Working Paper 2022-98

Intergenerational Transmission of Education: Set-Theoretic Exploration of Accumulation of Social Advantages and Disadvantages in Six European Countries

Triin Lauri
Tallinn University
School of Governance, Law and Society

Ellu Saar
Tallinn University
School of Governance, Law and Society

Abstract: The aim of the paper is to investigate the patterns of multiple advantages and disadvantages of parental resources measured by educational attainment of both parents as well as parental cultural resources and their impact on the educational attainment of offspring across three cohorts in six European countries – the Czech Republic, Estonia, Germany, Italy, Sweden, and the United Kingdom. We separate the examination of combined advantages from that of combined disadvantages to emphasise the asymmetries in these relationships by employing a novel configurational approach, set coincidence analysis introduced by Ragin and Fiss (2017). The analysis based on the International Assessment of Adult Competencies data (PIAAC) revealed substantial country differences in degrees of cumulative advantages and disadvantages of respondents' parental resources and also in the linkages between these cumulative patterns and respondents' educational attainment.

Keywords: intergenerational transmission of education, social advantages and disadvantages, family resources, European countries, configurational analysis

---

COMPASSS Working Paper 2022-98
Available at http://www.compasss.org/wpseries/LauriSaar2022.pdf
COMPASSS Working Paper Series Managing Editor, Claude Rubinson

Intergenerational transmission of education: set-theoretic exploration of accumulation of social advantages and disadvantages in six European countries

Authors:

Triin Lauri, triin.lauri@tlu.ee

https://www.etis.ee/CV/Triin_Lauri/eng

Ellu Saar, ellu.saar@tlu.ee

https://www.etis.ee/CV/Ellu_Saar/est?tabId=CV_ENG

Abstract:

The aim of the paper is to investigate the patterns of multiple advantages and disadvantages of parental resources measured by educational attainment of both parents as well as parental cultural resources and their impact on the educational attainment of offspring across three cohorts in six European countries – the Czech Republic, Estonia, Germany, Italy, Sweden, and the United Kingdom. We separate the examination of combined advantages from that of combined disadvantages to emphasise the asymmetries in these relationships by employing a novel configurational approach, set coincidence analysis introduced by Ragin and Fiss (2017). The analysis based on the International Assessment of Adult Competencies data (PIAAC) revealed substantial country differences in degrees of cumulative advantages and disadvantages of respondents' parental resources and also in the linkages between these cumulative patterns and respondents' educational attainment.

Keywords: intergenerational transmission of education, social advantages and disadvantages, family resources, European countries, configurational analysis

Introduction

This article builds on the long tradition of intergenerational social transmission, analysing the associations between parents' resources and children's attainment of higher education. Various

parental resources (monetary and non-monetary) are usually considered to be important in intergenerational transmission of educational advantage (De Graaf et al. 2000). The magnitude of the effect on children's educational attainment may vary among different resource types (Jæger and Holm 2007). The impact of each kind of resource is suggested to capture the mechanisms and processes through which educational inequalities are produced (Bukodi and Goldthorpe 2013; Bukodi et al. 2018). Different resources often overlap to a large extent and they also are specific in their nature and cannot be equated to other resources. While different approaches deploy a multidimensional conceptualization of social origin, only recently have the role of interplay and combinations of parental resources in educational inequalities become more frequently the subject of scrutiny (e.g. Blossfeld 2019; Buis 2013; Bukodi and Goldthorpe 2013; Erikson, 2016; Erola et al. 2016; Huang 2013; Jæger 2009).

Research has often assumed that the mother's characteristics would be of little help in explaining children's educational attainment because maternal and paternal characteristics are highly correlated. However, previous research has indicated that fathers and mothers contribute differently to the educational attainment of children (Albrigth 2008; Beller 2009; Meraviglia and Buis 2015). Maternal influence is more often exerted through factors associated with mothers' own educational attainment (Korupp et al. 2002; Erola et al. 2016). The massive growth of female employment and higher levels of education attainment as well as the increase of the number of mothers with an equal or higher position compared to their husbands have been the driving forces changing the dominant method (parental education was indexed by the highest level of education of the two spouses) to measures of both parents (Blossfeld 2019; Thaning and Hällsten 2020).

The advantages and disadvantages passed from earlier to later generations in terms of unequal resources are connected and they tend to support and reinforce each other (Bukodi et al. 2018; Giudici and Pallas 2014; Kallio et al. 2016; Schoon and Mellis 2019). The connections and reinforcing mechanisms tend to vary by time and place. Institutions may (a) compensate for the lack of resources; (b) contribute to securing intergenerational transmission of advantage; and (c) narrow the differences between offspring of advantageous versus disadvantageous parents (Erola et al. 2017; Pölyö and Kallio 2017; Pölyö 2019). We investigate the patterns of multiple advantages and disadvantages of parental resources measured by educational attainment of both parents as well as parental cultural resources (measured by number of books at the parental home) and their impact on the educational attainment of offspring across three cohorts in six European countries. The six countries are the Czech Republic (CZ), Estonia (EE), Germany

(DE), Italy (IT), Sweden (SE), and the United Kingdom (UK). Our case selection strategy is aiming to maximise diversity, i.e. these countries differ in the various features of their educational systems, speed of educational expansion and welfare state regimes.

We ask how the individual level patterns of parental resources combine and reinforce in associations with attainment of higher education. Which links are stronger, the combining advantages in enabling or the combining disadvantages in hindering the attendance of higher education?

Social inequalities (based upon different parental resources) tend to be strongly linked and correlated as variables at the individual level. While most researchers have used (net effects oriented) regression-type models in explaining the interplay of parental resources, we follow a configurational analysis where interplay and multicollinearity is the asset and focus of analysis, not a problem as in case of may covariational techniques. In so doing, we are greatly motivated by Ragin, and Fiss (2017) and Borgna (2013), who in addition to the importance of interplay of explanatory conditions emphasise that the separation of an outcome (attainment of higher education) from the analysis of its negation (no attainment) is important because a causal asymmetry. In other words, the condition may be consistently connected to one but not the other. Thus, configurational analysis treats each case (an individual's) as a combination of parental characteristics as the basis of analysis and assumes interplay between them (Ragin 2008; Glaesser 2015). Therefore, this approach allows us to understand the attainment of higher education as a result of intersecting and reinforcing parental resources and to overcome the difficulties in interpretation and multicollinearity of higher-order interactions in regression models (Glaesser and Cooper 2012; Glaesser and Cooper 2014; Vis 2012).

We see our contribution as being valuable in at least two ways. First, we elaborate on the multidimensional explanations of parental resources in facilitating children's educational paths. Secondly, we separate the examination of combined advantages from that of combined disadvantages to emphasise potential asymmetries in these relationships by employing a novel configurational approach.

The analysis is based on the International Assessment of Adult Competencies (PIAAC) in 2011–2012.

Transmission of parental resources: mechanisms, multidimensionality and accumulation

At the conceptual level, social origin is usually approached as a multidimensional construct and different parental resources are often considered to be important in intergenerational transmission of educational advantage (De Graaf et al. 2000). Multidimensionality of social origin has important implications for our topic. Multidimensionality means that several, not just one, parental resources are important in structuring educational attainment of the individual.

Sociology theories emphasize the importance of parental non-monetary resources used to secure children's educational success. The cultural resource hypothesis argues that the effect of social background on educational attainment is also due to the higher level of cultural resources of privileged parents (Bourdieu 1977; Bourdieu and Passeron 1990). Cultural capital is differentiated into three subtypes: embodied (competences, manners, tastes, cultural knowledge etc.), objectified (books, pictures etc.) and institutionalized (educational credentials) (Bourdieu 1977). Theorists commonly assume that embodied capital is necessary for objectified capital to be effectively used for enhancing institutionalised capital (Lamont and Lareau 1988). There is an important difference between the possession and the activation of cultural capital (Lareau and Horvat 1999). It is possible to transmit objectified cultural capital but the ability to appreciate or consume cultural objects presupposes cultural capital in its embodied form. Cultural capital involves a range of elite status signals that have been a challenge to operationalise (Reay 2004). Empirical research focuses on different indicators, for example on participation in highbrow cultural activities (Katsillis and Rubinson 1990; Werfhorst and Hofstede 2007) or on objectified cultural possessions (Downey1995; Evans et al. 2010).

