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The End of Dominance?

Evaluating Measures of Social Background in Stratification Research

8,291 words

Abstract

We analyze how to best combine information on both parents' socioeconomic standing (SES) in intergenerational research. This can be done by utilizing separate measures for each parent, taking averages over parents, or only using the highest value across parents – the latter commonly referred to as the dominance approach. Our literature review suggests that the dominance tradition is widespread, but that this practice is rarely justified on theoretical and empirical grounds. We assess how much of the sibling correlations in continuous measures of education, occupation, and earnings that are explained by parents' SES in the same dimensions using the different operationalizations. The dominance approach performs poorer than other models of parental SES. For the total contribution of social background we find a bias of about 4 to 5 percent for children's education and occupational outcomes compared to other approaches. We also conduct a separate evaluation of nominal EGP social class operationalizations and find that the dominance approach is the most suboptimal choice compared to the alternatives.

Introduction

Mobility research is about how socio-economic standing (SES) correlates across generations. SES refers to an individual's position within a hierarchical social structure, which can be measured through different stratification variables (e.g., class, occupation, education, and income). Mobility research was originally only interested in men and analyzed father-son associations (Goldthorpe, 1983, 1984). Recent research has brought mothers and daughters into the analyses, and measures of social background also take mother's SES position into account. However, the current research practice is often to take the highest, or dominating value, of SES across father and mother pairs to represent the family, especially in operationalizations of education and occupation. This may more often than not disregard the mother's status and downplay the totality of SES resources. In a review of recent articles in the intergenerational inequality research field, we find that the dominance approach is common but rarely justified on theoretical or empirical grounds. The origins of this approach dates back to McDonald (1977), who argued that children orient themselves to the more powerful parent and that his or her SES then becomes the most important. Furthermore, Erikson (1984) originally outlined the dominance coding for social class, arguing that a household's living condition is more often structured by a dominant parental class position. In common practice, dominance has become equal to the highest of the mother's and father's SES position. Although Erikson (1984) is used as a motivation and legitimization of dominance, his evaluation was only based on an *intra*generational setup. Given that the dominance approach to EGP social class is widely used in intergenerational research, it is odd that there are, to our knowledge, no evaluations of nominal social class with an intergenerational focus.

In this paper, we analyze how information from both mothers and fathers can be combined to measure social background most effectively. Our main evaluation concerns the intergenerational transmission of inequality in three continuous measures of socio-economic

standing: education, earnings, and occupation. We will contrast the *dominance* approach with individual measures for both the mother and father (a *mother/father* model), and a measure that takes the average value of the combined parental resources (the *average* model), but also the rarely used *modified dominance* model (Korupp *et al.*, 2002), which in addition to the coding of the dominant parents' SES also includes the non-dominant parents' SES as a separate covariate. As a supplementary analysis, we also evaluate the most optimal operationalization of nominal EGP social class over the three child outcomes stated above together with children's probability of entering the salariat.

We use sibling correlations in outcomes as a benchmark of the total influence of the family, and then assess how much variance the different social background measures explain in children's outcomes. Swedish full population register data is utilized, which due to its large scale, detailed and reliable characteristics allows for a decomposition of multiple parental SES variables. Sweden is gender egalitarian with a high labor force participation of women, making it a strong case for evaluating different operationalizations simply because most mothers have an occupation and income, but also because most Swedish women are true breadwinners and do not just provide a secondary income.

We find that dominance explains less of the family effect than the other measures. The highest level of explained variance is most often achieved by two variable measures, such as separate mother/father measures, but for the continuous measures little is generally lost by taking averages for parents' education and occupation.

Theoretical background

It is difficult to trace the practice of dominance, or the "highest value approach", for various family background variables back to any single root. Most work using this operationalization do not provide an explicit argument or refer to any specific study. Instead, this may be driven

by a mimicry of prior published works, which becomes a self-propelling practice once widely used. However, certainly the discussions in the class analysis tradition have been important and probably set the ground for this practice. Hence, Erikson (1984) should be seen as the original founder of this approach, yet, his works was also an amalgamation of the works of e.g., Lockwood and Goldthorpe. Nevertheless, it is important to note that Erikson was entirely focused on social class, and not on education, income or any continuous measure of occupational status. In fact, Erikson (1984) never proposed that the dominance approach should be used on other SES factors than a nominal class scheme, and was certainly open for e.g., taking averages for continuous measures such as income. Still research on intergenerational inequality and mobility have, over time, come to refer to the approach of taking the highest value across parents as a dominance coding regardless of the SES factor under study (cf. Korupp, Ganzeboom and Van Der Lippe, 2002, Meraviglia and Buis, 2015). This boils down to the general theoretical as well as methodological question, i.e. whether to represent family SES by an individual or a family measure and how to operationalize each of these approaches.

Family or individual?

The conventional framework in mobility studies originally assumed that (1) the family in itself was the unit of analysis (cf. Watson and Barth, 1964) and (2) that this unit was either defined by the male (Goldthorpe, 1983, 1984) or by the exclusionary dominance of one of the parents (Erikson, 1984). Kalmijn (1994) states three reasons for this practice (p. 257):

“First, because maternal and paternal status characteristics are highly correlated, it was often assumed that mother's characteristics would be of little help in explaining additional variance in educational and occupational outcomes. Second, because few mothers were working outside the home when status attainment research was developing, socioeconomic differences among employed mothers were not believed to be as consequential as socioeconomic

differences among fathers. Third, data on the socioeconomic characteristics of mothers in nationally representative surveys have been scarce."

In effect, the male centered and the dominance approach alike most often resulted in neglecting women's work and status positions, although the original idea with the dominance approach was not to restrict the analysis to men. However, criticism against this one-sided research practice included empirical as well as a theoretical concerns against the assumption that the family (in opposition to the individual) always should be considered as the relevant unit of analysis. Even as far back as in the beginning of the sixties, Watson and Barth (1964), by using household, marital and labor market statistics, noted that the model of a patriarchal nuclear family deviated considerably from empirical data. Watson and Barth argued that social stratification was further complex and scholars had to extend their analysis to within family relationships and thus beyond the conventional male breadwinner approach. Pushing the argument further, Acker (1973) reasoned that generalizations about population mobility patterns and stratification trends where too narrowly inferred from studies based on white males. Acker called for an abandonment of the assumption of female dependence on males as well as the notion of the family being the unit of analysis, paving the way for research on female experiences of stratification.

Along these lines, McDonald (1977) argued instead that adolescents' identified with the most powerful parent, independent of the gender – a framework he labelled the Power model. A couple of years later, Erikson (1984) provided the 'dominance' solution to the problem. Since social class is nominal, taking average values of different nominal categories would make little sense. Erikson argued that it was often the class position of one of the family members, i.e. the dominant, that was more decisive for the life chances and socioeconomic situation of the family. The underlying assumption was that "the market situation of the family is more dependent upon the work position of one of the parents than of the other, provided the positions are different" (p. 503), and that the dominant position is the one with

"the greatest impact upon ideology, attitudes, behavior and consumption patterns of the family members [… and] has most importance for the life chances of the children in the family (p. 504)". A key argument in the dominance tradition relied on a conceptual split between market situation (distribution of production) and work position (organization of production), where the former can be determined by a family (dominance) unit of analysis and the latter by the individual occupation (Erikson, 1984). In Erikson's operationalization, and to simplify a bit, more qualified jobs dominated over less qualified jobs, non-manual jobs dominated over manual jobs, self-employment dominated over employment, and gainfully employment dominated over persons outside of the labor force. In practice, this meant that the mother's class position replaces the father's class when former was higher than the male counterpart. Hence, (only) if the female had a higher ranking class, she would represent the family. Erikson's (1984) analysis clearly suggested that a dominance measure outperformed individual variables for predicting family level outcomes such as living space, standard of equipment, vacation, and cultural activities. But some early findings from the UK showed that women's work mattered over and above the occupational position of their spouses, e.g. in voting and fertility outcomes (Heath and Britten, 1984). Later, Sorensen (1994), however, concluded that the conventional or family based approach probably did not lead to grave misrepresentations in empirical research. Nevertheless, she contended that proponents of this framework failed to recognize the research interest of female employment conditions as a value in itself.

