European Sociological Review, 2025, **41**, 793–807
https://doi.org/10.1093/esr/jcaf029
Advance access publication 12 June 2025
Original Article

Social origins and socioeconomic outcomes: a combined twin and adoption study

Arno Van Hootegem[1,2,*], Adrian Farner Rogne[1,3], Caroline Tveter Cros[4], Ole Røgeberg[5] and Torkild Hovde Lyngstad[1]

[1]Department of Sociology and Human Geography, University of Oslo, 0851 Oslo, Norway
[2]Centre for Fertility and Health, Norwegian Institute of Public Health, 0473 Oslo, Norway
[3]Institute for Social Research, 0260 Oslo, Norway
[4]Department of Political and Social Sciences, European University Institute, 50014 Fiesole, Italy
[5]Ragnar Frisch Center for Economic Research, 0349 Oslo, Norway
[*]Corresponding author. Email: a.van.hootegem@sosgeo.uio.no

Parents and children tend to have similar socioeconomic status (SES). Sociological theory has often emphasized the role of social mechanisms in intergenerational transmission, including the influence of the broader rearing environment as well as parental investments and aid, but often not allotted an important role to genetics. Accumulating evidence suggests that genetics play an important role in the transmission of SES from parents to children. Yet, estimates differ substantially across data sets, measures and methods. Using two research designs that account for potential genetic confounding, and high-quality data from Norway, we estimate the strength of the intergenerational social transmission of a range of SES indicators. By triangulating data and designs, we obtain estimates that are more robust to idiosyncratic modelling assumptions. Measures of Norwegian parents' socioeconomic position predict their children's socioeconomic outcomes, but purely social mechanisms only account for a fifth of the total explained variance in intergenerational transmission.

Introduction

The reproduction of inequality is a core topic in the social sciences. In brief: Wealthier, more educated parents with high-status jobs tend to have children with higher socioeconomic status (SES) as well. This is true for a wide range of SES indicators, such as education, occupational prestige, income, wealth, and social class (Ganzeboom, Treiman and Ultee 1991; Narayan, Van der Weide, et al. 2018; Breen, Ermisch and Helske 2019; Bukodi, Paskov and Nolan 2019; DiPrete 2020; Gregg et al. 2022). Parent-child and sibling associations have been shown to be resource-specific (Thaning 2021; Hällsten and Thaning 2022; Mastekaasa and Birkelund 2023), suggesting that different mechanisms are salient to the transmission of different SES domains.

In the social sciences, theoretical explanations for this strong intergenerational persistence have traditionally focussed on social factors—what parents *have* and *do* (Turkheimer 2000; Freese 2008). Children from different social backgrounds will face different parenting styles and child rearing practices, have different material circumstances, social environments, role models, neighbourhoods, etc. This influences their abilities, preferences and aspirations, their educational opportunities and financial support, their educational and occupational careers, and thus their income and wealth (Bourdieu 1984; Becker and Tomes 1986; Goldthorpe 1996; Heckman 2006). Such explanations are plausible. We would expect many affluent, high-status parents to use their financial, social and cultural capital to help their children succeed in important life domains.

Assessing such mechanisms in empirical work, however, also requires accounting for a second source of similarity in parent-child outcomes: genetic relatedness. Genetic differences contribute to variation in multiple traits and abilities that may influence educational and occupational success. Children are genetically more similar to their parents than they are to a random stranger, and this similarity should be expected to induce a similarity in traits and abilities that leads to more similar life outcomes. Genetically influenced traits

Received: July 2024; **revised:** April 2025; **accepted:** May 2025

include cognitive abilities (Trampush et al. 2017), personality traits (Constantinou et al. 2023), physical and mental health (Steenstrup et al. 2013; Gatt et al. 2014), physical appearance (Mobius and Rosenblat 2006), or indeed—as a massive review of the twin-study literature put it - 'all human traits' (Polderman et al. 2015, p. 708). Recent sociological, economic and behavioural genetic research into the role of genetics has widened our understanding of the pathways through which children come to resemble their parents. Yet, these insights have not yet been fully integrated into theoretical and empirical work interpreting parent-child associations, and several knowledge gaps remain.

This article contributes to the literature on intergenerational socioeconomic persistence in three important ways. First, we present an overview of research designs appropriate for disentangling social and genetic transmission mechanisms, along with a broad overview of what researchers have found using these.

Second, we present novel results on the importance of social transmission of socioeconomic status in Norway using two research designs that account for genetic confounding, following previous landmark studies employing mixed designs (Haegeland et al. 2010; Holmlund, Lindahl and Plug 2011). By comparing estimates across designs using different sources of identifying variation, results should be more robust to the idiosyncratic methodological weaknesses present in any single approach. Specifically, we compare the transmission of social status from parents to adoptive and biological children (method 1), and employ a biometric model to separate the role of genetics and social environments, using data on twins, their spouses and their children (method 2).

Third, we fill gaps in the extant literature by estimating the social transmission of SES between and across four different measures of social position: years of education, occupational prestige, income, and wealth, and provide standardized estimates of transmission within and across domains. This is relevant as most research focuses on education, and our understanding of the social transmission of wealth and occupation-related indicators of SES, net of genetic influences, hence remains limited. Further, previous descriptive studies have documented resource-specific reproduction within and across SES domains (Thaning 2021; Hällsten and Thaning 2022; Mastekaasa and Birkelund 2023), but we know little about the patterns of within- and between-resource associations after accounting for genetic transmission.

In sum, the aim of this article is to identify the social transmission of SES, and distinguish between social and genetic transmission from parents to children for various SES dimensions. We conduct our study in Norway, a Nordic welfare state characterized by low income inequality, free access to education and other welfare benefits, and where intergenerational persistence is known to be weaker in comparison to other countries (Hertz et al. 2008). Importantly, both designs use data from high quality administrative registers covering educational attainment, occupational prestige, income and wealth, avoiding sample attrition, recall bias, and many other sources of measurement error.

While our empirical strategies produce results that differ in some important ways, the overall conclusions from our study can be summarized as follows: (1) Raw parent-child associations are strongest for education, echoing previous findings. (2) Intergenerational correlations in SES indicators are found for both genetically related and unrelated parents and children, but they are mostly substantially weaker when genetic relatedness is netted out. (3) Social transmission of education and occupation is moderate. Net of genetic transmission, parental education and occupation are poor predictors of child income and wealth rank. Parental income rank and fathers' wealth rank moderately predicts child income rank among children of twins, but not among adoptees. Father's wealth rank moderately predicts child wealth rank. (4) In the relatively egalitarian context of Norway, social mechanisms of transmission play a role in SES reproduction, but overall, this social transmission only accounts for around one fifth of the total transmission.