Research emphasizes book-oriented socialisation of children, indicated by home library size (Evans et al. 2014; Sikora et al. 2019). A home library shows routine social practices where books co-exist with specific mental activities and motivational states stimulating children's cognitive skills and facilitating their academic achievement (Jæger 2009; Tramonte and Willms 2010; Jæger and Breen 2016; Mikus et al. 2020). Previous results indicate the number of books in the home is a crucial measure of parental cultural participation as well as parental interest involvement in studies of the child (for example Farkas and Hibel 2008). So, home libraries should enhance children's educational attainment. Previous studies have indeed found that children who come from homes with larger home libraries attain higher levels of education (De Graaf et al. 2000; Georg 2004; Evans et al. 2010).

There seems to be broad consensus that in modern (meritocratic) nations there are good reasons to suggest that parental education is the most important family background factor that influences children's educational success. Empirical studies confirm this expectation (Meraviglia and Buis 2011; Buis 2013; Bukodi and Goldthorpe 2013; Barone and Ruggera 2018). In this paper, we distinguish parental education as a separate resource. Parental education is considered as a critical indicator for the parents' capacity to further their children's educational career by providing informed guidance concerning navigation in the educational system. Highly educated parents will be more familiar with the educational system and are better able to help their children with schoolwork. They will stimulate their children to do well in school and will be more likely to secure a high level of educational attainment for their children (for an overview of contributing processes see Kraaykamp and van Eijck 2010).

Recently researchers started to devote more attention to the ways different resources interact to support or weaken the educational attainment of offspring (e.g. Huang 2013; Erola et al. 2016; Erola and Kilpi-Jakonen 2017; Blossfeld 2019). Various combinations of resources might produce qualitatively different outcomes (Blossfeld 2019) and parental resources can have compensating and cumulative effects (Erola and Kilpi-Jakonen 2017). The compensation effect occurs when it is possible to compensate for a low level of some parental resources with their other resources to get access to higher education. Contrary to that, respondents whose parents have a high level of some resource for attainment of higher education, might also profit from some other (additional) parental resources even more effectively (accumulation) (Erola and Kilpi-Jahonen 2017; Kailaheimo-Lönnquist et al. 2019).

Previous empirical evidence suggests that parental resources cumulate rather than substitute one another because parental resources are highly interwoven (Conley 2001; Korupp et al. 2002). Furthermore, this accumulation of resources has an often qualitatively distinct importance in influencing intergenerational transmission of educational attainment not captured by the additive approach (Ragin and Fiss 2017).

Besides accumulation of parental resources, there is a clear tendency of intergenerational transmission of advantages and disadvantages (e.g. Kallio Kauppinen and Erola 2016; Schoon and Mellis 2019). Children growing up in disadvantaged families are at an increased risk to experience similar adversities, while a favorable position is likely to become a resource that produces further relative gains in the children's generation. Attainment of education has often been viewed as highly dependent on advantages and disadvantages passed on from earlier to

later generations in terms of unequal resources and socialization patterns (Tramonte and Willms 2010; Bukodi and Goldthorpe 2013; Jæger and Karlson 2018).

Inequality in educational attainment: previous comparative research

Transmission of parental advantages and disadvantages to their children varies across countries and time, depending on a wider context, particularly by institutions (e.g. Breen and Jonsson 2005; Breen et al. 2009; Esping-Andersen and Wagner 2012). Literature (Pöyliö 2019) distinguishes between different roles institutions could play in moderating parental impact on children's educational attainment. First, they may *compensate* for the lack of resources (ibid.). Second, certain policies may even *contribute* to securing intergenerational transmission of advantage (Erola and Kilpi-Jakonen 2017; Pölyö and Kallio 2017). And lastly, institutions could *equalize*, i.e. narrow differences in intergenerational transmission of (dis)advantage.

Recent comparative literature on educational inequality offers a solid evidence for equalization in certain contexts. The comparative study of eight European countries (Breen et al. 2009) report evidence of the declining effect of social origin on children's educational attainment in all studied countries (Germany, France, Italy, Ireland, Britain, Sweden, Poland, Hungary, and the Netherlands) for women and in most of them (barring Italy and Ireland) for men. The authors claim that the important mechanism for declining educational inequality was the substantial reduction in social origin effects at the transition to secondary education but this led also to more equality in the attainment of higher education. Breen et al. (2009) report the declining trend was evident mainly for cohorts born between the mid-1930s and the mid-1950s. Afterwards the decline slows down or even disappears for some countries. Esping-Andersen and Wagner (2012) also report about one-directional equalization process, especially in the Nordic countries. They state there were no real disadvantages of low social origins both at the secondary and tertiary levels of education, but the advantages persisted for those with 'salariat' origins. They explain such asymmetries by aggressive egalitarian welfare state measures in Nordic countries. However, they found that in Italy educational inequalities remained quite persistent.

In some post-socialist countries, a stable or even increasing impact of social origin on children's educational attainment has been revealed. This has been the case for instance in Hungary (Goldthorpe and Bukodi 2010), in the Czhechia (Mateju et al. 2003), in Estonia (Saar and Aimre 2013; Helemäe et al. 2020) and in Russia (Gerber 2000).

Comparing the effect of different social origin measures Bukodi and Goldthorpe (2013) report the stable effect of social class (i.e. family economic resources available for the support of children's education), declining effect of social status (i.e. family socio-cultural resources available for the support of children's education) and increasing effect of parental education over time in the United Kingdom. Bukodi et al. (2014) reached similar conclusion in their comparative analysis of the United Kingdom and Sweden. However, once they extended their sample to include four countries to include also Germany and Italy), the cross-country differences in the magnitude of those effects became evident, revealing the relative importance of social class in the United Kingdom and Sweden and social status and education in Germany and Italy. As a consequence, they argue for the importance of multidimensionality of conceptualization of social origin and the design of country's educational system in analyzing intergenerational transmission of education.

Barone and Ruggera (2018) reveal similar cross-regime variety in analyzing educational inequalities across 26 European countries. They found clear evidence of declining inequalities for Sweden, the Netherlands, France and Italy, whereas in the United Kingdom and Ireland equalization was milder. They indicated quite stable effect of social origin on educational attainment in Germany. However, the equalization was pronounced between cohorts born in 1930-1944 and 1945-1954. This trend weakened considerably or even flattered for most European countries in following cohorts (1955-1964 and 1965-1980). The pattern for post-socialist countries was more varied (declining educational inequalities in most of them, but a curvilinear trend in Hungary, Russia, Romania and Bulgaria).

Most previous research has analyzed the effect of each variable of social origin (each parental resource) separately (Bukodi et al. 2018 being one of the exceptions). We, however, focus on the **combinatorial nature of disadvantages and advantages concentrating on two opposite groups**: people with advantageous and disadvantageous social origins and their linkages with the attainment of higher education.

Research has identified many conflicting pressures that favor both the persistence and the decline of intergenerational transmission of advantages and disadvantages primarily in educational expansion[1], equality of condition and equality of opportunity policies etc. (see Raftery and Hout 1993; Lucas 2001; DiPrete 2002; Esping-Andersen and Wagner 2012; Alon 2014; Downey and Condron 2016; Bukodi et al. 2018; Jackson 2019). These different pressures can coexist, but it is difficult to estimate which of them prevails. For this reason, it is difficult

to formulate clear-cut hypotheses concerning differences between countries and cohorts, since these mechanisms do not necessarily operate in same directions across countries.

Data, variables and analytical strategy

Data and variables

Our data source is the Programme for the International Assessment of Adult Competencies (PIAAC). Developed by the OECD and collected between 2011 and 2012, the PIAAC provides internationally comparable data on skills in adult populations in 24 countries, 6 of which are the focus of our analysis: the Czech Republic (CZ), Germany (DE), Estonia (EE), Italy (IT), Sweden (SE), and the United Kingdom (UK). The PIAAC background questionnaire includes also factors, which influence the development and maintenance of skills such as education, social background, engagement with literacy and numeracy and ICTs etc. The survey was implemented by interviewing adults aged 16 to 65 years in their homes – 5,000 individuals in each participating country. We select respondents aged 25-64 and distinguish between three cohorts: cohort 1 (cohort born in 1948-1967), cohort 2 (cohort born in 1968-1977), and cohort 3 (cohort born in 1978-1987). By separating three cohorts we aim to to capture potential changes in countries' educational landscapes and its impact on higher education attainment of offspring with diverse backgrounds. Details on the numbers of respondents in each country and cohort and the descriptions of the main dimensions included in the analyses are presented in Appendix 1.