One of the driving forces behind the critique of the conventional approach was the massive gain in the level of female employment – rising about 50 percentage points from the 1920´s to the 1980´s in the US (Beller, 2009). The Swedish case was no different, and Sweden now has one of the highest rates of female labor force participation in the world. Another aspect of this development is the clear rise of dominant mothers, i.e., mothers with

equal or higher position in education, income, and/or occupation compared to their husbands (Meraviglia and Ganzeboom, 2008). Indeed, there is ample evidence to suggest that mothers are more or less influential in their own right, or as important as the fathers are. For example, Gisselmann and Hemström (2008) found that maternal working conditions matter independently when accounting for class disparities in different child birth outcomes in Sweden. Both Kalmijn (1994), Korupp, Ganzeboom and Van Der Lippe (2002), and Buis (2012) found that there is a considerable independent influence of mothers' resource(s) on children's schooling. Using data from 30 countries, Marks (2008) showed that mothers education was more important compared to fathers' educational attainment for children's school performance.. Furthermore, Mood (2017) showed that mother and father social class matter independently in explaining child earnings in Sweden. The literature contains many more references to similar findings. In sum, given such a dramatic change for women's labor market status over the 20th century, it is highly likely that both the totality of family resources and thus the variation within families as such should have gained importance over time.

Last, but not least, trends in inequality may be misrepresented when ignoring women and disagreeing on how to measure social background. The literature suggest that there are diverging trends depending on the inclusion of mothers' status in the case of social mobility in the US (Beller, 2009), intergenerational inequality in occupational status in Italy (Meraviglia and Ganzeboom, 2008), and economic mobility in Norway (Hansen, 2010).In other words it seems attractive for stratification research to agree on any single or various measure(s) of social background for consistent comparisons over national contexts and time.

Operationalizing socioeconomic background

The literature on how to best combine information of mothers and fathers into measures of family resources contains four models: separate mother father/measures, taking averages

across parents, taking the highest value across parents (dominance), and the so called modified dominance approach in which both parents enter, but not by their gender but instead by their status order. The modified dominance thus contains two measures: the SES of the "dominating" and the SES of the "non-dominating" parent. The case for a mother/father model is often motivated by the need to include mothers in their own right. However, a one variable measure is often desired for easing interpretation, circumventing collinearity, and reducing consumption of degrees of freedom. For the continuous variables, the choice is then between averaging and dominance.[1] For averaging, one must assume an equal influence of mothers' and fathers' SES.[2] In families with a low educated father and a high educated mother, there will be a large difference between the average and the dominance mode of measurement. In the dominance scheme, this family will appear much better off than in the average scheme.

There is only limited research on how to best combine information of mothers and fathers into measures of family resources. Erikson's (1984) empirical analysis of dominance was a rare exception, but was later followed by Korupp, Ganzeboom and Van Der Lippe (2002). Due to data restrictions, Erikson (1984) was unable to analyze children's outcomes, and so whether or not dominance coding also worked for intergenerational transfer of advantage remained unsettled. This is somewhat ironic because of the predominant use of dominance in intergenerational analyses. Korupp, Ganzeboom and Van Der Lippe (2002) on the other hand had an explicit focus on intergenerational effects. They assessed influence of parent's education and occupation on children's education in the Netherlands, Germany and the US. Their analyses contrasted all of the models outlined above (and some more; they also

[1] Because of the nominal nature of EGP social class, averages are not an option, which simplifies EGP evaluation to three operationalization modes (dominance, modified dominance, and mother/father).
[2] In principle, we could also weight mothers' and fathers' with a weighting scheme: $SES = w*SES_{father} + (1-w)*SES_{mother}$, $0 \leq w \leq 1$. However, such a strategy would require a calibration of the weight w, and it is likely that w will vary across time and place, and possibly also by SES itself.

considered e.g., father/mother only models). They found that modified dominance explained most of children's education, closely followed by the average and in turn the mother/father models. The simple dominance model performed worst of the four models. Hence, it is somewhat puzzling that the dominance approach has remained to be used so widely.

The case for accumulation

Following the discussion above, one of the core question when operationalizing SES of a family is whether parents' resources are cumulative or not. For purely economic variables, it is easy to see how adding incomes in a larger and combined pool allows for larger investments and higher levels of consumption. Hence, the totality of the family's combined economic resources produces an economic environment that provides more or less valuable material resources.

Similar implications may also apply for other aspects of SES, i.e., education, social class or other occupation measures. For example, since social class position is perceived as an indicator of economic security, stability and prospects (Goldthorpe and McKnight, 2004), the status of both the parents would be more important for the long-run SES of the family than constraining the analysis to just one of them.[3] However, we argue that there are at least four reasons that information on both parents' class, occupation, or income are important in present times. First, major structural changes and higher unemployment rates in the labor market have led to less stable occupational positions (DiPrete and Nonnemaker, 1997). Increasing part time contracts and precarious working conditions (Kalleberg, 2000), indicates that the status and position of both parents are important as one may stabilize the other, or make the household even more vulnerable depending on the respective positions of the

[3] Again, since EGP social class is nominal, accumulation assessed as averages is impossible. Nevertheless, cumulation corresponds to adding two parents (i.e. variables) instead of one.

partners. Second, further increasing female participation and rising status in the labor market (Meraviglia and Ganzeboom, 2008) would by default suggest that families increasingly rely on both female and male employment. Third, female and male employment status has still remained highly differentiated in many important dimensions, e.g. in terms of sector and industry belonging as well as contract hours (Jarman *et al.*, 2012, Magnusson, 2008). Given the transition to a dual breadwinner labor market, the duality, and particularly the gender aspect of class positions is lost by only including a (single) family SES variable. Finally, divorce rates have increased implying that the occurrence of holding on to a particular relationship and household formation over a lifetime is decreasing, thus the actual home environment and labor market (as well as general) market situation of both parents are important in their own right (Gisselmann, 2007: 17-18, McLanahan and Percheski, 2008).

From an intergenerational perspective, i.e. when childhood social conditions are addressed, the case for accumulation becomes even stronger. For resources that are comprised of behavior and skill transfer, as captured by parents' education, it will matter if the child is exposed to two, rather than only one educated parent. Although this of course depends on actual patterns of exposure. Even if the family has a highly skilled member, this will not matter much if the member that takes care of the children is lower skilled, for example if the highly educated parent is a breadwinner that spends most of the time outside of the family. Based on a similar argument, Murnane *et al.* (1981) argued that mothers' educational attainment was critical in its own right for the child's achievement, as an effect of mothers spending relatively more time with children than fathers.

Another aspect of accumulation is assortative mating. Several studies suggest that increasing female economic independence (i.e. lower gender inequality) is followed by intensified male competition over high-status female partners, which translates into increased homogamy (cf. Schwartz, 2013: 456-457). To the extent that there is a heightened homogamy

tendency, the polarization in cumulative resources across families is likely to increase compared to the historical scenario where hypergamous relations (with clearly status dominant males) were more common. Furthermore, given that homogamy is increasing and that accumulation most likely matter, this makes cases where there is asymmetry in parent's resources even more important.