A brief overview of the extant literature on intergenerational transmission of socioeconomic status

Suggested theoretical mechanisms in the social transmission of status

To what extent is the attainment of social positions dependant on people's social origins? The question lies at the core of social mobility research (Breen and Jonsson 2005). Empirical analyses typically proceed by examining how different indicators of socioeconomic status—e.g. categorical class positions, educational levels, occupational status, income and wealth—are correlated across generations (Erikson and Goldthorpe 2002). Generally, this approach finds that origins matter: parental SES predicts offspring SES.

Multiple mechanisms and factors have been proposed to explain this intergenerational transmission of SES, typically focussing on the social childrearing environment and the material and social resources that parents provide (Erikson et al. 2005; Stocke 2007; Roksa and Potter 2011). These factors include parenting styles, family resources, help with homework, parental involvement in school relations (Lareau 2011), financial and practical aid in education (Raftery and Hout 1993; Goldthorpe 1996), the direct transfer of economic capital (Hansen and Toft 2021), the accumulation of cultural capital through socialization and the role of parental social capital (Bourdieu 1984, 1986), parental investments in children's early development and human capital (Becker and Tomes 1986; Heckman 2006), the role of schools and neighbourhoods (Massey 1990), rational action, differences in initial positions and relative risk aversion (Goldthorpe 1996; Breen and Goldthorpe 1997), and parents acting as a resource or role model (Helland and Wiborg 2019).

These factors, which have to do with what parents *have* and *do*, paint a picture of affluent well-educated parents doing what they can to advantage their children over others. In the words of Bukodi, Paskov and Nolan (2019: 967): *'Advantaged families will seek always to use their superior resources—economic but also cultural and social—to the extent necessary in order to maintain their children's greater chances of success in educational systems and labour markets, relative to those of children from less advantaged class positions'*.

This perspective is certainly plausible, and our expectation is that many of these mechanisms will contribute to the transmission of socioeconomic status across generations. Determining the net impact of such social environmental factors, however, requires research designs that can filter out the second main source of intergenerational transmission: the shared genetics of parents and their children. Several alternative approaches have been suggested to separate genetic and social transmissions, or remove genetic confounding when estimating social transmission effects. In what follows, we give a short overview of these potential methods as well as the available research using each of these designs.

A review of research designs and findings

The main problem with disentangling the role of social and genetic transmission of socioeconomic status is that they tend to operate simultaneously: parents transmit genes to their children, and typically also raise them and provide a home environment and neighbourhood. The net similarity generated by both the genetic and social transmission can be estimated using intergenerational correlations (Mastekaasa and Birkelund 2023), but this does not tell us the relative contribution of the two transmission channels. Identifying the separate contribution of social and genetic transmission requires a source of identifying variation in the data. Put differently, we need to find situations where the two transmission channels will be blended in a different way so that we can see how this alters the net induced parent-child similarity. In large lines, previous research has built upon five different methods or empirical strategies to assess the pure social transmission while accounting for genetics: the Adoption design, the Multiple-Children-of-Twin design, the Nuclear Twin Family Design, the Instrumental Variable approach and the Polygenic Index control design.

The strengths and weaknesses of these designs as well as intergenerational correlations are shown in Table 1, while a more detailed discussion of each of the methods can be found in the Supplementary Materials part A. Our argument is that while all research designs discussed rely on assumptions that, if violated, may bias the results, they also rely on different assumptions and are sensitive to different sources of bias. Providing results based on different methods and sources of identifying variation allows us to draw firmer conclusions regarding the role of social factors in intergenerational socioeconomic reproduction.

The interpretation of results from these study designs differs. For intergenerational correlations, results should be interpreted as reflecting the *total transmission* of the given trait, encompassing both social and genetic pathways. While giving intergenerational correlations a descriptive interpretation is unproblematic, interpreting these as estimates of social transmission, would only be correct under the implausible assumption that there was no genetic confounding (Freese 2008). In the other presented designs, the goal is to avoid genetic confounding and estimate social transmission. Conditional on idiosyncratic modelling assumptions, estimates from adoption, Multiple-Children-of-Twin, Nuclear Twin Family, and Polygenic Index control designs can be interpreted as the *total social transmission* of the given trait. These estimates should not, however, be interpreted as causal effects of these traits in parents, nor as exclusively trait-specific. The IV design is different in this regard, as it produces estimates of the causal effects of a specific trait in parents, netting out confounding from other family-level characteristics that are not causally downstream from the trait in question.

To provide an overview of the previous research using these different designs, and hence on evidence on the social transmission of SES, we reviewed results from 40 studies that measure intergenerational associations while attempting to account for the role of genetic transmission. This should not be considered a comprehensive systematic review, but provides an overview of the literature on social transmission effects: the strength of transmission and how it varies by SES indicator, context and methodological choices. Detailed results are given in the Supplementary Material section A.

Among these 40 studies, several studied multiple measures of social origins and destinations. 26 included measures of social origins that were related to parental education, while 34 presented results for schooling-related outcomes. Several studies also presented income-related origin and/or outcome measures (14

Table 1 Research designs and their strengths and weaknesses with regards to identifying the *social* transmission of SES

Method	Strategy for identification of social transmission	Critical assumptions for inference on social transmission (bias as an estimate of social transmission if assumption is violated)	Internal validity and generalizability
Intergenerational correlations/ associations	Compare parents and children	No genetic confounding (Upwards bias) No confounding from other parental/family characteristics (Upwards bias)*	Low internal validity as estimate of social transmission High generalizability as estimate of total transmission; low generalizability as estimate of social transmission
Conditional intergenerational correlations	Compare parents and children and control for observed potential confounders*	No genetic confounding (Upwards bias) No confounding from unobserved parental/family characteristics (Upwards bias)*	Low internal validity as estimate of social transmission High generalizability as estimate of total, conditional transmission; low generalizability as estimate of social transmission
Adoption studies	Compare adopted and non-adopted children to their parents	As-good-as-random adoption process; no correlation between characteristics of biological and adoptive parents (Upwards bias) Adopted and non-adopted siblings are treated similarly (Likely downward bias) No confounding from unobserved parental/family characteristics (Downward bias)*	High internal validity as estimate of social transmission if assumptions hold. Limited generalizability due to unrepresentative samples
(Multiple) children of twins designs	Compare children of MZ and DZ twins to their parents, uncles, aunts and cousins	No assortative mating—may be corrected for on observed characteristics (Upwards bias) Equal environments (Downwards bias) No non-additive genetic effects No confounding from unobserved parental/family characteristics (Upwards bias)*	Medium internal validity as estimate of social transmission due to potential assumptions violations (primarily NAM if not corrected, and EEA) Medium generalizability as estimate of social transmission due to potential bias and unrepresentative samples

and 6 studies, respectively). Only two of the reviewed studies focussed on parental and child wealth, while none studied occupation-related measures. 9 studies reported findings on parent-child associations across SES domains (parental income and child education was the most common).