Our outcome is attainment of higher education[2] (*eduattain*), which is operationalised and based on the PIAAC question asking for the highest level of formal education obtained by the respondent. We dichotomised our outcome to distinguish between respondents with university degrees versus those without. Appendix 1 maps the patterns of the expansion of higher education, i.e. as expected we can detect higher shares of respondents with higher education among later cohorts (the difference between the first and the third cohort is approximately 10 percentage points - 21% versus 32% of respondents on average respectively have higher education). Both SE (40%) and UK (39%) stand out as countries where educational expansion has been the highest, while IT (24%) lags. At the same time, changes in the share of people with higher education between older and younger cohorts have been quicker in CZ and IT (from 18% to 29% in CZ, and from 14% to 24% in IT).

We have three independent variables characterising parental family resources: the mother's educational resources (*medu*); the father's educational resources (*fedu*); and the family's cultural resources (books)[3]. Parental education is operationalised based on the PIAAC question about the highest level of education for the respondent's mother/father. In addition to parental education, we have included the dimension of parental objectified cultural capital, operationalised by the number of books in the parental home when the respondent was about 16 years old (see Appendix 2 about operationalisation). Previous research shows that parents' books are correlated with other aspects of parental cultural resources (for example, reading behavior, cultural participation etc.) (De Graaf et al. 2000; Sullivan 2001). This measure is commonly used in education research as a proxy for cultural capital. However, there is also growing criticism against using books (Engzell 2018)[4]. We controlled for the potential selective non-response and the measurement error stemming from potential under-reporting. While the non-response rate is low across our sample (less than 1%), this is slightly biased toward the low-educated. In general, families in IT and UK tend to have fewer books at home than those in CZ, EE, SE, and DE. Unfortunately, the PIAAC dataset does not include any indicators for parental embodied cultural capital. Interpreting our results, we should bear in mind that our parental capital indicators might also incorporate the impact of parental embodied cultural capital.

To conclude, in our analysis we distinguish between two types of dimensions – outcome (attainment of higher education) and explanatory conditions (parental resources). Cases (respondents, i.e. offspring in our study) are understood as differing combinations of these dimensions.

Analytical strategy

In previous research, a multidimensional approach to social origin has been applied in one of two major ways: (a) several measures of social origin are included simultaneously into the analyses or (b) dimensions of social origin are combined into one measure (Blossfeld 2019). In this paper, we follow a different approach using *configurational analysis and resulting coincidence measures that are based on set-theoretic logic*. The main difference between our approach and classical statistical analysis is that it operates with (co-)presences and absences instead of covariations. Furthermore, in the case of configurational analysis, combinations (i.e. configurations) have distinctive qualities and explanatory power instead of measuring isolated independent effects[5].

In analysing inequality of parental resources, we rely on set-theoretic measures of overlapping advantages versus disadvantages, with a special focus on the different ways advantages and disadvantages are combined by country and cohort. We start with coincidence analysis, which is the assessment of the degree of overlap of multiple advantages and multiple disadvantages. Here the central focus is on *set coincidence*, that is defined as the degree to which two or more sets of respondents have overlap overlapping memberships[6]. In other words, the degree to which, in case of our data, the set of respondents who have both parents with higher education overlaps with the set of respondents who have only one parent with higher education. The higher the overlap (i.e. set coincidence), the higher the degree of cumulation of parental capital. We distinguish between *advantageous* and *disadvantageous sets*. The former consists of respondents with exceptional advantages -- meaning respondents whose parents (mother's educational capital indicated by the acronym 'medu' and father's 'fedu') both have higher education (ISCED 5A, 6) and more than 200 books at home. The latter are respondents with acute disadvantages -- consisting of respondents whose parents both have secondary or lower (ISCED 1, 2 and 3C short) education and fewer than 100 books at home (corresponding labels are nomedu, nofedu, nobooks)[7].

We analyse 3-way advantages and disadvantages. Thus, the groups/sets under investigation are:

3-way advantaged = medu * fedu * books

3-way disadvantaged = nomedu * nofedu * nobooks.

After set coincidence analysis we move on to examine the degree to which these coinciding advantages and disadvantages are linked to the attainment and non-attainment of higher education. In other words, we aim to analyse three aspects of associations. First, how consistently the indicators of cumulative parental advantages (i.e. our set coincidence measures) are associated with the educational attainment of the respondent. Secondly, how consistently the indicators of cumulative parental disadvantages are associated with the educational non-attainment of respondent. Thirdly, what the main trends of these linkages are across cohorts in the participating countries. For that we calculate the measures of *subset consistence* and *outcome coverage*. Subset consistency indicates how consistently the individuals who combine exceptionally advantageous backgrounds (or alternatively, who combine acute disadvantages) attend higher education (or in case of acute disadvantages not attend higher education)[8]. Outcome coverage, at the same time, shows the prevalence of a combination of advantages/disadvantages among all those who have attained/not attained higher education[9].

These measures range from 0 to 1, with 1 indicating a perfect subset relation. However, in social sciences we can hardly talk about the perfect subset relations and therefore the parameters of consistency and coverage are used to measure the degree, to which the subset relation is approximated. While there are no absolute standards to set the benchmark for consistent subset relations, generally a consistency score of 0.75 is seen as the minimum cut-off point for a reliable analysis of sufficiency (Schneider and Wagemann 2012).

Analysis and Results

Coinciding advantages and disadvantages

First, we examine the accumulation of parental resources of respondents across birth cohorts and countries. The measures of coinciding advantages and disadvantages are given in Figure 1 (given also in Appendix 3). Figure 1 reveals that the overlap of advantages increases in almost all countries (except IT) indicating the increasing accumulation of advantageous parental resources such as higher educated parents and lots of books at home in most of our case countries. The degree of coinciding advantages is highest for younger cohorts, being as high as 0.26 in SE, 0.23 in EE and 0.21 in DE. This means, that in those countries the overlap between respondents with exceptional advantages (i.e. they have all three categories of beneficial parental resources) and those respondents with only one of them is more than 20 percent. This indicator is somewhat lower in CZ and UK, and the lowest in IT, which is the only country where we do not see the growing accumulation of advantages (as a robustness check we report also two-way – the accumulation of mother' and father's advantages and disadvantages and while the degree of overlap is higher – in case of youngest cohorts in EE and SE close to 0.5, the cross-generational and cross-country trends are relatively similar to three-way cumulation).

The right-side panel of Figure 1 shows that acute disadvantages tend to coincide to a much greater degree than exceptional advantages, being as high as 0.80 in IT in the case of cohort 1. In other words, in case of the oldest cohort in IT, the set of respondents who misses all the advantageous characteristics of parental resources analysed overlaps 80 percentage with the set who misses at least one. While this degree of cumulative disadvantages in IT decreases for younger cohorts, it is still the highest - 0.58 for cohort 3. The accumulation of disadvantages of the older cohorts is also quite high in SE, UK, and EE, but this accumulation is sharply decreasing in these countries. Compared to other countries, CZ and DE have moderately low degrees of accumulative disadvantages, especially for the two older cohorts.