[Table 1 about here]

Summary

Table 1 summarizes the four models we test. They differ by the level of analysis and the key assumptions involved. Our expectation is that the dominance model should be more inferior to the other models, simply because it uses less information. This is also what the limited previous research has shown (Korupp, Ganzeboom and Van Der Lippe, 2002). For the other models, our reading of previous literature does not allow us to hypothesize that any of the three is more relevant than any other; they simply reflect different assumptions, not differences in the amount of information they use. One would generally expect the household measures to be inferior to parent-level measures because of the amount of less degrees of freedom used, yet if both parents are equally important to children (so that the $w = 0.5$ is realistic; see Table 1), the average scheme will not lag much behind.

State of the art in current literature

To assess the state of art in the current literature, we have documented how researchers operationalize social background in three journal outlets: European Sociological Review (ESR), American Sociological Review (ASR) and Research in Social Stratification and

Mobility (RSSM). While these journal are not representative of all of intergenerational research, they are typical outlets for such studies. ESR and ASR are general journals, with different emphasis on European and American research, and the RSSM is a specialist journal. We have downloaded all articles in 2017, and screened for quantitative studies using parental SES either as a focal variable or as control. We have then coded these studies by (a) the operationalization mode used, (b) if motivation or references to prior work is included in order to justify the operationalization, and (c) if any sensitivity analyses of alternative operationalizations are reported.

[Table 2 about here]

When screening for relevant articles, we focus on those that have some form of intergenerational perspective and operationalizes the SES of parents using data from both father and mother. We exclude articles that focus on only one parent, whatever the reason for doing so. While dominance could also be used to link households to other outcomes than intergenerational, such as in Erikson's (1984) original analysis, such analyses are rare and do not correspond to our focus, which is why we exclude them from our sample. First, we coded whether the articles were of relevance by the above criterions. For the relevant articles, we then coded if they used dominance, averaging, mother/father specific measures, or some other method of operationalization. We code the mode of operationalization primarily for education or occupation (whatever is present). Income is rarely operationalized in any other way than household income (i.e., an average). Our simple analysis is based on frequency counts in these three dimensions by outlet.

Table 2 shows that the dominance approach is the most common among the four research practices we study. A majority of the works utilizes this approach. It is also the case

that motivations for this is very rare. We do not interpret this as ignorance (simply because space in articles is very limited), but as a further indication how established this practice is: apparently neither reviewers nor editors find dominance any controversial. There appears to be some variation across journals, with dominance being more common in ESR than in the other outlets. This is perhaps not surprising since Erikson (1984) represents a European research tradition. However, given the ad hoc sample, one should not put too much emphasis on this variation, not least because the ASR contained so few relevant articles. We find most studies that use some alternative to dominance predominantly in ASR and RSSM, and it is then primarily separate measures of mothers' and fathers' SES. Averaging is a rarer model of operationalization. Finally, Table 2 also shows that few studies attempt any sensitivity analyses. It should be pointed out that what we include as sensitivity analysis is not the type of analysis as is pursued in this paper, but whether or not dominance is used together with an alternative operationalization. To conclude, our brief review of articles suggest that dominance is indeed dominating in empirical studies, but on rather arbitrary theoretical or methodological grounds.

Analytical strategy

We use sibling correlations as a benchmark of family effects to separate out the relative influence of the different approaches to socioeconomic background operationalization. Sibling correlations capture the variation shared by individuals born in the same family, and thus represent a broad omnibus measure of the influence of socioeconomic background (cf. Solon, 1999). Sibling correlations are equal to the intra-class correlation (ICC), since it is the ratio of covariance between siblings relative to the sample variance.[4]

[4] The relationship between the sibling correlation (ICC) approach and the conventional intergenerational correlation (IGC) is the following: given that the variance structure is approximately the same over the child and parent generations, the $ICC = IGC^2 + unobserved\ heterogenity$ (Solon, 1999).

We compute the four models of SES as displayed in Table 1. It should be noted that we do not consider the following common cases: (1) using information on only one parent, whatever the reasons for doing so (2) when information is partially missing for any of the parents. Our approach also measure parental resources regardless of exposure during childhood. For example, to what extent the SES of a non-residential parent matter, or the SES of a step-parent matters, is beyond the scope of our study.

Data

We utilize Swedish register data, and restrict the cohorts in the child generation to be born between 1955 and 1972. The choice of cohorts is made in order for the children to be old enough to be established in the labor market and provide us with enough data on their and their siblings' outcomes. We then link children to their parents using the Multigenerational register, which is based on birth records. The sibling correlations are delimited to closely spaced siblings (seven years), since they share more environmental conditions compared to siblings with greater age distance (Eriksson *et al.*, 2016). We have delimited the data to cases where information on both parents are available. Table A1 shows the descriptive statistics for the variables used in the models.

Earnings

Information on earnings are based on tax records. In order to construct long-run earnings measures for children, data from 1990 to 2012 is collected for ages 34 to 40. For parents, earnings are measured in similar tax data from 1980 to 1989. To arrive at a less noisy measure, we derive the mean earnings of these periods, and then take log values.

Education

Education is collected from the education registers from 1990 and onwards for both parents and children, and coded to years of education.[5] Note that since information on education is an inclusionary criterion, we thus require parents to survive until 1990.

Occupation

For parents, occupation is self-reported and collected from the quintennial censuses (1985 to 1990), and coded to occupational prestige, SIOPS (Ganzeboom and Treiman, 1996, Treiman, 1977), and EGP (Erikson and Goldthorpe, 1992). For children, occupation is collected from the occupation register (2001 and onwards), which consists of employer reports, and coded to SIOPS and EGP. We use highest attained SIOPS score and EGP status for both children and parents.[6] A occupational prestige score is used since it shows the highest intergenerational correlation vis-à-vis other continuous occupational indicators (anonymized reference), both in regard to occupational education (Hauser and Warren, 1997), and when other SES factors are accounted for.

Methods

We employ a multilevel regression framework to model sibling correlations. The outcome (Y) of sibling *i* is clustered to family *j*.

(1) $Y_{ij} = \beta_0 + \boldsymbol{\beta X_{ij}} + \varepsilon_{ij}$,

[5] We do not have data on years of education as such, but since the measure is derived from educational levels it is pseudo-years of education. In most cases, this will reduce measurement error, e.g., social desirability biases.
[6] Seen in the light of this article, this choice may itself be subject to further scrutiny. For the purposes of this study, however, we rely on established practice of measuring peak careers, however fragile this may turn out to be.

$\boldsymbol{X_{ij}}$ defines a vector of independent variables on individual and family level. The residual term of the equation, ε_{ij}, contains two components:

(2) $\varepsilon_{ij} = a_j + b_{ij}$.

The two components represent a shared family term (a_j) complemented by an individual part (b_{ij}). The variance of the residual term, σ_ε^2 , then translates to the sum of the variances of the family and individual components:

(3) $\sigma_\varepsilon^2 = \sigma_a^2 + \sigma_b^2$.

Finally, we assess the intra-class correlation (ICC) among a pair of randomly drawn siblings (ρ), which equals the ratio of family background influence relative to the sum of variances of individual and family components:

(4) $\rho = \frac{\sigma_a^2}{\sigma_a^2 + \sigma_b^2}$,

All singletons are dropped in the analysis, since they do not contribute to the estimation of the intra-class correlation. Solon *et al.* (1991) suggest that including singletons, which may sometimes be used to arrive at a better estimate of the family variance component, carries the risk of introducing outlier biases.[7]

[7] However, we do test for sibling vs. singleton discrepancies as a robustness check using conventional intergenerational, instead of sibling, models. The intergenerational correlations in SES are of similar magnitude for singletons and non-singletons. We can observe identical correlations for occupation (only 1.8 % stronger for singletons), and close to identical correlations in education (3.6 % stronger). Only for income, is there any larger

In order to delineate the contributions of different SES components, we use different specifications of the $\boldsymbol{X_{ij}}$ vector in equation (2), which will produce different estimates of the shared family component (Mazumder, 2008). Comparing a baseline estimate with alternative configurations ($\Delta\sigma_a^2 = \sigma_a^2 - \sigma_a^{2*}$) gives the relative explanatory power of the different models. We use this procedure in two separate ways: (1) we add SES factors to an otherwise empty model, and; (2) we remove (jackknife) factors sequentially from a full model (with all SES measures in). The former provides the gross contribution, which may overlap a great deal across SES measures, while the latter (jackknife) method establishes the net contribution. Net influences are only covering the small portion of the variance that is uniquely attributed to any single operationalization. We focus our analysis on the gross measure, and use the net measure for sensitivity analysis.