Table 1. Continued

Method	Strategy for identification of social transmission	Critical assumptions for inference on social transmission (bias as an estimate of social transmission if assumption is violated)	Internal validity and generalizability
Nuclear twin family design	Compare MZ and DZ twins to their parents and non-twin siblings	Equal environments (Downwards bias) Genetic influences are similar across generations No confounding from unobserved parental/family characteristics (Upwards bias)*	Medium internal validity as estimate of social transmission due to potential assumptions violations (EEA and constant genetic influences) Medium generalizability as estimate of social transmission due to potential bias and unrepresentative samples
Instrumental variable designs	Exploit exogenously induced variation in parental characteristics, compare those affected by the instrument to those who are not	Instrument exogeneity/exclusion restriction Instrument relevance (Upwards bias) Stable unit treatment value assumption (Downward bias)	High internal validity as an estimate of social transmission, if assumptions hold. Limited generalizability due to unrepresentative samples/compliers
Polygenic index control designs	Compare parents and children, and control for children's polygenic indices (PGI) and observed potential confounders*	All relevant genetic confounding is captured by PGIs (Upwards bias) Requires unbiased SNP weights from relevant GWAS No confounding from unobserved parental/family characteristics (Upwards bias)*	Low internal validity as estimate of social transmission due to large measurement error in PGIs and unmeasured genetic variants. Medium generalizability as estimate of social transmission due to potential bias

*Such confounding is a problem if estimates are interpreted as representing the causal effect of the specific characteristic in parents, but not if they are interpreted as the total social intergenerational transmission, net of genetic confounding.

Direct comparisons between studies are difficult due to differences in variable definitions (years of education vs. post-compulsory schooling attendance; log earnings vs family income etc). However, some patterns are clear. Studies of the intergenerational transmission of years of schooling - the most commonly estimated association – generally produce coefficients around 0.1 or less in Nordic contexts (Björklund, Lindahl and Plug 2006; Bingley, Christensen and Jensen 2009; Holmlund, Lindahl and Plug 2011; Pronzato 2012; Amin, Lundborg and Rooth 2015; Breen, Ermisch and Helske 2019; Baier et al. 2022). Estimates tend to be considerably larger in British and US samples, but with relevant exceptions also here (Dearden, Machin and Reed 1997; Sacerdote 2002, 2007; Plug 2004). Several of the studies presented also include estimates based on raw intergenerational associations between parents' and children's outcomes that do not account for genetic influences. Such estimates are typically considerably larger, suggesting substantial genetic confounding. This is in line with findings in previous literature summaries (Holmlund, Lindahl and Plug 2011; Mogstad and Torsvik 2023). PGI control studies have found limited evidence for genetic confounding, but these studies may underplay the magnitude of genetic confounding (Zietsch, Abdellaoui and Verweij 2023). Yet, future PGIs and related methods may alleviate some of the concerns related to PGIs as control variables. Figure 1 is a visual summary of parameter estimates for the social component of the intergenerational transmission of years of education by research design.

However, based on this overview, we can see several important caveats that make consistent conclusions about social transmission difficult. First, there is a

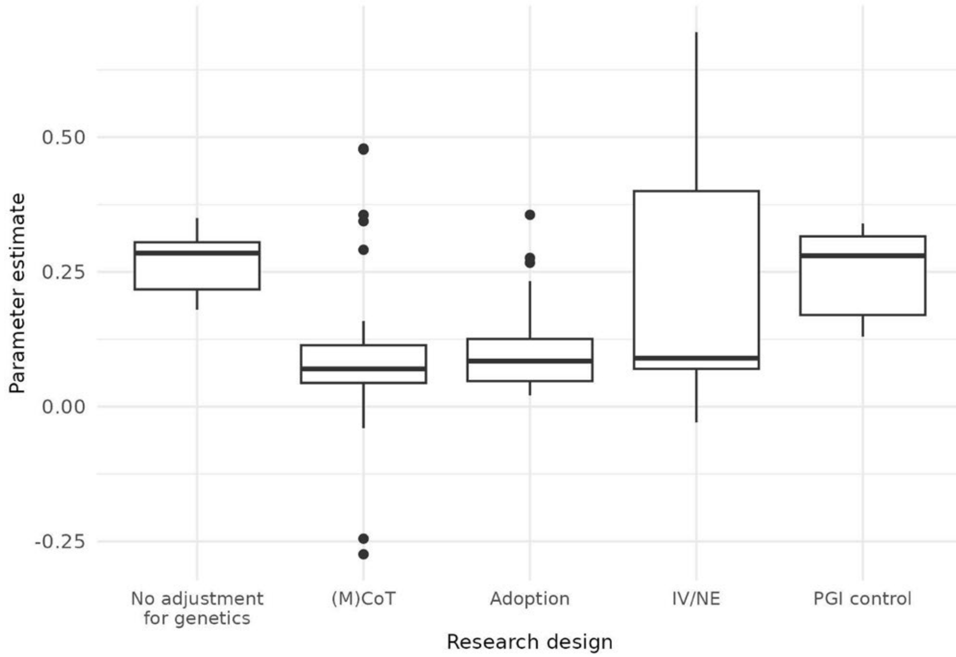

Figure 1 Parameter estimates from studies of the social component of intergenerational transmission of years of education across research designs. Abbreviations: (M)CoT - (Multiple) Children of Twins; IV—Instrumental variable; NE—Natural Experiment; PGI—Polygenic index

strong skewness towards analysing years of education as both the independent and dependent variable, making conclusions based on other SES dimensions tenuous. Second, most of the previous research uses a single method, which, combined with inconsistent samples, complicates the comparison of the magnitude of social transmissions across designs. Third, previous studies have used different measures, definitions and scaling of the variables, limiting comparability across studies and SES indicators. In response to this, the current study expands previous research by making use of two distinct approaches to evaluate social transmission, namely the Adoption and the Multiple-Children-of-Twin design, across four main indicators of SES: education, occupational prestige, income and wealth. These two methods are chosen as they can be applied on the same cohorts on Norwegian register data, thereby facilitating comparisons across designs. Measures are standardized to ease comparisons across indicators and contexts.