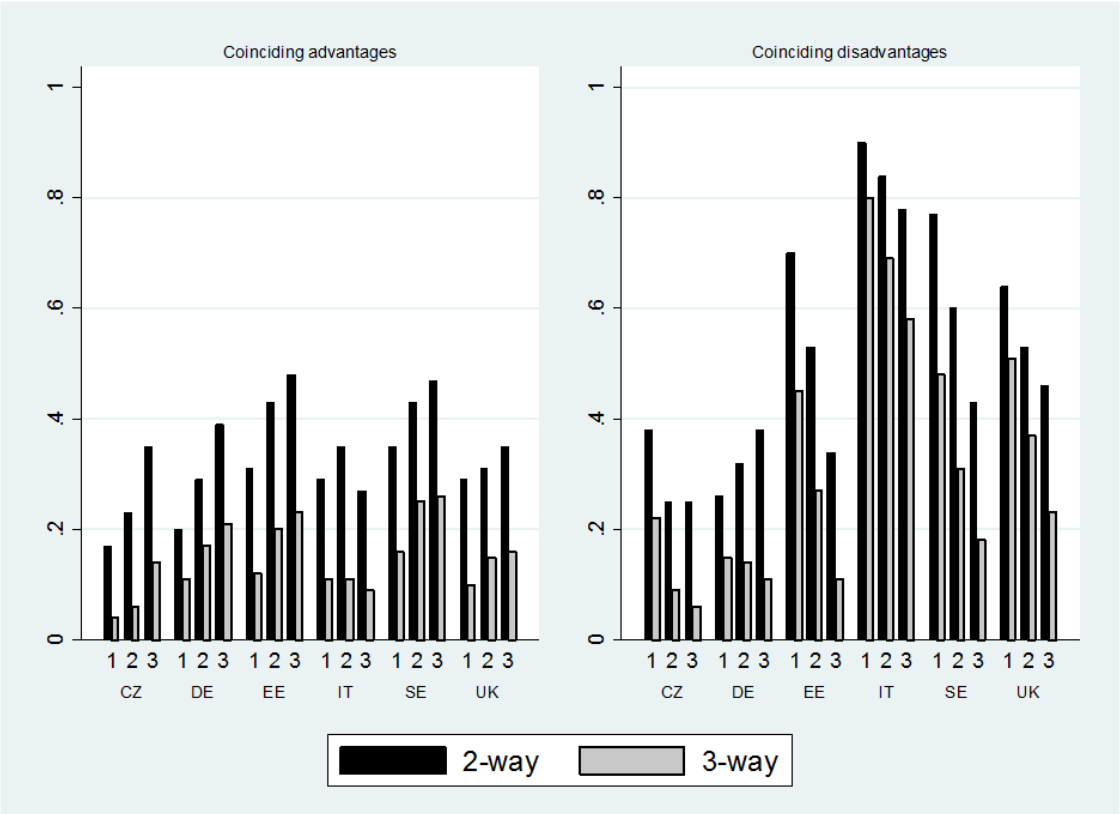


Figure 1. Coinciding advantages and disadvantages across countries and cohorts (1, 2, and 3)

Source: own calculation based on PIAAC 2011/2012.

Notes: Czech Republic (CZ), Estonia (EE), Germany (DE), Italy (IT), Sweden (SE), and the United Kingdom (UK). For comparison we visualised also 2-way advantages and disadvantages which means the accumulation of parental educational capital or the lack of it.

Parental resources and attainment of higher education

We proceed with the analysis of subset consistencies to explore the link between parental background and attainment of higher education (eduattain). Table 1 presents the subset consistencies and outcome coverages of all our case countries (visualised also in Figure 2). To remind, subset consistency indicates the consistency of the link between a particular combination of parental resources (or the lack of it) and educational attainment/non-attainment. Outcome coverage shows the empirical relevance of this link. We can detect a well-known trade-off between these two parameters of fit: the higher the consistency score, the lower the coverage tends to be (Schneider and Wagemann 2012). In IT, for instance, the link between exceptional advantages and attainment of higher education is very high (over 0.9 in the case of

cohort 1) indicating that the cumulation of advantageous background guarantees higher education in IT with the consistency of 0.9. At the same time, the degree to which all respondents who have higher education is "covered" by that exceptionally advantageous background, is low (8%). The left side panel of Figure 2 reveals that countries are becoming more diverse in terms of the degree to which advantageous background is linked to the attainment of higher education (see also Table 1 for exact values). In SE, UK and CZ the link between exceptional advantages and attainment of higher education has increased, in DE it has remained quite stable but in EE and IT has decreased. Still, compared to other countries analysed, in EE and DE the advantageous social origin has a somewhat weaker link with the attainment of higher education, especially for the youngest cohort. For SE, UK and IT, we see much higher subset consistencies (0.69-0.74) indicating that the link between advantageous background and educational attainment is consistent for the youngest cohort. It means that in CZ and UK for younger cohorts and in IT for older cohorts, the exceptionally advantageous background is sufficient to attain higher education.

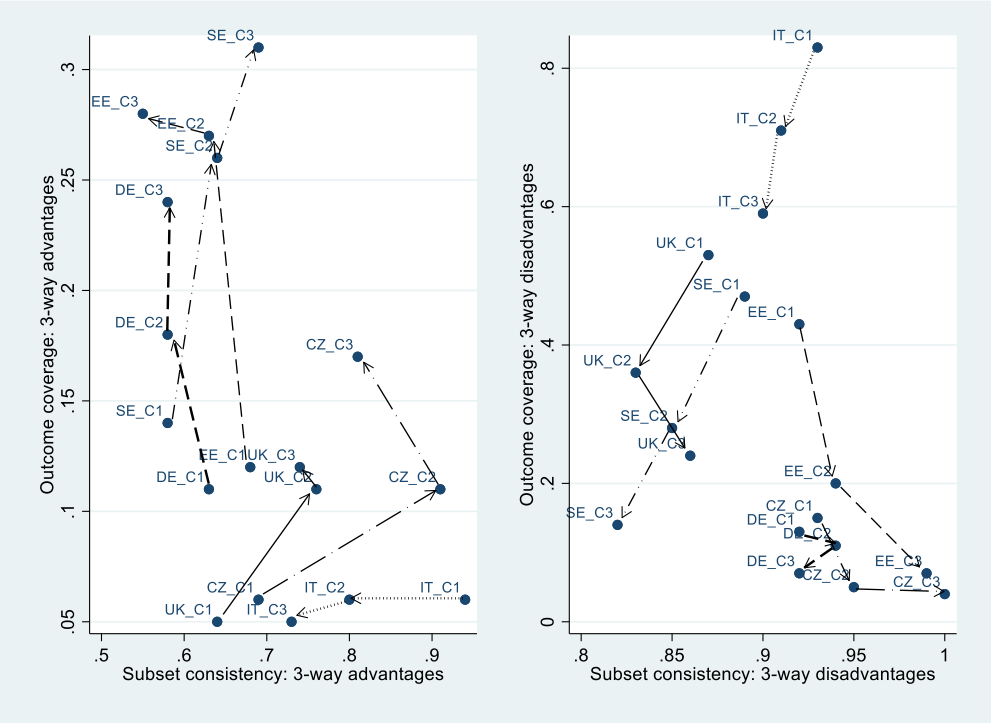
Table 1. Subset consistencies and outcome coverage of advantageous and disadvantageous groups

	Subset consistency			Outcome coverage		
	Cohort 1	Cohort 2	Cohort 3	Cohort 1	Cohort 2	Cohort 3
Advantageous group, has attained higher education						
Czech Rep.	0.69	0.91	0.81	0.06	0.11	0.17
Germany	0.63	0.58	0.58	0.11	0.18	0.24
Estonia	0.68	0.63	0.55	0.12	0.27	0.28
Italy	0.94	0.80	0.73	0.06	0.06	0.05
Sweden	0.58	0.64	0.69	0.14	0.26	0.31
UK	0.64	0.76	0.74	0.05	0.11	0.12
Disadvantageous group, has not attained higher education						
Czech Rep.	0.93	0.95	1.00	0.15	0.05	0.04
Germany	0.92	0.94	0.92	0.13	0.11	0.07
Estonia	0.90	0.94	0.99	0.43	0.20	0.07
Italy	0.93	0.91	0.90	0.83	0.71	0.59
Sweden	0.89	0.85	0.82	0.47	0.28	0.14
UK	0.87	0.83	0.86	0.53	0.36	0.24

Source: authors' calculations based on PIAAC 2011.

We proceed with the subset consistency and outcome coverage analysis of disadvantageous groups and explore the connection between acute disadvantages and (higher) educational non-attainment (*noeduattain*). Figure 2 indicates that the degrees of these connections are much higher (pay attention to different scales of X and Y axes) compared to advantages and attainment of higher education (see also Table 1 for concrete values).