The decomposition of sibling correlations in the various outcomes are calculated on mixed siblings, but complementary sensitivity analyzes of brother and sister correlations do not change the conclusions much (available in an online appendix, tables S1 and S2). In that appendix, we also present results from using a rank-rank transformation of the data (Chetty *et al.*, 2014), see Tables S3 and S4; these also support our conclusions.[8]

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discrepancies with stronger correlations for singletons (33 %; but note that absolute levels are low, approximately .08 vs. .06). It should also be noted that singletons is not just the smallest family size, but this state may have been caused by exogenous events such as involuntary fertility stops (disease or complications in the first birth). This exogenous variation may also eschew the intergenerational correlation. We would thus not in baseline expect that a non-bias scenario would mean identical intergenerational correlations across singleton status. Seen in this light, it is reassuring that estimates show a high degree of similarity. In addition, close to 90 % of all kids have a sibling, which means that we still can generalize to 90 % of the population.

[8] We have also estimated alternative models, where SES is instead measured as percentile ranks using the cumulative distribution function (Chetty, Hendren, Kline and Saez, 2014). This coding is straightforward, but whenever we encounter ties (cases with the same values), we take the average rank across all tied values. Ranks are estimated on separate distributions not only for each SES, but also for each variable in the different modes of operationalization (i.e. ranks for mothers, fathers, averages, dominant, and non-dominant all come from their own distribution).The virtue of employing a rank measure is that the functional form is more realistic (Chetty, Hendren, Kline and Saez, 2014), but it also minimize attenuation and life-cycle bias compared to elasticity and loglinear correlations (Nybom and Stuhler, 2017). The reason why we don't adopt a rank approach in the main analysis is that most researcher use non-transformed scales for education and occupation, and logged transformation for earnings/income. Hence, we want to primarily evaluate these measures.

Results

Specific contributions of parents' SES by operationalization model

We present our main findings in Table 3, i.e. for the continuous SES variables. The Table shows the estimated sibling correlations (ICC) and its standard errors and the reductions in ICC by different explanatory factor (↓%). We focus here on the reduction associated with the SES factor and its specific operationalization. In essence, it is the contribution of the factor in question to explaining the sibling correlation, or put in substantive terms, the degree to which it represents how family background structures the outcome. All models control for child birth year and thus cohort influences.

[Table 3 about here]

Examining the gross contributions in detail, by focusing initially on children's years of education (the first column), we find that the average model and both the two variable parental measures (modified dominance and mother/father models) of education contributes to explaining the sibling correlations by 30.4 percent, while the dominance approach contributes only with 25.9 percent.[9,10] For parents' occupation, the dominance model is the most inferior choice, contributing with only 14.4 percent, while both the average and mother/father models perform substantially better with almost 24 percent contributions. When we focus on children's occupation in column 2, the average, modified dominance and

[9] Significance test are not shown since the standard errors are marginal. However, consider a two-sided t-test: $\frac{\widehat{\beta}_i - \widehat{\beta}_j}{\sqrt{(S.E.\widehat{\beta}_i)^2 + (S.E.\widehat{\beta}_j)^2 - 2cov(\widehat{\beta}_i, \widehat{\beta}_j)}}$. Since the $2\text{cov}(\hat{\beta}_i, \hat{\beta}_j)$ term is hard to estimate with conventional methods it is omitted. However, given that this term is always positive, the test will be conservative since the omitted term automatically would decrease the denominator and thus increase the test statistic. In general, a 0.01 difference in ICC or 1% reduction corresponds to a t-value of about 4.5. A 0.005 ICC or 0.5 percent difference in turn is roughly equal to a t value of 2.2 or 2.3. In other words, a 0.5 percentage contribution or above can always be regarded as significant.

[10] Again, note that averages and dominance are one variable measures, while modified dominance and mother/father approaches utilizes two variables.

mother/father models all contributes with 32.4 percent vs. 27.8 percent for dominance. For parent's occupation, the average or mother/father model explain roughly 31 percent, which is considerable more than 19 percent for dominance. Also for children's earnings in column 3, the same pattern for parental education and occupation is prevalent, even though the differences are smaller – 12.8 vs. 10.9 percent for average, modified dominance, and mother/father approaches vis-à-vis dominance in parental education, and almost 15 percent vs. 8.7 percent contributions for parental average as well as the mother/father model compared to dominance in parental occupation. Hence, the difference in impact sizes between dominance and other operationalizations are clearly non-negligible. Furthermore, in all these cases, the one variable average model are on a par with the optimal model using two variables for mothers' and fathers' SES.

However, turning to parents' earnings in the bottom panel of the gross contributions in table 3, the relative performance of dominance increases compared to the parental education and occupation – especially in relation to the two variable mother/father model. Nevertheless, for one variable approaches, averages are still equal to or slightly superior to dominance, albeit the difference is minimal and does not exceed 0.2 percentage points. The different results for parents' earnings should be seen in the light of it being the least important of the SES dimensions, except for explaining children's earnings. Earnings is also more difficult to measure, not least because of its volatility over time, which could play a role here. However, even when we use an equivalent to parents' lifetime income (disposable income measured through tax records from 1968 to 2012, in ages 18 to 65), we find a similar pattern (results not shown).

Last, we discuss the net influences, which naturally are much smaller since the overlaps are portioned out of the contributions. For the difference between dominance models and the rest, we find that dominance is outperformed for parental education and occupation (over all

outcomes). However, for parental earnings, dominance is marginally better than both average and mother/father operationalizations (0.2 to 0.4 percentage point differences). The modified dominance approach is equal to or slightly better than the dominance measure.

Total contributions of parents SES by operationalization model

In Table 4, we shift perspective to a more realistic case for researchers: how the choice of operationalization affects all the SES contributions together over the different outcomes. We thus compare how the operationalization models affect the total amount of variation accounted for by parents' education, occupation and income together. We apply the same schemes as above, but also complement with a hybrid approach that uses dominance for education and occupation, but takes average for the earnings part. We denote this the *standard* model since it is frequently encountered in research and represent a more reasonable operationalization than using dominance measures for income or earnings (which is an operationalization we have not seen in the literature). However, for reference and consistency purposes we do include a model utilizing dominance measures for all SES factors.

[Table 4 about here]

The results for children's education and occupation show that the dominance and the standard model are inferior compared to the average, modified dominance and the mother/father models. The dominance and the standard approaches explain slightly more than 30 percent of the sibling correlation in education, and about 36-37 percent of the sibling correlation in occupation, while the average, the modified dominance, and mother/father

models contribute to roughly 35 percent of the sibling correlation in education, and some 40 percent of the sibling correlation in occupation. For children's earnings, it is a closer call. There is no clear dividing line, but the two variable models perform slightly better than the one variable approaches.

In the lower panel of table 4 we also show the actual bias between the standard model vs. the other approaches. The information is already included in table 3, although not as clear as in table 4 where we also display the difference in ICC (shown under the delta ICC columns). We single out the bias using the standard model as a reference since this is the most common approach used when there are education, occupation and economic variables at hand. It is thus the most realistic and practical example of a dominance framework, since economic measures generally are averaged (or summed). For children's education and occupational prestige, we find that bias is non-negligible, with some 4 to 5 percent difference in ICC between the standard model vs. the rest. For children's earnings, the modified dominance model is the most optimal choice, and second to that is the mother/father model, but averages still perform better than the standard model – although the differences are quite marginal.