Both of our methodological approaches attempt to identify the uniquely social transmission of SES. This is challenging, both conceptually and empirically, as the nature-nurture complex involves a range of different mechanisms. Parental genes will for instance be expected to make children similar to their parents both directly (genetic transmission), and indirectly through the behaviours they induce in the parent (i.e. 'genetic nurture'; Kong et al. 2018). Such indirect genetic effects are a type of social transmission that will be captured by both the adoption and Children-of-Twin design. Both designs also consider gene-environment correlation. E.g. children growing up in affluent environments may tend to also have genetic endowments that predict higher earnings. Yet, such gene-environment correlations may also arise in other ways, as when those showing early academic promise receive more encouragement, resources and opportunities - causing them to diverge further from their peers ('evocative childrearing'). Such effects, to the extent the positive reinforcement is stronger among certain types of parents, would typically also be captured by social transmission in the designs. Prenatal environments, on the other hand, would likely be mainly reflected in social estimates for the Children-of-Twin analyses and not be part of the social estimates for the adoption designs. Finally, genetically influenced traits in children may be expressed differently depending on the social environment provided by the parents (Breinholt and Conley 2023) - in effect gene-environment interactions (GxE). These will be picked up by the adoption design, but not by the Children-of-Twins design. However, social science theory puts much emphasis on a 'main effect' of parents' socioeconomic position, and typically not on interactive or evocative effects. Estimating this main effect of social origins is the main focus of this study.

Methods

Data

We use data from the Norwegian Twin Registry (NTR) as well Norwegian administrative register data from Statistics Norway, with individual level pseudonymous identifiers allowing for cross-file linkages. The administrative registers cover the whole population resident in Norway. From the administrative registers, we obtain demographic information, information on SES indicators, and parent-child links for both designs (Røed and Raaum 2003). NTR is a large twin panel study including a wide range of information on twin pairs born in Norway (Harris, Magnus and Tambs 2002; Nilsen et al. 2013). From the NTR, we obtain demographic information on twin pairs and their zygosity.

Measures

We assess four indicators of socioeconomic position, allowing us to explore differences in the strength of transmission across indicators: educational attainment, occupational prestige, and income and wealth rank.

To capture persistent differences in socioeconomic position, observed earnings, income, wealth and occupational prestige are averaged across an age range. Child outcomes are measured across all ages 30–45 present in the data. Parental outcomes are measured later in life, to correspond to the socioeconomic position attained at the time their children are potentially affected by social transmission. For earnings, income and education we use ages 45–60, while occupational prestige is measured across ages 50–65 as occupational codes are only available from 2003 onwards. While the age of measurement in the parental generation is relatively late, a broad age span is taken to reflect average socioeconomic positions across formative years of the children's generation.

Educational attainment is measured using annual NUS2000 codes, from which we extract the first digit to obtain educational levels. From this, we calculate the number of years of education required to complete the level attained and average the obtained years of education across the target age range.

Income rank uses total income, defined as income from work, capital gains and transfers. Ranks are calculated within birth cohort, age and sex (using the full population as the base), and averaged across the target age range for each individual.

Wealth ranks use net wealth (gross wealth deducted by any debt) from tax records. Ranks are calculated within birth cohort, age and sex and averaged across the target age range for each individual.

Occupational prestige uses occupational ISCO88 codes and assigns values (0–100) on the SIOPS scale (i.e. as 'Treiman scores'). SIOPS is a validated and widely used score of occupational prestige in mobility research (Treiman 1970; Ganzeboom, Treiman and Ultee 1991) based on international surveys on the perceived prestige of various professions.

Adoptee sample definition and research design

The adoptee sample starts with the identification of adopted children from South Korea. Adoptees are identified from the population register as individuals born in the Republic of Korea (South Korea) with two Norwegian-born registered parents. The adoptees are further restricted to those born between 1965 and 1985, whom past research has shown to be quasi-randomly assigned to parents (Fagereng, Mogstad and Rønning 2021) - as required by our research design. More information on the reason for using South Korean adoptees and on the exact identification strategy of adoptees can be found in the Supplementary Materials (Section B).

The adoption design compares transmission between biological children and parents to that of adopted children and their adoptive parents, where there is no genetic material transmitted from parent to child and all transmission is social. However, the adoption design does rely on several assumptions, such as limited selectivity into adoption, similar treatment of adopted and biological children, no confounding from prenatal and early life experiences, and adoptees' representativeness for the general population. Although a breach of some of these assumptions will most likely lead to an underestimation of social background effects, we do try to account for some of these issues in our design. More details on the adoption design and its assumptions can be found in Supplementary Material (see Section A).

To facilitate the comparison between adopted and biological children, we use a matching procedure on a random 5 per cent sample of Norwegian-born individuals born to Norwegian-born parents in the years 1965–1985. The matching procedure uses a 1:1 nearest neighbour propensity matching without replacement, with a logistic regression of the treatment on various covariates. Based on this, 2152 adoptees and 2152 matched Norwegian-born children were retained in the analysis sample. Preliminary checks found the overall distributions of social positions of adoptees and Norwegian-born children to be similar, especially after matching, and hence suggest that we are comparing similar families. More information on the matching procedures and descriptive statistics for matched and unmatched samples can be found in the Supplementary Materials (Section C).

For each of the (adopted and biological) children in the adoptee sample we have eight indicators of parental social position (four from each parent) and four indicators of the child's own social position. The intergenerational transmission is assessed using linear regression in R. This is done separately for each combination of parental indicator (controlling for the SES indicator of the other parent to account for assortative mating) and child indicator, and separately for adoptees and biological children, resulting in $8 \times 4 \times 2 = 64$ separate estimates.

Twin sample definition and multiple-children-of-twins research design

Twins are identified from the Norwegian Twin Registry, which is a national database that provides information on twin pairs and their zygosity. We limit the sample to twin pairs belonging to birth cohorts born between 1940 and 1960 ($N_{pedigrees} = 7023$; $N_{observations} = 42867$). These twins comprise the parental generation, and their children will hence be born in similar cohorts as the adoptees, making the cohorts for both samples similar. These twin cohorts were also used in recent research by Baier et al. (2022), who used the Children-of-Twin design to decompose the intergenerational transmission of education into genetic and environmental components. Yet, they did so only for education, used a liability scale for education and included adjustments for assortative mating based on phenotypic similarity, which makes the results not directly comparable.