Figure 2. Outcome coverages and subset consistencies: advantages vs disadvantages



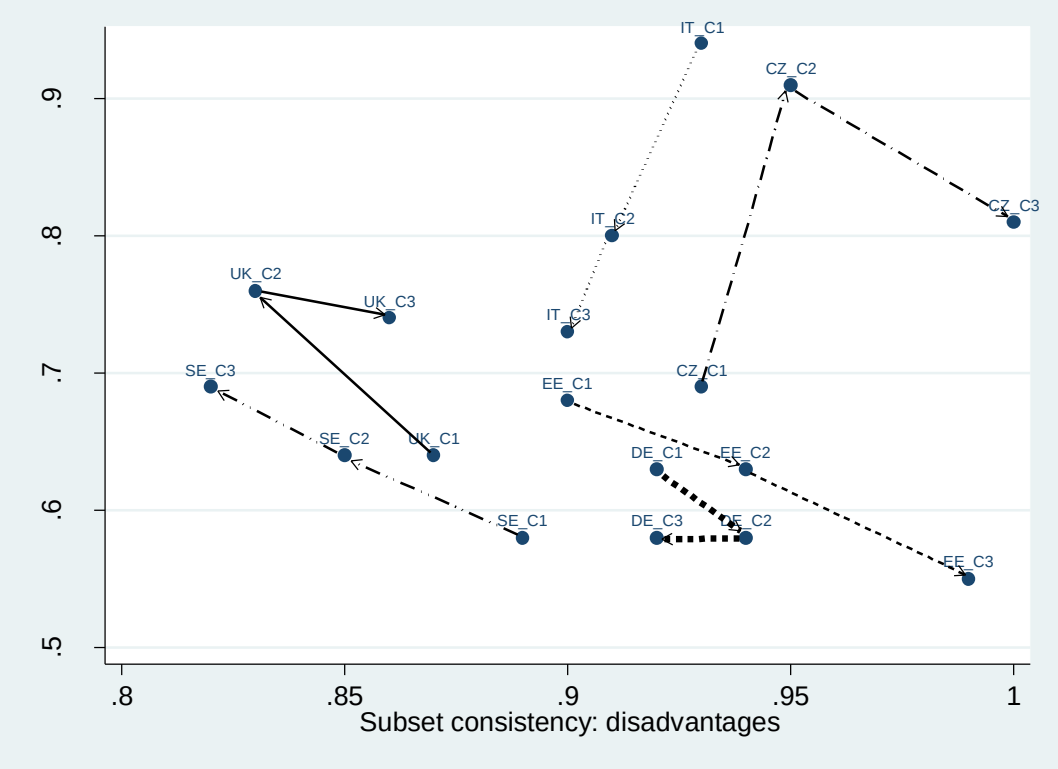
Source: own calculation based on PIAAC 2011/2012.

Notes: CZ_C1 — CZ_C3 (Cohorts 1-3 in Czech Republic), EE_C1 — EE_C3 (Cohorts 1-3 in Estonia), DE_C1 — DE_C3 (Cohorts 1-3 in Germany), IT_C1 — IT_C3 (Cohorts 1-3 in Italy), SE_C1 — SE_C3 (Cohorts 1-3 in Sweden), UK_C1 — UK_C3 (Cohorts 1-3 in the United Kingdom).

Thus, the link between an acutely disadvantageous background and absence of higher education is much stronger and more prevalent. However, its empirical relevance is decreasing in all analysed countries as indicated by the measure of outcome coverage. At the same time the trend of the degree, to which acute disadvantages guarantee the absence of higher educational attainment is more diverse. The only country where the situation is improving for the disadvantageous is SE, as the link between the accumulation of disadvantages and absence of higher education is decreasing across cohorts. Still, even for youngest cohort in SE it is 0.82, meaning that while this is the lowest value, acute disadvantages are sufficient to not to attain higher education for Swedish youngest cohort. In DE and IT the situation with subset consistency is stable and in CZ, EE and UK this link is increasing. For younger cohorts in CZ and EE, this means that in those countries for youngest cohort acute disadvantageous parental background is sufficient to not to attain higher education with consistency as high as 0.99 and 1.

Finally, in Figure 3, we scatter associations between advantages/educational attainment and disadvantages/educational non-attainment, in order to be able to explore the overall dynamics and potential asymmetries in these pairings.

Figure 3. Asymmetries of changes of subset consistencies of advantages and disadvantages



Source: own calculation based on PIAAC 2011/2012.

Notes: CZ_C1 — CZ_C3 (Cohorts 1-3 in Czech Republic), EE_C1 — EE_C3 (Cohorts 1-3 in Estonia), DE_C1 — DE_C3 (Cohorts 1-3 in Germany), IT_C1 — IT_C3 (Cohorts 1-3 in Italy), SE_C1 — SE_C3 (Cohorts 1-3 in Sweden), UK_C1 — UK_C3 (Cohorts 1-3 in the United Kingdom).

In general, changes across cohorts are smallest in DE, leaving that country with one of the lowest levels of intergenerational associations of advantages in explaining respondents' attainment of higher education and high levels of intergenerational associations of disadvantages in explaining respondents' absence of higher education. There are three countries, CZ, SE and UK, where the association between parental advantages and higher education increases for younger cohorts, making the advantageous background close to sufficient (above 0.75) for higher education in younger cohorts in CZ and UK. In EE and IT, at

the same time, the link between advantageous background and higher education is unidirectionally weakening. Regarding disadvantages, in IT and SE the association between acute disadvantageous background and absence of higher education diminishes, in UK the trend is not clear and in CZ and EE the importance of disadvantages increases across all cohorts.

Conclusion

This paper aimed to explore how parental resources work together to secure higher education for their offspring. More specifically, we, *initially* aimed to map the diversity of cumulative (coinciding) advantages and disadvantages of respondents' parental resources across countries and cohorts; and *secondly*, sought to explore the linkages between these cumulative patterns and respondents' educational attainment. To do that we applied set-theoretic measures that better enabled the capture of the importance of the accumulation of parental resources (or the lack of it) and the asymmetry in intergenerational transmission of parental resources.

Our results suggest important cross-country differences in terms of inherited advantages and disadvantages, as well as patterns of change over time. First, we showed that the degree of coinciding disadvantages is much higher compared to coinciding advantageous and with some exceptions, coinciding advantages are an increasing, and coinciding disadvantages a decreasing trend. Secondly, we showed that the absence of parental resources hinders higher educational attainment of offspring to a much larger extent than the presence of parental resources enables it. In other words, disadvantageous parental background is sufficient for offspring cohorts to be left out from higher education in all six analysed countries across all cohorts. However, the prevalence of that 'route' to the non-attainment of higher education is relatively low, except in Italy. The relative importance of disadvantages accords with Borgna (2013) and Ragin and Fiss (2017) who have also pointed out that factors of disadvantage coincide more than factors of advantage. Inherited disadvantages are very persistent in most studied countries.

Regarding country specificities, we found that Italy and the Czech Republic have the most explicit connections in both directions, i.e. linkages between the presence and absence of parental resources and higher educational attainment. However, the importance of advantages is decreasing in Italy.

Germany has quite a stable pattern in both directions, i.e. linkages between the presence and absence of parental resources and higher educational attainment do not change greatly in cohort-based comparisons. However, similarly to other countries acutely disadvantageous

parental background is sufficient to not to attain higher education in Germany across all cohorts. Estonia stands out as a country where the trends are most consistently moving in the opposite directions – the situation is improving in case of the importance of inherited advantages whereas worsening in case of inherited disadvantages, being one of the highest (0.99) among all countries analysed in case of the youngest cohort. In the United Kingdom, it is the other way around—advantages are increasingly associated with attainment of higher education, while the connection between disadvantages and educational non-attainment has not changed. This somewhat supports the previous analysis by Bukodi and Goldthorpe (2013) and Bukodi et al. (2018) about cohort differences in the combined effects of social origin.

Somewhat surprisingly the importance of inherited advantaged turned out to be increasingly relevant also in Sweden. At the same time Sweden is exceptional among our case countries with the lowest and steadily decreasing importance of disadvantageous background in hindering higher educational attainment. This finding corresponds to previous conclusions by Esping-Andersen and Wagner (2012) who argue that the equalization of life chances has primarily occurred at the bottom of the social hierarchy and that this is most clearly manifested in the Nordic countries.

