	53	47	49	73	73	100		52	66
ISEI										
upper secondary	45	59	-	50	-	-	68	-	-	-
compulsory/lower sec	47	56	-	51	-	-	58	-	-	-
Earnings										
upper secondary	46	57	-	52	58	65	83	16	-	-
compulsory/lower sec	47	54	-	54	60	65	78	14	-	-

Notes: tertiary education is the reference category for parents' education; ns=not statistically significant at 0.05 level; #values for Germany are for track attendance/completion at age 22.

Table A16. *Percent of association between parents' EGP class and long-term outcomes explained by educational differentiation (first upper secondary track)*

Outcome parents' class	DK broad	DK detail	ENG#	FIN	FRA broad	FRA detail	GER##	IL	ITA broad	ITA detail
HE completion										
IIIab	45	56	29	-	-	-	58	-	-	-
IVab	47	57	28	-	-	-	81	-	50	73
IVc	59	73	25	-	-	-	61	-	66	83
V+VI	46	56	32	-	-	-	68	-	51	68
VIIab	47	54	23	-	-	-	69	-	54	72
University completion										
IIIab	32	51	35	-	-	-	48	-	-	-
IVab	37	55	34	-	-	-	59	-	-	-
IVc	38	56	29	-	-	-	61	-	-	-
V+VI	35	52	28	-	-	-	54	-	-	-
VIIab	41	54	27	-	-	-	54	-	-	-
EGP I										
IIIab	34	49	21	-	-	-	42	-	-	-
IVab	40	53	20	-	-	-	ns	-	26	47
IVc	39	50	19	-	-	-	27	-	33	46
V+VI	36	48	18	-	-	-	25	-	30	48
VIIab	38	48	18	-	-	-	28	-	30	46
EGP I+II										
IIIab	38	49	37	-	-	-	38	-	ns	ns
IVab	41	51	32	-	-	-	ns	-	28	52
IVc	37	46	22	-	-	-	33	-	35	51
V+VI	40	49	22	-	-	-	38	-	34	54
VIIab	39	45	22	-	-	-	36	-	36	56
EGP V+VI+VII										
IIIab	55	57	41	-	-	-	64	-	ns	ns
IVab	59	59	25	-	-	-	ns	-	61	71
IVc	53	54	19	-	-	-	62	-	74	80
V+VI	49	50	17	-	-	-	56	-	37	42
VIIab	48	49	22	-	-	-	60	-	46	51
EGP VIIab										
IIIab	49	50	22	-	-	-	ns	-	ns	ns
IVab	50	51	27	-	-	-	-100	-	48	68
IVc	47	48	13	-	-	-	ns	-	56	66
V+VI	45	46	12	-	-	-	44	-	32	41
VIIab	37	37	19	-	-	-	69	-	35	43
ISEI										
IIIab	39	50	-	-	-	-	53	-	-	-
IVab	44	53	-	-	-	-	56	-	-	-
IVc	46	57	-	-	-	-	33	-	-	-
V+VI	62	50	-	-	-	-	51	-	-	-
VIIab	71	45	-	-	-	-	49	-	-	-
Earnings										
IIIab	38	43	-	-	-	-	36	-	-	-
IVab	39	44	-	-	-	-	ns	-	-	-
IVc	52	55	-	-	-	-	ns	-	-	-
V+VI	38	42	-	-	-	-	ns	-	-	-
VIIab	37	40	-	-	-	-	43	-	-	-

Notes: EGP I+II is the reference category for parents' class; ns=not statistically significant at 0.05 level; #values for England are for track attendance at age 16, class categories follow NS-SEC coding; ##values for Germany are for track attendance/completion at age 17.