Based on this sample, we apply a second research design: the Multiple-Children-of-Twins (MCoT) design (McAdams et al. 2018). This design builds on genetic similarity variances by comparing children of MZ twins who share 100 per cent of their genetic material and children of dizygotic twins who are assumed to on average share 50 per cent of their genes. It compares associations within a family defined as a twin pair, and their respective partners and children. The design allows us to directly estimate the *social* transmission of fathers' and mothers' SES measures to child outcomes. However, it does entail several assumptions as well, such as the equal environments assumptions, no assortative mating and no non-additive genetic effects. More information on this method and its assumption can be found in the Supplementary Material (section A).

The MCoT model is specified as a structural equation model with latent variables for sources of variance in the outcome variables (see section D of the Supplementary Materials for the path diagram and descriptive statistics for twin pairs and their offspring). The models were estimated using the structural equation modelling package OpenMx in R (Neale et al. 2016). Estimates of the social transmission from mother and father are both estimated simultaneously, and the model was estimated 16 times (4 parental SES indicators x 4 child SES indicators).

Sensitivity analyses

We also perform a number of additional analyses in order to gauge the sensitivity of our results:

(a) Estimating intergenerational associations for adoptees and their non-adopted siblings in a smaller sample of families with both adoptive and own-birth children. This allows us to compare adopted and biological children within the same families to evaluate concerns about to what extent the distinct nature of adoptive families drives the results.
(b) Using gross wealth rather than net wealth as the operational definition of wealth. The former does not deduct debt and hence allows us to test whether we see similar intergenerational transmission when assets including debts are considered.
(c) Estimating models with only mothers or only fathers, which highlights whether the results are driven by including both parents and hence by the similarity between mothers and fathers.
(d) Estimating associations for adoptees in unmatched samples. While an unmatched sample of the general population is less comparable to adoptees, they mimic the population more closely and hence offer a more representative comparison group of Norwegian-born children.
(e) Estimating separate adoption models for boys and girls, as well as for those adopted before and after the age of 1, to test subgroup heterogeneity, assess sensitivity to early childhood environments, and check whether the overrepresentation of girls in our sample could bias the results.

The results are discussed and presented in Section G of the Supplementary Material, but overall, these sensitivity analyses produce estimates that are consistent with our main results.

Results

Estimates from analyses of adoptive families

Results from the 16 regressions on the adoptee sample and corresponding regressions for the Norwegian own-birth sample are shown in Figure 2 (see Section E in the Supplementary Material for a tabular version of the main results). Estimates express the expected difference (in standard deviation units) of two children on indicator Y of social position when their mother or father differs by 1 standard deviation on indicator X.

Overall, there are strong differences between the transmission for adoptees and Norwegian-born children for education, occupation and income, where estimates for adoptees are often about half as large and in some cases (e.g. most income estimates) not significantly different from zero. This highlights that only a relatively limited part of the total transmission appears to be social. Substantial differences in the discrepancy between adopted and

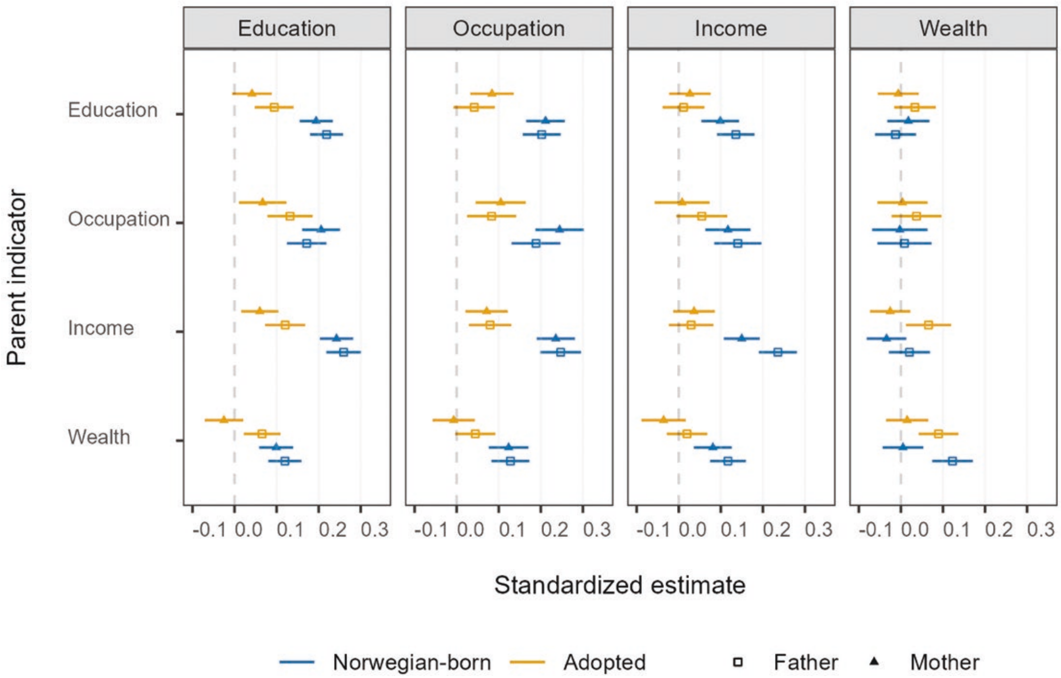

Figure 2 Forest plot of estimates of standardized regression coefficients for the intergenerational transmission of status for adoptees and Norwegian-born children from 16 model specifications each (with clustered standard errors by family identifier to account for siblings in the data)

Norwegian-born children are discernible across SES indicators, reinforcing the point that multiple measures are required to unpack intergenerational transmission.

However, we do observe similarities between adoptees and Norwegian-born children for some dimensions. The role of family background indicators for net wealth outcomes seems rather weak in general, with several estimates being insignificant for both groups. An exception is the association between fathers' wealth and child wealth, which shows somewhat stronger estimates for both groups, suggesting a stronger social transmission. In addition, the association between fathers' occupational status and children's education is of a similar magnitude for adoptees and biological children. In general, for education and occupational prestige, there is important intergenerational transmission also for adoptees, which runs purely through social mechanisms. It is also important to consider that most of the estimates for adoptees will likely provide an underestimation of the impact of social origins. However, all in all, these findings are in line with previous studies finding intergenerational associations to be stronger for non-adopted children (cf. Supplementary Materials, Section A).

Estimates from multiple-children-of-twins analyses

Figure 3 shows a similar set of results from estimations of parameters in the MCoT design. Full numerical results are available in the Supplementary Materials, section F. We focus on the path coefficients for the paternal (p) and maternal (m) status indicator on the latent factor representing shared environmental influences on the family's children (denoted as the F component in the path model, cf. Supplementary Materials section D). As can be seen from the panel, nine of the coefficients have confidence intervals overlapping with 0. The largest coefficients are generally seen for models where the outcome is a child's educational attainment or occupational prestige. Estimates are generally lower for models of wealth rank and income rank. One exception is estimates for paternal wealth and offspring's wealth, which is likely due to the ease with which wealth can be directly transferred from parents to children (Hansen 2014; Adermon, Lindahl and Waldenström 2018). In general, there is also a weak tendency for higher coefficients when outcomes and predictors measure the same SES dimension.