Our analyses leave room for further investigation and improvements. The PIAAC data lack information on many of the dimensions of parental resources. It does not include any indicators for parental embodied cultural capital (measures of cultural attitudes, behaviours etc.) as well as other dimensions of social background (economic and social capital). However, previous research indicates the declining significance of parental class origin as a measure of economic resources on educational attainment of children, at least in some contexts (Bukodi et al. 2018). We admit that the relationship between parental economic capital and educational attainment is necessary for a more complete analysis of intergenerational social transmission, but we leave this for a separate endeavour. The movement of societies towards digital literacy should also be considered. It is possible that the concept of books will become obsolete as an indicator of cultural capital. However, previous research indicates that the effect of home libraries is large with no sign of decrease over time (Sikora et al. 2019). Nevertheless, future surveys should collect information about the use of audio books and e-books and take into account the endogeneity of books revealed in literature (Engzell 2018).

There is one other limitation. The operationalization (calibration) of the outcome and the conditions is the same across countries and cohorts. The relative (or positional) value of education varies depending on the distribution of education within the whole population (Shavit

and Park 2016). We were not able to use the relative value of education because the PIAAC dataset includes only a 3-point scale for parental education (secondary and lower; lower tertiary; higher). However, we were able to run a robustness check by using alternative relative measures for books, but this only marginally changed our measure of subset consistencies and outcome coverages.

References

Albright, K. 2008. "In families or as individuals? Theoretical and methodological problems in the incorporation of women in class analysis." *Sociology Compass* 2(5): 1672–1689.

Alon, S. 2014. "Continuing to Build a Theory of Inequality in Higher Education: Claims, Evidence, and Future Directions." *American Sociological Review* 79(4):817-824.

Barone, C., and L. Ruggera. 2018. "Educational equalization stalled? Trends in inequality of educational opportunity between 1930 and 1980 across 26 European nations." *European Societies* 20(1): 1–25.

Beller, E. 2009. "Bringing intergenerational social mobility research into the twenty-first century: why mothers matter." *American Sociological Review* 74(4): 507–528.

Blossfeld, P. N. 2019. "A multidimensional measure of social origin: theoretical perspectives, operationalization and empirical application in the field of educational inequality research." *Quantity & Quality* 53: 1347–1367.

Borgna, C. 2013. "Fuzzy-Set Coincidence Analysis: the Hidden Asymmetries." *Compass Working Paper* No 72.

Bourdieu, P. 1986. The forms of capital. Pp. 241-258 in *Handbook of Theory and Research for the Sociology of Education*, edited by J. G. Richardson. Ney York: Greenwood.

Bourdieu, P. and J.-C. Passeron. 1990. *Reproduction in Education, Society, and Culture*. London: Sage.

Breen, R., and J. O. Jonsson. 2005. "Inequality of Opportunity in Comparative Perspective: recent Research on Educational Attainment and Mobility." *Annual Review of Sociology* 31: 223-243.

Breen, R., R. Luijkx, W. Müller, and R. Pollak. 2009. "Nonpersistent inequality in educational attainment: Evidence from eight European countries." *American Journal of Sociology* 114(5): 1475–521.

Buis, M. L. 2013. "The Composition of Family Background: The Influence of the Economic and Cultural Resources of both Parents on the Offspring's Educational Attainment in the Netherlands between 1939 and 1991." *European Sociological Review* 29(3): 593–602.

Bukodi, E., and J. 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.

Bukodi, E., J. Goldthorpe, and R. Erikson. 2014. "The effects of social origins and cognitive ability on educational attainment: Evidence from Britain and Sweden*." Acta Soociologica* 57(4): 293-310.

Bukodi, E., F. Eibl, S. Buchholz, S. Marzadro, A. Minello, S. Wahler, H.-P. Blossfeld, R. Erikson, and A. Schizzerotto. 2018. "Linking the Macro to the Micro: A Multidimensional

Approach to Educational Inequalities in Four European Countries." *European Societies* 20(1): 26–64.

Conley, D. 2001. "Capital for college: parental assets and postsecondary schooling." *Sociology of Education* 74(1): 59–72.

De Graaf, N. D., P. M. De Graaf, and G. Kraaykamp. 2000. "Parental cultural capital and educational attainment in the Netherlands: A Refinement of the cultural capital perspective." *Sociology of Education* 73(2): 91–111.

DiPrete, T. 2002. "Life Course Risks, Mobility Regimes, and Mobility Consequences: A Comparison of Sweden, Germany, and the United States." *American Journal of Sociology* 108(2): 267-309.

Downey, D. B. 1995. "When Bigger is not Better: Family Size, Parental Resources, and Children`s Educational Performance." *American Sociological Review* 60(5): 746-61.

Downey, D. B. and D. J. Condron. 2016. "Fifty Years since the Coleman Report: Rethinking the Relationship between Schools and Inequality." *Sociology of Education* 89(3): 207-220.

Engzell, P. 2018. What do books in the home Proxy for? A cautionary tale. *Sociological Methods & Research*, 0049124119826143.

Erikson, R. 2016. "Is it enough to be bright? Parental background, cognitive ability and educational attainment." *European Societies* 18: 117–135.

Erikson, R. and J. O. Jonsson. 1996. "Explaining class inequality in education: the Swedish test case." Pp. 1-63 in *Can Education be Equalized? The Swedish Case in Comparative Perspective,* edited by R. Erikson and J. O. Jonsson. Westview Press, Boulder.

Erola, J., S. Jalonen, and H. Lehti. 2016. "Parental education, class and income over early life course and children's achievement." *Research in Social Stratification and Mobility* 44: 33–43.

Erola, J., and E. Kilpi-Jakonen (Eds.). 2017. *Social Inequality across the Generations: The Role of Resource Compensation and Multiplication in Resource Accumulation*. Edward Elgar Publishing.

Esping-Andersen G, and S. Wagner. 2012. "Asymmetries in the opportunity structure. Intergenerational mobility trends in Europe" *Research in Social Stratification and Mobility* 30: 473-487.

Evans, M. D. R., J. Kelley, and J. Sikora. 2014. "Scholarly culture and academic performance in 42 nations." *Social Forces* 92(4): 1573-1605.

Evans, M. D. R., J. Kelley, J. Sikora, and D. J. Treiman. 2010. "Family scholarly culture and educational success: Books and schooling in 27 nations." *Research in Social Stratification and Mobility* 28: 171-97.

Farkas, G., and J. Hibel. 2008. "Being unready for school: Factors affecting risk and resilience." Pp. 3-30 in *Disparities in school readiness: How families contribute to transitions into school,* edited by A Booth, and A. C. Crouter. New York, NY: Lawrence Erlbaum Associates.

Georg, W. 2004. "Cultural capital and social inequality in the life course." *European Sociological Review* 20(4): 333-344.

Gerber, T. 2000. "Educational stratification in contemporary Russia: Stability and change in the face of economic and institutional crisis." *Sociology of Education* 73(4): 219-246.

Giudici, F. and J.-A. Gauthier. 2009. "The Differentiation of Occupational Trajectories across the Transition to Parenthood in Switzerland." *Swiss Journal of Sociology* 35(2): 253-78.

Glaesser, J. 2015. *Young People's Educational Careers I England and Germany: Integrating Survey and Interview Analysis via Qualitative Comparative Analysis*. Palgrave McMillian, India.

Glaesser, J., and B. Cooper. 2012. "Educational achievement in selective and comprehensive local education authorities: a configurational analysis." *British Journal of Sociology of Education* 33(2): 223–244.

Glaesser, J., and B. Cooper. 2014. "Gender, parental education, and ability: their interacting roles in predicting GCSE success." *Cambridge Journal of Education* 42(4): 463–480.

Goldthorpe, J. and E. Bukodi. 2010. "Market versus meritocracy: Hungary as a critical case." *European Sociological Review* 26(6): 731-744.

Helemäe, J., Saar, E. and Lauri,. T. 2020. „How educational, economic and cultural resources do matter: cohort differences in the impact of parental resources on educational attainment in the socialist and post-socialist context". *International Journal of Sociology*: DOI: 10.1080/00207659.2020.1856543.

Huang, J. 2013. "Intergenerational transmission of educational attainment: The role of household assets." *Economics of Education Review* 33: 112–123.

Jackson, M. 2019. "Expansion, Enrollment, and Inequality of Educational Opportunity." *Sociological Methods and Research* https://doi.org/10.1177/0049124119852376

Jæger, M. M. 2009. "Equal Access but Unequal Outcomes: Cultural Capital and Educational Choice in a Meritocratic Society." *Social Forces* 87(4): 1943–1972.