Table A17. Percent of association between parents' EGP class and long-term outcomes explained by educational differentiation (track of secondary completion)

Outcome parents' class	DK broad	DK detail	ENG#	FIN	FRA broad	FRA detail	GER##	IL	ITA broad	ITA detail
HE completion										
IIIab	56	71	94	74	77	77	79	29	ns	ns
IVab	57	69	49	69	71	74	62	28	57	78
IVc	68	85	48	76	79	79	66	39	76	95
V+VI	58	70	45	73	78	78	75	34	57	75
VIIab	59	68	49	66	80	80	74	32	60	77
University completion										
IIIab	35	59	62	43	64	68	52	-	-	-
IVab	39	61	67	53	67	71	41	-	-	-
IVc	39	62	63	51	73	73	55	-	-	-
V+VI	39	60	60	55	70	70	50	-	-	-
VIIab	44	63	64	58	76	79	54	-	-	-
EGP I										
IIIab	38	56	32	37	53	59	58	-	ns	ns
IVab	43	59	34	46	57	64	ns	-	28	48
IVc	39	55	36	38	53	58	30	-	36	51
V+VI	40	56	35	48	57	62	29	-	32	51
VIIab	42	55	37	49	54	58	31	-	31	46
EGP I+II										
IIIab	45	58	39	50	64	64	57	-	ns	ns
IVab	47	59	42	56	65	65	ns	-	33	56
IVc	41	51	33	38	50	53	42	-	41	60
V+VI	48	59	31	53	64	67	50	-	39	61
VIIab	47	55	36	54	64	67	43	-	40	59
EGP V+VI+VII										
IIIab	67	70	61	60	71	71	79	-	ns	ns
IVab	70	71	43	80	100	100	ns	-	68	76
IVc	60	62	36	62	77	77	67	-	79	84
V+VI	61	63	32	49	54	54	63	-	41	46
VIIab	60	61	46	46	59	62	63	-	47	51
EGP VIIab										
IIIab	62	64	37	57	71	71	ns	-	ns	ns
IVab	63	64	52	84	100	100	-100	-	60	75
IVc	48	49	27	69	50	50	ns	-	63	74
V+VI	58	61	25	47	64	64	56	-	40	48
VIIab	50	51	48	37	53	53	69	-	38	45
ISEI										
IIIab	47	61	-	48	-	-	61	-	-	-
IVab	51	62	-	59	-	-	53	-	-	-
IVc	50	63	-	37	-	-	37	-	-	-
V+VI	50	61	-	49	-	-	60	-	-	-
VIIab	48	56	-	50	-	-	54	-	-	-
Earnings										
IIIab	46	58	-	48	56	60	52	24	-	-
IVab	46	54	-	45	48	56	ns	17	-	-
IVc	45	55	-	25	44	47	ns	18	-	-
V+VI	46	55	-	47	56	59	ns	17	-	-
VIIab	46	55	-	43	49	51	54	15	-	-