Evaluating the dominance approach for nominal social class

Although the focus of the paper is on continuous SES variables, we also present an evaluation of how the dominance approach works in regard to the nominal EGP social class variable. This is because EGP dominance is still widely used in intergenerational research, but has never been evaluated (to our knowledge) with an intergenerational perspective but only in regard to intragenerational inequality (Erikson, 1984).

The highest disparity in contributions is for children's occupation variables (i.e. either SIOPS or EGP itself), where the difference between dominance and the two other approaches amount to roughly 7 percentage points. The difference is slightly less pronounced in

children's education (about 4.5 percentage points) and lower for children's earnings (roughly 2.5 percentage points). Nevertheless, it is clear that both modified dominance and mother/father models outperform the dominance approach for EGP. This result hold for all outcomes and in the gross as well as net analyses.[11]

[Table 5 about here]

Discussion

We have shown that using a dominance approach, i.e., taking the highest value across parents, will result in a suboptimal measure of the total contribution parents' SES when we analyze children's occupation and education outcomes. The relative bias is about 4 to 5 percent when comparing a standard model (dominance for parental education/occupation and average for earnings) to the average, modified dominance, and mother/father approaches. For children's earnings, the three other models still perform better than the standard model, although the results are less clear cut, with overall small differences across operationalization models. When we consider the influence of particular resources, a dominance approach to parental education and occupation does not perform as well as either parental averages or the two variable models (modified dominance and mother/father measures). A result that holds over children's education, SIOPS, and earnings, although the results are less substantial for parental earnings (where dominance is a better operationalization of parental earnings than a

[11] Since Erikson (1984) was writing in a different context, where a male only model was standard, we also checked how dominance performs relative to separate mother and father model specifications. Dominance is a superior measure of class background compared to only using either the EGP status of the father, or just the mother. This holds over all four outcomes, for both gross and net estimations.

separate mother/father model). However, contrasting the two household (i.e. one variable) measures, parental averages outperform or is at least on par with the dominance approach.

When we evaluate the particular contributions of various EGP social class operationalizations (excluding the average model), we find that a dominance approach explain the smallest amount of the sibling correlations in all outcomes (including children's own EGP) compared to the modified dominance and mother/father models. Hence, for EGP, we conclude that a two variable model instead of the dominance solution is a better representation of class background.

Our brief review of recent articles suggests that the use of the dominance approach is widespread in current literature, and as a rule, there is no motivation of this operationalization. In light of our results, researchers should pay more attention to the operationalization of parents' SES and think twice when or if they use the dominance approach, and not do it ad hoc without a proper motivation.

The risks involved with using the dominance operationalization is that intergenerational associations are underestimated. Furthermore, social background will functions more poorly as a control or as a confounder when analyzing associations between other covariates, which will cause (an upward) bias of the association of interest. While the most optimal model generally includes a two variable operationalization, such as entering the mothers' and fathers' (or dominant and non-dominant) measures independently, we show that taking averages (for the continuous SES measures) across parents will provide an effective and yet parsimonious middle ground with minimal or no loss of explanatory power – especially when one analyzes children's education and occupation.

It is important to be clear on the various assumptions involved in the different operationalizations. A dominance approach will only concern itself with the variation in the outcome that can be attributed to a singular dominant parent. Whereas the mother/father

method or modified dominance approach all impose hypotheses of the internal dynamics of family resource (i.e. the importance of parent A compared to parent B). The average approach assumes a simple accumulation, or summation, of the combined (and equally important) parental resources. In other words, researchers should be more careful and explicit on what the underlying assumptions are when a specific operationalization of social background is used. Accordingly, our finding that the dominance model underperforms relative to other operationalizations of social background has some theoretical implications. It supports the accumulation perspective on parental resources, meaning that the family environment is influenced by both of the parents. Families where resources across parents are polarized, such as the type with one home-maker low in SES and one breadwinner high in SES, will be a very different environment compared to a family where both parents are high (or low) in SES. The finding that both parents are important may appear trivial, but it is clearly at odds with how the established research practice operates.

Our results also suggests a noteworthy anomaly, namely that dominance seems to work slightly better (but still not best) when operationalizing earnings. We see no theoretical reason for why the highest earner should predict outcomes better than averages or a mother/father model (other than the classical argument Erikson made for dominance in regard to social class). However, one must take into account that earnings or income is perhaps of less relevance in the Swedish context since the wage structure was and still is compressed and redistribution is comparatively strong. This dimension is also the least important in explaining children's SES in education and occupation. Earnings is simply a less discriminatory measure in the Swedish context. Analyses from other countries are warranted to help solve this puzzle. Nevertheless, it should be stressed that few if any of previous research has used dominance coding for income.

Even if one would not perceive the inferiority of dominance as suggested by our results to be large enough to cause serious biases, there is no reason to use a suboptimal measure. Already some fifteen years ago, Korupp, Ganzeboom and Van Der Lippe (2002) showed that (simple) dominance was an inferior model to use to predict children's education, but somehow research practice did not incorporate this result and change practise. We conclude that the often unreflected dominance of dominance over all measures of SES and social class alike should end: averaging (for continuous variables) and, especially, parent specific measures appear as better indicators of social background, and they are also accompanied by good theoretical arguments. We argue that the research community should explicitly discuss theirs and other's choices of operationalization, but also harmonize social background measures for consistent comparisons over countries and time.

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Table 1. Different operationalizations of parent's SES.

Model	Level (no. variables)	Assumption	Expression
Dominance	Household (1)	Only dominant parent matter	$SES = Max(SES_{father}, SES_{mother})$
Average	Household (1)	Equal influence of both parents	$SES = w\ SES_{father} + (1\text{-}w)\ SES_{mother}$ $w = 0.5$
Mother/Father	Parent (2)	Gender-specific contribution	SES_{father}, SES_{mother}
Modified Dominance	Parent (2)	Dominance-specific contribution	$SES_{dominant} = Max(SES_{father}, SES_{mother})$ $SES_{non\text{-}dominant} = Min(SES_{father}, SES_{mother})$

Table 2. Usage of dominance coding in 2017 articles.

	ASR	ESR	RSSM	Total
Relevant articles				
Non-codable	1	2	2	5
Codable	4	14	10	28
Operationalization				
Dominance	1	10	4	15
Averaging	1	2	1	4
Mother/father	2	1	5	8
Other	0	1	0	1
Reference or motivation				
No	4	13	6	23
Yes	0	1	4	5
Sensitivity analysis				
No	3	12	9	24
Yes	1	2	1	4

Note: See text for details on coding. Total n = 33.

Table 3. Decomposition of sibling correlations in education, occupation, and earnings, by mode of operationalization.