These path coefficients are not directly comparable to standardized coefficients obtained in the adoptees analysis, as the path coefficients in the MCoT design were modelled to affect the amount of variance in a variance component and not the outcome directly. Yet, the results are substantively very similar as those obtained from the sample of adoptees.

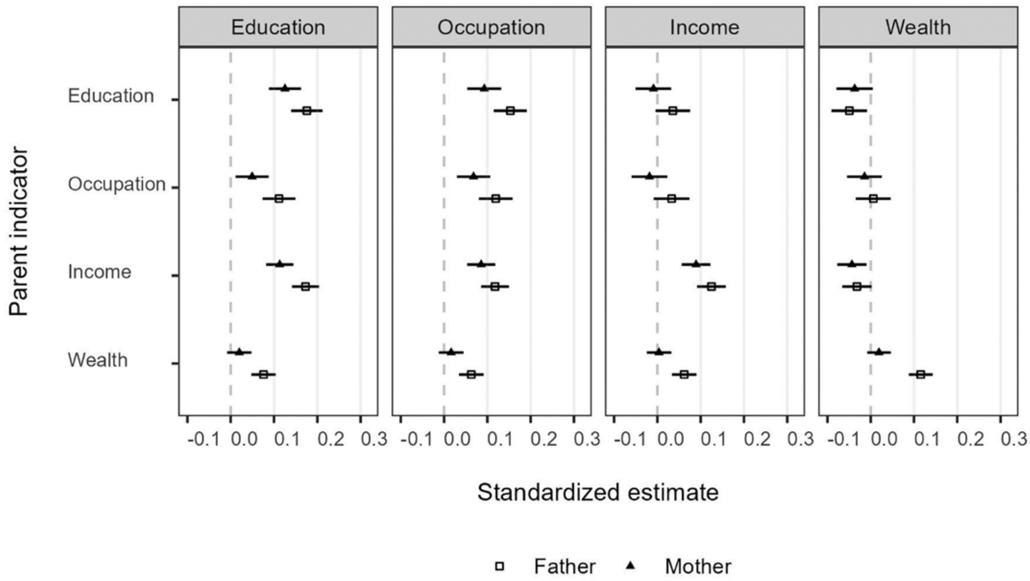

Figure 3 Forest plot of estimates of standardized coefficients for the intergenerational transmission of SES for mothers and fathers from 16 Multiple-Children-of-Twins models. Coefficients shown are *m* and *p* coefficients in the MCoT path diagram (cf. Supplementary Materials part D)

How much of intergenerational transmission is social? A comparison of methods

A question that remains is how much the social transmission—what parents have and do—contributes to the overall intergenerational transmission. To answer this and to meaningfully synthesize results obtained with two different research designs and from 48 different models, we can compare how much of the variation in the outcomes are explained by the relevant predictors. In the models of adoptees and Norwegian-born children, the statistic of interest would be the R^2 from each model. In the MCoT results, the relevant statistic is the relative variance component for the shared family environment in the offspring generation (denoted F in the path model). These estimates are comparable to the readily available R^2 values from OLS models. Total transmission—both genetic and social components—would then best be represented by the R^2 for the Norwegian-born children, while R^2 values obtained from adoptees and MCoT models would represent estimates of social transmission for the otherwise corresponding model. Figure 4 plots estimated levels of social transmission against levels of total transmission by design and outcome. The black line reflects a hypothetical scenario where social transmission explains 50 per cent of the total transmission. The blue dotted and yellow dashed lines represent the average estimates form our children of twins and adoption designs, respectively. The average across these designs is shown by an orange solid line

From Figure 4 we can isolate several key patterns in the intergenerational transmission of socioeconomic status. Firstly, the social transmission component is significantly lower than total transmission, as all points except for the wealth indicators (for which transmission is limited) lie below the solid black line. Secondly, social origins contribute about 20 per cent to the overall transmission of socioeconomic outcomes, as indicated by the solid orange line. This suggests that social factors play a substantial, albeit partial, role in intergenerational processes. Lastly, there is marked variation in social transmission of socioeconomic status across outcomes and predictors. Explained variances are generally lowest for models where income or especially wealth is the outcome variable, and highest for models where education or occupational prestige is the outcome variable.

Comparing designs, we can see that explained variances by social origins are on average systematically lowest for the adoption design (dashed yellow line) and slightly higher for the Multiple-Children-of-Twin design (dotted blue line).

Discussion and conclusion

The main finding of this study is the significant intergenerational reproduction of socioeconomic status (SES), with social origins only playing a moderate role in this transmission process. Genetic relatedness is likely an important confounder in the social transmission of SES indicators.

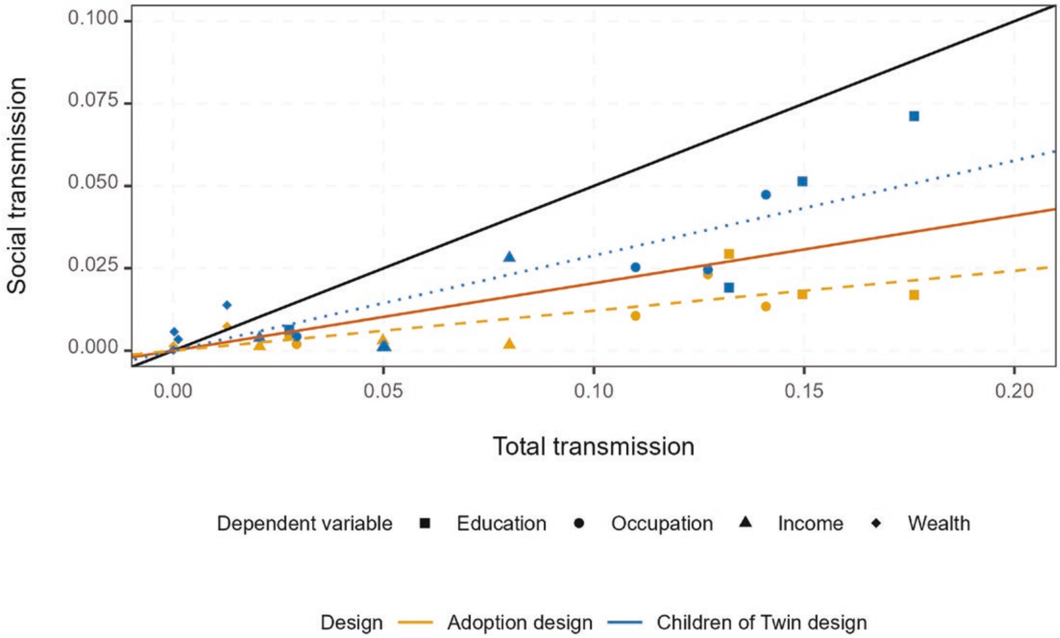

Figure 4 Explained variance from OLS models on adoptees and Norwegian-born and shared family environment variance component (F) from MCoT models. The solid black line suggests the scenario where half of the total transmission is social. The solid orange line represents the linear trend in social transmission as a function of total transmission. The yellow and blue lines represent the results separately for the adoption (dashed) and MCoT (dotted) design, respectively