Notes: EGP I+II is the reference category for parents' class; ns=not statistically significant at 0.05 level; ns=not statistically significant at 0.05 level; #values for Germany are for track attendance/completion at age 22.
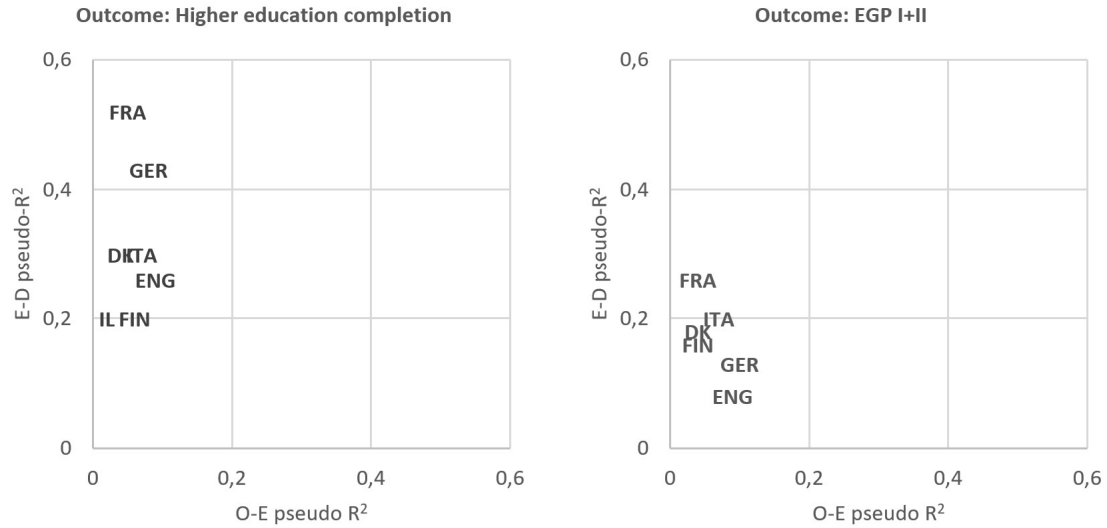
Figure A1. Association between social origin (EGP I vs. VII) and educational differentiation in secondary education (OE) plotted against the association between educational differentiation and destinations (ED)
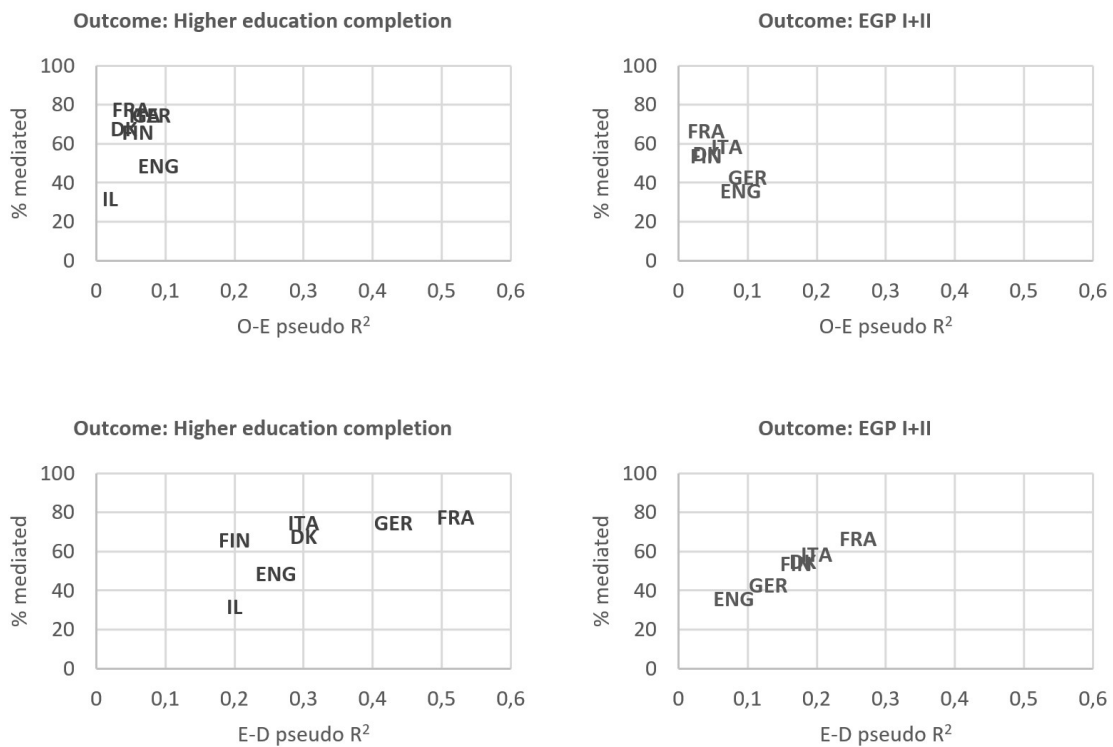

Figure A2. Associations between social origin (EGP I vs. VII) and educational differentiation in secondary education and between educational differentiation and destinations plotted against the mediating role of educational differentiation