	Children's…								
	(1) Education (years)			(2) Occupation (SIOPS)			(3) ln Earnings		
	ICC	s.e.	↓%	ICC	s.e.	↓%	ICC	s.e.	↓%
Baseline sibling correlation	0.384	0.001	–	0.295	0.002	–	0.124	0.002	–
Gross contribution of parents' SES:									
Dominance Education[1]	0.285	0.002	25.9	0.213	0.002	27.8	0.111	0.002	10.9
Modified Dom Education[2]	0.267	0.002	30.4	0.200	0.002	32.4	0.108	0.002	12.8
Average Education[1]	0.267	0.002	30.4	0.200	0.002	32.4	0.108	0.002	12.8
Mother/father Education[2]	0.267	0.002	30.4	0.200	0.002	32.4	0.108	0.002	12.8
Dominance SIOPS[1]	0.329	0.001	14.4	0.239	0.002	19.0	0.113	0.002	8.7
Modified Dom SIOPS[2]	0.314	0.002	18.3	0.224	0.002	24.0	0.110	0.002	11.4
Average SIOPS[1]	0.293	0.002	23.7	0.203	0.002	31.2	0.106	0.002	14.5
Mother/father SIOPS[2]	0.293	0.002	23.8	0.203	0.002	31.3	0.106	0.002	14.7
Dominance Earnings[1]	0.337	0.001	12.2	0.241	0.002	18.3	0.101	0.002	19.1
Modified Dom Earnings[2]	0.336	0.001	12.5	0.239	0.002	19.0	0.100	0.002	19.9
Average Earnings[1]	0.338	0.001	12.2	0.241	0.002	18.5	0.100	0.002	19.3
Mother/father Earnings[2]	0.345	0.001	10.3	0.248	0.002	15.9	0.102	0.002	18.0
Net contribution of parents' SES:									
Dominance Education[1]	0.261	0.002	6.9	0.180	0.002	4.8	0.096	0.002	0.4
Modified Dom Education[2]	0.253	0.002	9.0	0.176	0.002	6.2	0.096	0.002	0.7
Average Education[1]	0.253	0.002	9.0	0.176	0.002	6.2	0.096	0.002	0.7
Mother/Father Education[2]	0.252	0.002	9.0	0.176	0.002	6.2	0.096	0.002	0.7
Dominance SIOPS[1]	0.257	0.002	1.3	0.182	0.002	2.6	0.096	0.002	0.8
Modified Dom SIOPS[2]	0.255	0.002	1.9	0.179	0.002	3.4	0.096	0.002	1.2
Average SIOPS[1]	0.253	0.002	2.5	0.176	0.002	4.6	0.096	0.002	1.4
Mother/Father SIOPS[2]	0.252	0.002	2.5	0.176	0.002	4.6	0.096	0.002	1.4
Dominance Earnings[1]	0.252	0.002	0.7	0.175	0.002	2.0	0.095	0.002	6.9
Modified Dom Earnings[2]	0.252	0.002	0.7	0.175	0.002	2.0	0.095	0.002	7.1
Average Earnings[1]	0.253	0.002	0.5	0.176	0.002	1.7	0.095	0.002	6.7
Mother/Father Earnings[2]	0.252	0.002	0.6	0.176	0.002	1.6	0.096	0.002	6.5

Note: the models are estimated for mixed siblings. [1] One variable household measure; [2] Two variable parental measures.

Table 4. Decomposition of sibling correlations into total contributions by mode of operationalization.

	Children's…								
	(1) Education (years)			(2) Occupation (SIOPS)			(3) ln Earnings		
	ICC	s.e.	↓%	ICC	s.e.	↓%	ICC	s.e.	↓%
Baseline sibling correlation	0.390	0.001	–	0.296	0.002	–	0.146	0.002	–
Total contributions of parents' SES:									
Dominance[1]	0.268	0.002	31.3	0.186	0.002	37.2	0.114	0.002	22.0
Modified Dom[2]	0.254	0.002	34.7	0.177	0.002	40.2	0.112	0.002	22.7
Average[1]	0.254	0.002	34.7	0.175	0.002	40.7	0.114	0.002	21.6
Standard[1,a]	0.270	0.002	30.6	0.189	0.002	36.3	0.116	0.002	20.6
Mother/father[2]	0.253	0.002	35.0	0.176	0.002	40.7	0.113	0.002	22.6

Bias	ΔICC	%	ΔICC	%	ΔICC	%
Standard vs. Modified Dom	0.016	4.1	0.012	4.1	0.004	2.7
Standard vs. Average	0.016	4.1	0.014	4.7	0.002	1.4
Standard vs. Mother/father	0.017	4.4	0.013	4.4	0.003	2.1

Note: the models are estimated for mixed siblings. [1] One variable household measure; [2] Two variable parental measures,
[a] Standard model = Dominance principle in education and SIOPS, but averages in earnings.

Table 5. Decomposition of sibling correlations in education, occupation, and earnings, by EGP (social class) mode of operationalization.

	Children's…											
	(1) Education (years)			(2) Occupation (SIOPS)			(3) Social class (EGP)			(4) ln Earnings		
	ICC	s.e.	↓%	ICC	s.e.	↓%	ICC	s.e.	↓%	ICC	s.e.	↓%
Baseline sibling correlation	0.384	0.001	–	0.295	0.002	–	0.252	0.002	–	0.124	0.002	–
Gross contribution of parents' SES:												
Dominance EGP[1]	0.300	0.002	22.02	0.214	0.002	27.42	0.187	0.002	25.96	0.107	0.002	13.94
Modified Dom EGP[2]	0.282	0.002	26.73	0.195	0.002	33.98	0.169	0.002	33.08	0.104	0.002	16.59
Mother/father EGP[2]	0.282	0.002	26.56	0.195	0.002	33.94	0.169	0.002	33.10	0.104	0.002	16.49
Net contribution of parents' SES:												
Dominance EGP[1]	0.248	0.002	1.30	0.171	0.002	1.63	0.151	0.002	1.68	0.095	0.002	0.82
Modified Dom EGP[2]	0.246	0.002	1.69	0.168	0.002	2.60	0.148	0.002	3.04	0.094	0.002	1.16
Mother/father EGP[2]	0.246	0.002	1.68	0.168	0.002	2.67	0.148	0.002	3.01	0.094	0.002	1.23

Note: the models are estimated for mixed siblings. [1] One variable household measure; [2] Two variable parental measures.
Children's outcome in EGP is measured as probability of entering the service class.

Table A1. Descriptive statistics.

	n	
Individuals		742809
Families		384251
	Mean	St. Dev
Family size	2.4	0.7
Children's characteristics		
Percent female	49.0%	0.5
Years of education	12.5	2.2
SIOPS	47.5	13.3
ln (earnings)	5.3	0.7
Mother's characteristics		
Birth year	1939.0	5.9
Years of education	9.9	3.2
SIOPS	38.8	13.0
ln (earnings)	3.8	0.6
Father's characteristics		
Birth year	1936.2	6.3
Years of education	9.9	3.5
SIOPS	43.2	12.6
ln (earnings)	4.4	0.5

Table S1. Decomposition of sister correlations in education, occupation, and earnings, by mode of operationalization.

	Sister's…								
	(1) Education (years)			(2) Occupation (SIOPS)			(3) ln Earnings		
	ICC	s.e.	↓%	ICC	s.e.	↓%	ICC	s.e.	↓%
Baseline sister correlation	0.387	0.003	–	0.312	0.003	–	0.132	0.003	–
Gross contribution of parents' SES:									
Dominance Education[1]	0.301	0.003	22.1	0.235	0.003	24.9	0.121	0.003	8.8
Modified Dom Education[2]	0.288	0.003	25.6	0.223	0.003	28.7	0.119	0.003	10.4
Average Education[1]	0.288	0.003	25.6	0.223	0.003	28.7	0.119	0.003	10.4
Mother/father Education[2]	0.287	0.003	25.7	0.223	0.003	28.7	0.119	0.003	10.4
Dominance SIOPS[1]	0.335	0.003	13.3	0.256	0.003	18.2	0.122	0.003	7.8
Modified Dom SIOPS[2]	0.324	0.003	16.2	0.244	0.003	21.9	0.120	0.003	9.6
Average SIOPS[1]	0.308	0.003	20.5	0.227	0.003	27.4	0.117	0.003	11.5
Mother/father SIOPS[2]	0.308	0.003	20.5	0.227	0.003	27.4	0.117	0.003	11.5
Dominance Earnings[1]	0.352	0.003	9.0	0.267	0.003	14.5	0.117	0.003	11.9
Modified Dom Earnings[2]	0.351	0.003	9.3	0.265	0.003	15.1	0.115	0.003	13.2
Average Earnings[1]	0.352	0.003	9.0	0.266	0.003	14.9	0.115	0.003	13.4
Mother/father Earnings[2]	0.357	0.003	7.6	0.273	0.003	12.7	0.116	0.003	12.0
Net contribution of parents' SES:									
Dominance Education[1]	0.282	0.003	5.8	0.207	0.003	4.5	0.111	0.003	0.4
Modified Dom Education[2]	0.276	0.003	7.4	0.203	0.003	5.7	0.110	0.003	0.7
Average Education[1]	0.276	0.003	7.4	0.203	0.003	5.7	0.110	0.003	0.7
Mother/Father Education[2]	0.276	0.003	7.6	0.203	0.003	5.7	0.110	0.003	0.7
Dominance SIOPS[1]	0.279	0.003	1.4	0.207	0.003	2.7	0.111	0.003	0.8
Modified Dom SIOPS[2]	0.278	0.003	1.8	0.206	0.003	3.2	0.110	0.003	1.1
Average SIOPS[1]	0.276	0.003	2.4	0.203	0.003	4.1	0.110	0.003	1.2
Mother/Father SIOPS[2]	0.276	0.003	2.4	0.203	0.003	4.1	0.110	0.003	1.2
Dominance Earnings[1]	0.275	0.003	0.2	0.202	0.003	1.2	0.111	0.003	3.4
Modified Dom Earnings[2]	0.275	0.003	0.3	0.202	0.003	1.2	0.110	0.003	3.9
Average Earnings[1]	0.276	0.003	0.1	0.203	0.003	1.0	0.110	0.003	4.0
Mother/Father Earnings[2]	0.276	0.003	0.2	0.203	0.003	0.9	0.110	0.003	3.6