Our models accounting for genetic confounding yielded markedly smaller estimates of intergenerational transmission of SES. Netting out genetic relatedness, we observed that parents' educational attainment, occupational prestige and income rank were moderate predictors of child educational attainment and occupational prestige. Coefficient sizes were around 0.1 for education, consistent with previous Scandinavian studies (cf. Supplementary Materials part A). Importantly, our results are of a similar magnitude to those of Holmlund, Lindahl and Plug (2011), who used a mixed design in the neighbouring country of Sweden. Fagereng, Mogstad and Rønning (2021) studied household wealth in an adoption design very similar to ours. Yet, our wealth estimates are considerably smaller than theirs, both for adoptees and non-adoptees[1]. The difference in estimates could be due to various reasons, but note that the relative size of their estimates for adoptees and non-adoptees are very similar to ours. However, Bingley, Cappellari and Tatsiramos (2023), find much larger social components and even attribute between 50 to 80 per cent in intergenerational transmission of different socioeconomic factors to shared environments or social factors. Their study uses a design similar to Children-of-Twins, but attempts to relax the Equal Environments Assumption and highlights that shared environments are stronger for monozygotic twins, which results in substantially larger social components[2].

An important goal of our study was to extend the literature using genetically informed research designs to a wider range of SES indicators, and to provide estimates of social transmission both within and across SES domains. In doing so, we found that the influence of social origins was weaker for economic outcomes, with the exception that among children of twins, parents' income rank and fathers' wealth rank predicted child income rank, while fathers' wealth rank predicted child wealth rank. These findings are only partially in line with the notion of resource specificity in social reproduction. Our estimates of social transmission were larger using a Multiple Children of Twins (MCoT) design compared to an adoption design, though both designs produced substantively compatible results.

Our study has several implications for theory and empirical research on intergenerational mobility and social reproduction. First, for important SES indicators, intergenerational persistence involves both social and genetic mechanisms. Theoretical explanations for intergenerational associations in socioeconomic outcomes should incorporate both genetic and social origins in their explanatory framework, and address how these forces of inequality work both independently and in interaction with each other. Second, explanatory empirical studies assessing the social mechanisms of intergenerational reproduction—e.g. what parents have and do—should account for genetic confounding to avoid such confounding biases. Finally, most of the variance in outcomes remains unexplained in our models, indicating that genetic and social origins do not have any kind of deterministic influence on socioeconomic attainment. Future research should thus also explore factors unrelated to the family of origin that matter for SES outcomes (Sauder 2020), alone or in interaction with genetics.

It is important to consider that our study was conducted in Norway, a Nordic welfare state with policies designed to reduce social inequalities, such as free or affordable education and healthcare, extensive welfare benefits, and progressive taxation. Intergenerational transmission is generally lower in the Nordics compared to other regions (Hertz et al. 2008). This makes our case particularly interesting, offering results close to a 'lower bound' for social origin effects, but also less generalizable to other contexts. In less egalitarian, more market-oriented political economies, social origins may play a more significant role (Björklund and Salvanes 2011; Holmlund, Lindahl and Plug 2011; Engzell and Tropf 2019).

Limitations should nevertheless be considered when assessing these results. Neither adoptees nor the included twin families are fully representative of the general population, limiting the generalizability. The adoption design used matched samples to increase comparability to the reference group, but differences may remain between adoptive and non-adoptive families. Adoptees may have experienced adverse early childhood environments or face differential treatment, discrimination, prejudice, and institutional barriers, limiting their ability to achieve higher SES despite abundant parental resources. Recent research comparing IVF donor children and adopted children has found that mothers' education has a three times larger influence on child test scores among donor children, illustrating a likely underestimation of social transmission among adoptees (Lundborg, Plug and Rasmussen 2024). This might be related to an exclusion of prenatal environments as a form of social transmission in adoption designs (see discussion in section A of the Supplementary Material). The Multiple Children of Twins Design relies on several identifying assumptions as well, such as the Equal Environment Assumption, which could potentially underestimate the role of social origins. Our analysis focuses on the independent role – the 'main effect' – of social origins, paying little attention to gene-environment interactions. Our study was also limited to two generations. Recent studies have produced mixed findings on the importance of grandparents and extended kin for SES reproduction (Pfeffer 2014; Engzell, Mood and Jonsson 2020). Future research integrating genealogical data with genetically informed designs may provide valuable insights.

Finally, we stress that a genetically rooted component to the intergenerational reproduction of SES does not imply that social inequalities are 'fair' or that policies cannot mitigate the impact of family background (Swift 2004; Harden 2022). Many policies can effectively reduce inequalities and level the playing field for children from different socioeconomic backgrounds (Björklund and Salvanes 2011). A proper understanding of intergenerational transmission requires integrating knowledge about how socioeconomic outcomes are influenced by both the DNA inherited from parents, the social practices of those parents, the environments in which the children grow up and live their lives, and the resources at the disposal of both generations. Integrating these elements is a major challenge for sociology and other social sciences.