Jæger, M. M., and R. Breen. 2016. "A Dynamic Model of Cultural Reproduction." *American Journal of Sociology* 121(4): 1079–115.

Jæger, M., and A. Holm. 2007. "Does parents economic, cultural and social capital explain the social class effect on educational attainment in the Scandinavian mobility regime?" *Social Science Research* 36: 719–744.

Jæger, M. and K. Karlson. 2018. "Cultural Capital and Educational Inequality: A Counterfactual Analysis." *Sociological Science* 5: 775-795.

Kailaheimo-Lönnqvist, S., E. Kilpi-Jakonen, A. O. Tanskanen, and J. Erola. 2019. "Behind every successful (wo)man is a successful parent-in-law? The association between resources of the partner's parents and individual's occupational attainment." *Research in Social Stratification and Mobility* 64.

Kallio, J. M., T. M. Kauppinen, and J. Erola. 2016. "Cumulative Socio-economic Disadvantage and Secondary Education in Finland." *European Sociological Review* 32(5): 649-661.

Katsillis, J., and R. Rubinson. 1990. "Cultural Capital, Student Achievement, and Educational reproduction: The Case of Greece." *American Sociological Review* 55(2): 270-279.

Korupp, S. E., H. B. G. Ganzeboom, and T. Van Der Lippe. 2002. "Do Mothers Matter? A Comparison of Models of the Influence of Mothers' and Fathers' Educational and Occupational Status on Children's Educational Attainment." *Quality & Quantity* 36: 17–42.

Kraaykamp, G., and K. van Eijck. 2010. "The intergenerational reproduction of cultural capital: A threefold perspective." *Social Forces* 89(1): 209–31.

Lareau, A., and E. M. Horvat. 1999. "Moments of Social Inclusion and Exclusion: Race, Class, and Cultural Capital in Family-School Relationship." *Sociology of Education* 72(1): 37–53.

Lamont, M., and A. Lareau 1988. "Cultural capital: allusions gaps and glissandos in recent

theoretical developments." *Social Theory* 6(2): 153-168.

Lucas, S. R. 2001. "Effectively Maintained Inequality: Educational Transitions and Social Background." *American Journal of Sociology* 106(6):1642-1690.

Mateju, P., B. Rehakova, and N. Somonoova. 2003. "Transition to university under communism and after its demise." *Czech Sociological Review* 39(3): 301-324.

Meraviglia, C., and M. L. Buis. 2015. "Class, Status, and Education: The Influence of Parental Resources on IEO in Europe, 1893–1987." *International Review of Social Research* 5(1): 35–60.

Mikus, K., N. Tieben, and P. S. Schober. 2020. "Children's conversion of cultural capital into educational success: the symbolic and skill-generating functions of cultural capital." *British Journal of Sociology of Education* 41(2): 197-217.

Pöyliö, H. 2019. *Institutions and the intergenerational transmission of socioeconomic resources*. University of Turku.

Pöyliö, H., and J. Kallio. 2017. "The Impact of Education and Family Policies on Intergenerational Transmission of Socioeconomic Status in Europe." Pp. 204-224 in *Social Inequality Across the Generations – The Role of Compensation and Multiplication in Resource Accumulation*, edited by J. Erola, and E. Kilpi-Jakonen. Cheltenham: Edward Elgar,

Ragin, C. C. 1987. *The Comparative Method: Moving Beyond Qualitative and Quantitative Strategies*. Berkley. Los Angeles and London: University of California Press.

Raftery, A. E. and M. Hout. 1993. "Maximally Maintained Inequality: Expansion, Reform, and Opportunity in Irish Education, 1921–75." *Sociology of Education* 66(1):41-62

Ragin, C. C. 2008. *Redesigning social inquiry: Fuzzy sets and beyond*. Chicago: University of Chicago Press.

Ragin, C. C., and P. C. Fis. 2017. *Intersectional Inequality*. Chicago: University of Chicago.

Reay, D. 2004. "'It's all becoming a habitus': beyond the habitual use of habitus in educational research." *British Journal of Sociology of Education* 25(4): 431-444.

Saar, E. and K. A. Aimre. 2013. Unequal educational transitions in Estonia: tracking and family background. *European Societies* 16(5): 694-716.

Schneider, C. Q. and C. Wagemann. 2012. *Set-Theoretic Methods for the Social Sciences: A Guide to Qualitative Comparative Analysis.* Cambridge: Cambridge University Press.

Schoon, I., and G. Melis. 2019. "Intergenerational transmission of family adversity: Examining constellations of risk factors." *PLoS ONE* 14: 1-18.

Shavit, Y., and Y. Park. 2016. "Introduction to the Special Issue: Education as a Positional Good." *Research in Social Stratification and Mobility* 43: 1-3.

Sikora, J., M. D. R. Evans, and J. Kelley. 2019. "Scholarly culture: How books in adolescence enhance adult literacy, numeracy and technology skills in 31 societies." *Social Science Research* 77: 1–15.

Sullivan, A. 2001. "Cultural capital and educational attainment." *Sociology* 35(4): 893-912.

Thaning, M., and M. Hällsten. 2020. "The End of Dominance? Evaluating Measures of Socio-Economic Background in Stratification Research." *European Sociological Review*: https://doi-org.ezproxy.tlu.ee/10.1093/esr/jcaa009.

Tramonte, L., and J. D. Willms. 2010. “Cultural capital and its effects on education outcomes.” *Economics of Education Review* 29(2): 2000–2013.

Triventi, M., N. Panichella, G. Ballarino, and C. Barone. 2016. “Education as a positional good: Implications for social inequalities in educational attainment in Italy.” *Research in Social Stratification and Mobility* 43: 39-52.

Van de Werfhorst, H. G., and S. Hofstede. 2007. “Cultural capital or relative risk aversion? Two mechanisms for educational inequality compared. ” *The British Journal of Sociology* 58(3): 391-415.

Vis, B. 2012. “The comparative advantages of fsQCA and regression analysis for moderately large-N analyses.” *Sociological Methods & Research* 41: 168–98.

Appendix 1. Descriptives

Sample / Dimension	CZ			DE			EE			IT			SE			UK		
	Respondents		%	Respondents		%	Respondents		%	Respondents		%	Respondents		%	Respondents		%
Whole	4 397			3 976			5 765			4 039			3 460			6 418		
C1: Cohort 1 (46-65)	2 037		46	2 059		52	2 735		47	1 900		47	1 690		49	2 844		44
C2: Cohort 2 (36-45)	961		22	1 021		26	1 435		25	1 252		31	857		25	1 711		27
C3: Cohort 3 (25-35)	1 406		32	896		23	1 595		28	887		22	913		26	1 863		29
	Percentages																	
	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3	C1	C2	C3
Respondent's education (AHE)																		
Higher	18	20	29	24	25	29	24	26	29	14	20	24	23	34	40	25	34	39
Other	82	80	71	76	75	71	76	74	71	86	80	76	77	66	60	75	66	61
Mother's education (MEDU)																		
Higher	3	6	12	8	16	28	10	24	37	2	3	6	10	25	40	6	11	20
Lower tertiary	49	70	76	48	60	60	26	43	51	7	16	25	11	23	30	18	33	46
Secondary and lower	48	24	13	44	24	12	63	34	13	91	81	69	79	51	29	76	56	34
Father's education (FEDU)																		
Higher	9	12	18	28	33	38	14	23	32	4	5	6	16	29	35	10	16	22
Lower tertiary	68	78	77	57	54	53	24	37	49	11	20	27	13	20	32	31	41	46
Secondary and lower	23	10	6	15	13	9	63	40	19	85	75	67	71	51	33	58	43	32
Books at parental home (BOOKS)																		
100 and less	41	35	36	64	53	45	51	33	30	84	75	70	51	37	34	71	61	59
101-200	26	27	25	17	21	19	21	24	26	9	14	15	22	20	18	15	18	19
More than 200	34	38	39	20	27	36	27	43	44	7	11	15	27	43	48	14	22	22

Source: authors' calculations based on PIAAC 2011/20

Appendix 2. Operationalisation and thresholds for advantageous and disadvantageous groups