n = 389 373. The sum of brothers and sisters will not exactly correspond to the amount of total siblings, this is because of the definition of closely spaced siblings (7 years) marginally alter which individuals who are included in the analyses. [1] One variable household measure; [2] Two variable parental measures.

Table S2. Decomposition of brother correlations in education, occupation, and earnings, by mode of operationalization.

	Brother's…								
	(1) Education (years)			(2) Occupation (SIOPS)			(3) ln Earnings		
	ICC	s.e.	↓%	ICC	s.e.	↓%	ICC	s.e.	↓%
Baseline brother correlation	0.449	0.002	–	0.327	0.003	–	0.196	0.003	–
Gross contribution of parents' SES:									
Dominance Education[1]	0.341	0.003	24.0	0.243	0.003	25.7	0.178	0.003	9.3
Modified Dom Education[2]	0.321	0.003	28.6	0.228	0.003	30.1	0.175	0.003	10.8
Average Education[1]	0.321	0.003	28.6	0.228	0.003	30.1	0.175	0.003	10.8
Mother/father Education[2]	0.321	0.003	28.6	0.228	0.003	30.2	0.175	0.003	10.9
Dominance SIOPS[1]	0.393	0.002	12.5	0.273	0.003	16.3	0.183	0.003	6.5
Modified Dom SIOPS[2]	0.375	0.003	16.6	0.256	0.003	21.7	0.178	0.003	9.2
Average SIOPS[1]	0.351	0.003	22.0	0.232	0.003	28.9	0.172	0.003	12.2
Mother/father SIOPS[2]	0.350	0.003	22.2	0.231	0.003	29.4	0.171	0.003	12.6
Dominance Earnings[1]	0.393	0.002	12.4	0.268	0.003	18.1	0.160	0.003	18.3
Modified Dom Earnings[2]	0.392	0.002	12.7	0.266	0.003	18.6	0.159	0.003	18.7
Average Earnings[1]	0.394	0.002	12.2	0.268	0.003	17.9	0.162	0.003	17.5
Mother/father Earnings[2]	0.402	0.002	10.5	0.275	0.003	15.8	0.162	0.003	17.1
Net contribution of parents' SES:									
Dominance Education[1]	0.312	0.003	6.4	0.206	0.003	4.3	0.155	0.003	0.4
Modified Dom Education[2]	0.302	0.003	8.5	0.202	0.003	5.6	0.155	0.003	0.5
Average Education[1]	0.302	0.003	8.5	0.202	0.003	5.6	0.155	0.003	0.5
Mother/Father Education[2]	0.302	0.003	8.6	0.202	0.003	5.6	0.155	0.003	0.5
Dominance SIOPS[1]	0.308	0.003	1.1	0.209	0.003	2.0	0.156	0.003	0.5
Modified Dom SIOPS[2]	0.305	0.003	1.7	0.206	0.003	2.9	0.155	0.003	0.9
Average SIOPS[1]	0.302	0.003	2.3	0.202	0.003	4.2	0.155	0.003	1.1
Mother/Father SIOPS[2]	0.302	0.003	2.3	0.202	0.003	4.3	0.155	0.003	1.1
Dominance Earnings[1]	0.302	0.003	1.0	0.201	0.003	2.2	0.154	0.003	7.2
Modified Dom Earnings[2]	0.301	0.003	1.0	0.201	0.003	2.2	0.154	0.003	7.3
Average Earnings[1]	0.303	0.003	0.7	0.202	0.003	1.8	0.156	0.003	6.4
Mother/Father Earnings[2]	0.302	0.003	0.9	0.202	0.003	1.8	0.155	0.003	6.9

n = 404 211. The sum of brothers and sisters will not exactly correspond to the amount of total siblings, this is because of the definition of closely spaced siblings (7 years) marginally alter which individuals who are included in the analyses. [1] One variable household measure; [2] Two variable parental measures.

Table S3. Decomposition of sibling correlations in ranks of education, occupation, and earnings, by mode of operationalization.

	Children rank in…								
	(1) Education (years)			(2) Occupation (SIOPS)			(3) Earnings		
	ICC	s.e.	↓%	ICC	s.e.	↓%	ICC	s.e.	↓%
Baseline sibling correlation	0.386	0.001	–	0.290	0.002	–	0.163	0.002	–
Gross contribution of parents' SES rank:									
Dominance Education[1]	0.284	0.002	26.4	0.207	0.002	28.8	0.139	0.002	14.6
Modified Dom Education[2]	0.273	0.002	29.1	0.198	0.002	31.9	0.137	0.002	16.1
Average Education[1]	0.281	0.002	27.1	0.204	0.002	29.8	0.139	0.002	14.9
Mother/father Education[2]	0.274	0.002	29.0	0.198	0.002	31.7	0.137	0.002	16.1
Dominance SIOPS[1]	0.312	0.001	19.1	0.215	0.002	26.0	0.138	0.002	15.0
Modified Dom SIOPS[2]	0.301	0.002	22.0	0.204	0.002	29.8	0.135	0.002	17.0
Average SIOPS[1]	0.304	0.002	21.3	0.206	0.002	29.0	0.136	0.002	16.6
Mother/father SIOPS[2]	0.300	0.002	22.3	0.203	0.002	29.9	0.135	0.002	17.1
Dominance Earnings[1]	0.333	0.001	13.6	0.231	0.002	20.6	0.126	0.002	22.6
Modified Dom Earnings[2]	0.331	0.001	14.3	0.227	0.002	21.8	0.124	0.002	24.1
Average Earnings[1]	0.333	0.001	13.7	0.228	0.002	21.4	0.125	0.002	23.1
Mother/father Earnings[2]	0.333	0.001	13.8	0.229	0.002	21.2	0.124	0.002	23.7
Net contribution of parents' SES:									
Dominance Education[1]	0.263	0.002	7.1	0.176	0.002	4.9	0.117	0.002	0.8
Modified Dom Education[2]	0.257	0.002	8.4	0.173	0.002	5.9	0.117	0.002	1.0
Average Education[1]	0.261	0.002	7.5	0.174	0.002	5.4	0.117	0.002	0.8
Mother/Father Education[2]	0.258	0.002	8.4	0.173	0.002	5.9	0.117	0.002	1.0
Dominance SIOPS[1]	0.261	0.002	1.4	0.176	0.002	2.6	0.118	0.002	0.6
Modified Dom SIOPS[2]	0.258	0.002	2.1	0.173	0.002	3.8	0.117	0.002	1.1
Average SIOPS[1]	0.258	0.002	2.0	0.173	0.002	3.7	0.117	0.002	1.0
Mother/Father SIOPS[2]	0.258	0.002	2.2	0.173	0.002	3.8	0.117	0.002	1.1
Dominance Earnings[1]	0.257	0.002	1.0	0.172	0.002	2.6	0.118	0.002	7.6
Modified Dom Earnings[2]	0.257	0.002	1.0	0.172	0.002	2.6	0.117	0.002	8.1
Average Earnings[1]	0.259	0.002	0.6	0.173	0.002	2.3	0.118	0.002	7.3
Mother/Father Earnings[2]	0.258	0.002	0.9	0.173	0.002	2.4	0.117	0.002	8.0

Note: the models are estimated for mixed siblings. [1] One variable household measure; [2] Two variable parental measures.

Table S4. Decomposition of sibling correlations into total contributions by mode of operationalization for ranked SES.

	Childrens rank in…								
	(1) Education (years)			(2) Occupation (SIOPS)			(3) Earnings		
	ICC	s.e.	↓%	ICC	s.e.	↓%	ICC	s.e.	↓%
Baseline sibling correlation	0.386	0.001	–	0.290	0.002	–	0.163	0.002	–
Total contributions of parents' SES:									
Dominance[1]	0.268	0.002	30.6	0.181	0.002	37.6	0.120	0.002	26.5
Modified Dom[2]	0.257	0.002	33.3	0.172	0.002	40.7	0.117	0.002	28.2
Average[1]	0.263	0.002	31.8	0.175	0.002	39.6	0.119	0.002	27.2
Standard[1,a]	0.269	0.002	30.4	0.181	0.002	37.6	0.119	0.002	26.7
Mother/father[2]	0.258	0.002	33.2	0.173	0.002	40.5	0.117	0.002	28.1

Note: the models are estimated for mixed siblings. [1] One variable household measure; [2] Two variable parental measures,
[a] Standard model = Dominance principle in education and SIOPS, but averages in earnings.

Table S5. Full model specifications of children's years of educations.

	Alternative operationalization models													
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Birth year	0.0285***	0.0100***	0.00678***	0.00677***	0.00671***	0.0226***	0.0228***	0.0217***	0.0219***	0.0221***	0.0232***	0.0259***	0.0244***	0.00797***
Dominant education		0.259***	0.158***											
Nondominant education			0.150***											
Average education				0.308***										
Mother education					0.155***									0.116***
Father education					0.153***									0.101***
Dominant SIOPS						0.0485***	0.00947***							
Nondominant SIOPS							0.0522***							
Average SIOPS								0.0747***						
Mother SIOPS									0.0344***					0.0144***
Father SIOPS									0.0405***					0.0159***
Dominant earnings										1.470***	1.386***			
Nondominant earnings											0.162***			
Average earnings												1.586***		
Mother earnings													0.339***	-0.0382***
Father earnings													0.993***	0.275***
intercept	-48.43***	-13.72***	-7.324***	-7.301***	-7.182***	-38.78***	-39.55***	-38.15***	-38.53***	-42.37***	-44.82***	-49.96***	-46.09***	-11.50***
ln σ_a^2	0.310***	0.0845***	0.0411***	0.0411***	0.0411***	0.189***	0.155***	0.106***	0.105***	0.208***	0.205***	0.209***	0.224***	0.00253
ln σ_b^2	0.546***	0.545***	0.545***	0.545***	0.545***	0.545***	0.546***	0.546***	0.546***	0.545***	0.545***	0.546***	0.546***	0.545***

Note: N = 742809. T-statistics are suppressed, but level of significance is given by * p<0.05, ** p<0.01, and *** p<0.001. The two bottom estimates represent the logged variance of the family level (σ_a^2) and the logged variance of the individual level (σ_b^2). These estimates correspond to the gross decompositions for children's education in table 3.

Table S6. Full model specifications of children's occupational prestige.

	Alternative operationalization models													
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Birth year	0.0356***	-0.0703***	-0.0882***	-0.0882***	-0.0872***	-0.00292	-0.00252	-0.0106**	-0.00953**	-0.00787*	0.000982	0.0161***	0.00904*	-0.0726***
Dominant education		1.342***	0.820***											
Nondominant education			0.775***											
Average education				1.596***										
Mother education					0.775***									0.457***
Father education					0.818***									0.446***
Dominant SIOPS						0.276***	0.0577***							
Nondominant SIOPS							0.292***							
Average SIOPS								0.425***						
Mother SIOPS									0.195***					0.104***
Father SIOPS									0.230***					0.107***
Dominant earnings										8.828***	8.197***			
Nondominant earnings											1.215***			
Average earnings												9.629***		
Mother earnings													2.241***	0.292***
Father earnings													5.933***	2.206***
intercept	-22.45**	177.3***	212.9***	213.0***	211.1***	42.58***	40.01***	50.89***	48.74***	24.12***	4.950	-24.21***	-4.586	166.2***
ln σ_a^2	1.974***	1.756***	1.715***	1.715***	1.714***	1.830***	1.789***	1.726***	1.725***	1.836***	1.831***	1.834***	1.855***	1.637***
ln σ_b^2	2.409***	2.409***	2.409***	2.409***	2.409***	2.409***	2.409***	2.409***	2.409***	2.409***	2.409***	2.409***	2.409***	2.409***

Note: N = 742809. T-statistics are suppressed, but level of significance is given by * p<0.05, ** p<0.01, and *** p<0.001. The two bottom estimates represent the logged variance of the family level (σ_a^2) and the logged variance of the individual level (σ_b^2).. These estimates correspond to the gross decompositions for children's SIOPS in table 3.

Table S7. Full model specifications of children's ln earnings.

	Alternative operationalization models													
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Birth year	0.0263***	0.0240***	0.0236***	0.0236***	0.0237***	0.0254***	0.0254***	0.0251***	0.0252***	0.0247***	0.0251***	0.0255***	0.0251***	0.0239***
Dominant education		0.0262***	0.0152***											
Nondominant education			0.0164***											
Average education				0.0315***										
Mother education					0.0145***									0.00576***
Father education					0.0168***									0.00458***
Dominant SIOPS						0.00568***	0.000425***							
Nondominant SIOPS							0.00702***							
Average SIOPS								0.00907***						
Mother SIOPS									0.00383***					0.00195***
Father SIOPS									0.00528***					0.00186***
Dominant earnings										0.276***	0.254***			
Nondominant earnings											0.0421***			
Average earnings												0.302***		
Mother earnings													0.0616***	0.0321***
Father earnings													0.201***	0.148***
intercept	-46.32***	-41.99***	-41.20***	-41.21***	-41.31***	-44.73***	-44.76***	-44.39***	-44.48***	-44.47***	-45.17***	-46.09***	-45.15***	-42.67***
ln σ_a^2	-1.415***	-1.481***	-1.493***	-1.492***	-1.493***	-1.467***	-1.484***	-1.504***	-1.505***	-1.534***	-1.540***	-1.536***	-1.527***	-1.562***
ln σ_b^2	-0.439***	-0.439***	-0.439***	-0.439***	-0.439***	-0.439***	-0.439***	-0.439***	-0.439***	-0.439***	-0.439***	-0.439***	-0.439***	-0.439***

Note: N = 742809. T-statistics are suppressed, but level of significance is given by * p<0.05, ** p<0.01, and *** p<0.001. The two bottom estimates represent the logged variance of the family level (σ_a^2) and the logged variance of the individual level (σ_b^2).. These estimates correspond to the gross decompositions for children's earnings in table 3.