Outcome High education of respondents			Calibration	
1	Lower secondary or less (ISCED 1, 2, 3C short or less)	eduttain		
2	Upper secondary (ISCED 3A-B, C long)			
3	Post-secondary, non-tertiary (ISCED 4A-B-C)			
4	Tertiary – professional degree (ISCED 5B)			
5	Tertiary –Bachelor's degree (ISCED 5A)		X	
6	Tertiary – Master's/PhD research degree (ISCED 5A/6)		X	
7	Tertiary – Bachelor's/Master's/PhD research degree (ISCED 5A/6)		X	
Explanatory Conditions **The highest education of mother**			**ADVANTAGES**	**DISADVANTAGES**
1	ISCED 1, 2, and 3C short	medu		X
2	ISCED 3 (excluding 3C short) and 4			
3	ISCED 5 and 6		X	
The highest education of father				
1	ISCED 1, 2, and 3C short	fedu		X
2	ISCED 3 (excluding 3C short) and 4			
3	ISCED 5 and 6		X	
Background - Number of books at home		books		
1	10 books or less			X
2	11 to 25 books			X
3	26 to 100 books			X
4	101 to 200 books			
5	201 to 500 books		X	
6	More than 500 books		X	

Appendix 3: Set coincidences, subset consistencies and outcome coverage of advantageous and disadvantageous groups

Country	Cohort	Set coincidence			
		2-way advantages	3-way advantages	2-way disadvantages	3-way disadvantages
CZ	1	0.17	0.04	0.38	0.22
CZ	2	0.23	0.06	0.25	0.09
CZ	3	0.35	0.14	0.25	0.06
DE	1	0.20	0.11	0.26	0.15
DE	2	0.29	0.17	0.32	0.14
DE	3	0.39	0.21	0.38	0.11
EE	1	0.31	0.12	0.70	0.45
EE	2	0.43	0.20	0.53	0.27
EE	3	0.48	0.23	0.34	0.11
IT	1	0.29	0.11	0.90	0.80
IT	2	0.35	0.11	0.84	0.69
IT	3	0.27	0.09	0.78	0.58
SE	1	0.35	0.16	0.77	0.48
SE	2	0.43	0.25	0.60	0.31
SE	3	0.47	0.26	0.43	0.18
UK	1	0.29	0.10	0.64	0.51
UK	2	0.31	0.15	0.53	0.37
UK	3	0.35	0.16	0.46	0.23

		Educational attainment = 1			
		Subset consistency		Outcome coverage	
Country	Cohort	2-way advantages	3-way advantages	2-way advantages	3-way advantages
CZ	C1	0.67	0.69	0.07	0.06
CZ	C2	0.73	0.91	0.13	0.11
CZ	C3	0.79	0.81	0.21	0.17
DE	C1	0.52	0.63	0.13	0.11
DE	C2	0.53	0.58	0.23	0.18

DE	C3	0.51	0.58	0.32	0.24
EE	C1	0.66	0.68	0.16	0.12
EE	C2	0.58	0.63	0.31	0.27
EE	C3	0.49	0.55	0.38	0.28
IT	C1	0.96	0.94	0.08	0.06
IT	C2	0.79	0.80	0.09	0.06
IT	C3	0.67	0.73	0.07	0.05
SE	C1	0.51	0.58	0.15	0.14
SE	C2	0.64	0.64	0.31	0.26
SE	C3	0.61	0.69	0.37	0.31
UK	C1	0.66	0.64	0.10	0.05
UK	C2	0.74	0.76	0.14	0.11
UK	C3	0.73	0.74	0.20	0.12

Educational attainment = 0

		Subset consistency		Outcome Coverage	
Country	Cohort	2-way disadvantages	3-way disadvantages	2-way disadvantages	3-way disadvantages
CZ	C1	0.92	0.93	0.22	0.15
CZ	C2	0.95	0.95	0.08	0.05
CZ	C3	0.96	1.00	0.05	0.04
DE	C1	0.92	0.92	0.15	0.13
DE	C2	0.94	0.94	0.11	0.11
DE	C3	0.91	0.92	0.08	0.07
EE	C1	0.88	0.92	0.60	0.07
EE	C2	0.92	0.94	0.32	0.20
EE	C3	0.91	0.99	0.10	0.07
IT	C1	0.92	0.93	0.89	0.83
IT	C2	0.89	0.91	0.79	0.71
IT	C3	0.89	0.90	0.69	0.59
SE	C1	0.85	0.89	0.71	0.47

SE	C2	0.79	0.85	0.46	0.28
SE	C3	0.75	0.82	0.23	0.14
UK	C1	0.86	0.87	0.60	0.53
UK	C2	0.82	0.83	0.42	0.36
UK	C3	0.86	0.86	0.29	0.24

Source: own calculation based on PIAAC 2011/2012.

Notes: Czech Republic (CZ), Estonia (EE), Germany (DE), Italy (IT), Sweden (SE), and the United Kingdom (UK). ADVS2 – 2-way advantages, ADVS3 - 3-way advantages; DISADVS2 - 2-way disadvantages, and DISADVS3 - 3-way disadvantages.

[1] Jackson (2019) calls into question the view that educational expansion has a causal effect on class-based inequalities of educational opportunity. She states the more important conceptual point is that evaluating the causal effects of educational expansion on inequality of educational opportunity is impossible unless we take into account the confounding effects of the policies that lie behind expansion.

[2] We take, as the outcome dimension, the highest level of education of respondents across age groups. This means we measure our outcome for each of the age-groups as they pass through the age cohort years. We acknowledge that it is an important restriction of our analysis. Especially as the youngest age cohort might attain higher education in later ages. Another problem is connected with the definition of university degrees, which would differentiate by countries and also between cohorts. However, this problem arises in all comparative studies. We are aware of this problem and try to account for it in interpreting both within-case and cross-case patterns of analysed associations.

[3] Unfortunately, the PIAAC dataset does not include any information about parental economic resources. Thus, we focus on the remaining two types of resources: cultural and educational resources of both parents.

[4] A recent critique indicates that self-reported books in the home are subject to sizeable and systematic errors of observation (Engzell 2018). Students from homes with many books perform better but better students accumulate more books and are better informed about their home libraries. There is also country variation: in countries where many books are the norm, the scope of underreporting is larger (Engzell 2018). We consider our scale to be sufficiently robust as not to be biased by error of observation, while capturing the major differences in parental cultural participation and their involvement in a child's studies.

[5] Configurational comparative and set-theoretic methods are increasingly taking root in social sciences starting from Ragin (1987) and related principles, guidelines, software and community are flourishing (see overview here: https://compasss.org/about/ . The most visible increase has been in macro-comparative research and the consequent method known as QCA (Qualitative Comparative Analysis). Applications with individual level data, the choice of the current study have been rare, however, there are interesting exceptions (Ragin and Fiss 2017; Glaesser and Cooper 2012; Borgna 2013; Helemae et al. 2020 to mention some).

[6] With dichotomised data, the calculation of set coincidence, i.e. the degree of overlap is simply the number of respondents who are in both groups (sets) (i.e. set intersection) divided by the number of respondents who are in either set (i.e. set union). In the instance of fuzzified data (i.e. raw data is calibrated into more than two categories, labelled fuzzy or calibrated values of sets in respective literature) the set intersection is divided by set unions. By contrast, in Boolean logic, the former (both parents are higher educated) is called a set intersection, which is calculated by minimum rule (Boolean AND) and the latter set union, which is calculated by the maximum rule (Boolean OR): set coincidence = min (medu; fedu) / max (medu; fedu).

[7] For the robustness check, we ran alternative analysis using relative scale for parental cultural resources (books) to compare cohorts and countries. We defined the groups with the disadvantaged and advantaged backgrounds based on the cumulative distribution for their children's cohort (respectively at least a quarter of parents falling below or above a specific category) (see Appendix 3). However, consequent differences in subset consistencies and outcome coverages were missing or marginal. In other words, replicating our analysis with alternative, relative measures of cultural capital did not significantly change our results of linkages between advantages in enabling and disadvantages in hindering higher education attainment in case of our countries-cohorts.

[8] Technically, subset consistency is the parameter of fit to assess the degree to which extent respondents who have X also have Y: min (X; Y) / X.

[9] The degree to which extent the respondents who have Y also have X: min (X; Y) / Y.