NOTES

1. Fagereng, Mogstad and Rønning (2021) present rank-based estimates of 0.159 for adoptees and 0.244 for non-adoptees (ratio: 0.65). Our estimates based on fathers are at 0.089 and 0.123 respectively, but with a similar ratio (0.72). They adjust their wealth measure for the market value of property, which we do not have detailed data on. Their results were not very sensitive to this adjustment. They further study household wealth, while we study the individual wealth of mothers and fathers separately. Additionally, there are slight sample differences that may account for the discrepancies and our rank estimates are calculated within birth year, age and sex, which is not the case for Fagereng, Mogstad and Rønning (2021).
2. Although the study of Bingley, Cappellari and Tatsiramos (2023) attempts to relax the Equal Environments Assumption and find much higher shares of intergenerational transmission explained by social components, it still rests on several assumptions that could impact the results. First, the paper does not seem to allow for sex-specific variances in the outcome variable or in the variance share reflecting additive genetic effects. As a result, any sex-related differences can only be accommodated through these shared environment terms (specific to the zygosity and sex composition of a twin pair). Second, the result in question rests on a model with an alternative assumption that 'avuncular relationships share their environments equally' (p. 21). The paper argues that this is a weaker assumption than the assumption that MZ and DZ share environments to the same extent, but this is not obvious. Last, from their preferred model, they report a very low heritability of educational attainment (approximately 9 per cent), which is clearly in contrast to other approaches that have found much higher heritabilities (20–75 per cent) using a variety of methods (Ebeltoft et al., 2025).

Supplementary Data

Supplementary data are available at *ESR* online.

Acknowledgements

The authors wish to thank participants at the OPENFLUX seminar, members of the Social Inequalities and Population Dynamics (SIPD) research group at the University of Oslo, members of the Arbeid og velferd (ARV) group at the Institute for Social Research and members of the Centre for Fertility and Health at the Norwegian Institute of Public Health for comments to earlier versions of this paper.

The Norwegian registry data used was from the project SUBPU. The Department of Psychology, University of Oslo, is responsible for the data handling of SUBPU, a Data Protection Impact Assessment (DPIA) has been signed by the head of department, and the project manager is Eivind Ystrom. SUBPU is approved by Committees for Medical and Health Research Ethics (#2017/2205). SUBPU has agreements with Statistics Norway for data linkage and usage. The data access and management costs of SUBPU is financed by the Research Council of Norway (RCN) (#336078, #288083, and #314601), the European Research Council (#101045526, #818425, #101088481, and #818420), and supported by the Department of Psychology (UiO). All data management and analyses were on the secure data 'Tjeneste for Sensitive Data' (TSD) facilities, owned by the University of Oslo.

Author contributions

Arno Van Hootegem (Conceptualization [equal], Formal analysis [equal], Investigation [equal], Methodology [equal], Software [equal], Writing - original draft [equal], Writing - review & editing [equal]), Adrian Rogne (Conceptualization [equal], Writing - original draft [equal], Writing - review & editing [equal]), Caroline Cros (Conceptualization [supporting], Resources [equal]), Ole Røgeberg (Conceptualization [equal], Funding acquisition [equal], Writing - review & editing [equal]), and Torkild Lyngstad (Conceptualization [equal], Formal analysis [equal], Funding acquisition [equal], Methodology [equal], Supervision [equal], Writing - original draft [supporting], Writing - review & editing [equal])

Funding

This work was supported by the OPENFLUX project which received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation program [Grant number 818420], the UiO:LifeSciences convergence project *AHeadForLife* and the Norwegian Research Council project on Intergenerational Mobility and Labor Market Inclusion [Grant number 300917].

Data Availability

Data was made available under strict conditions that prohibit sharing, but all code used to produce the results in this study are available at https://github.com/arnovanhootegem/Social-origins-and-socioeconomic-outcomes/. Researchers may apply to Statistics Norway and the Norwegian Institute of Public Health for access to linked data identical to those we received.

References

Adermon, A., Lindahl, M. and Waldenström, D. (2018). Intergenerational wealth mobility and the role of inheritance: evidence from multiple generations. *The Economic Journal*, **128**, F482–F513.

Amin, V., Lundborg, P. and Rooth, D. -O. (2015). The intergenerational transmission of schooling: are mothers really less important than fathers?. *Economics of Education Review*, **47**, 100–117.

Baier, T. *et al*. (2022). An anatomy of the intergenerational correlation of educational attainment – learning from the educational attainments of norwegian twins and their children. *Research in Social Stratification and Mobility*, **79**, 100691.

Becker, G. S. and Tomes, N. (1986). Human capital and the rise and fall of families. *Journal of Labor Economics*, **4**, 1–47.

Bingley, P., Christensen, K. and Jensen, V. M. (2009). Parental schooling and child development: learning from twin parents. *SFI - Det nationale Forskningscenter for Velfærd*, 1–55. https://pure.au.dk/portal/en/publications/parental-schooling-and-child-development-learning-from-twin-paren

Bingley, P., Cappellari, L. and Tatsiramos, K. (2023). On the origins of socio-economic inequalities: evidence from twin families. *IZA Discussion Paper*, **16520**, 1–53.

Björklund, A., and Salvanes, K. G. (2011). Education and family background. In *Handbook of the Economics of Education, Handbook of the Economics of Education*. San Diego: Elsevier, pp. 201–247.

Björklund, A., Lindahl, M. and Plug, E. (2006). The origins of intergenerational associations: lessons from Swedish adoption data. *The Quarterly Journal of Economics*, **121**, 999–1028.

Bourdieu, P. (1984). *Distinction: A Social Critique of the Judgement of Taste*. Cambridge: Harvard University Press.

Bourdieu, P. (1986). The forms of capital. In Richardson J. G. (Ed.), *Handbook of Theory and Research in the Sociology of Education*. Westport, CT: Greenwood Press.

Breen, R. and Goldthorpe, J. H. (1997). Explaining educational differentials: towards a formal rational action theory. *Rationality And Society*, **9**, 275–305.

Breen, R. and Jonsson, J. O. (2005). Inequality of opportunity in comparative perspective: recent research on educational attainment and social mobility. *Annual Review of Sociology*, **31**, 223–243.

Breen, R., Ermisch, J. and Helske, S. (2019). Educational reproduction in europe: a descriptive account. *Demographic Research*, **41**, 1373–1400.

Breinholt, A. and Conley, D. (2023). Child-driven parenting: differential early childhood investment by offspring genotype. *Social Forces*, **102**, 310 –329.

Bukodi, E., Paskov, M. and Nolan, B. (2019). Intergenerational class mobility in europe: a new account. *Social Forces*, **98**, 941–972.

Constantinou, A. *et al*. (2023). Childhood personality and academic performance: a sibling fixed-effects study. *Journal of Personality*, **92**, 1451–1463.

Dearden, L., Machin, S. and Reed, H. (1997). Intergenerational mobility in britain. *Economic Journal*, **107**, 47–66.

DiPrete, T. A. (2020). The impact of inequality on intergenerational mobility. *Annual Review of Sociology*, **46**, 379–398.

Ebeltoft, J. C. *et al*. (2025). The genetic and environmental composition of socioeconomic status: a population-wide multi-method study in> 170,000 norwegian individuals. *Nature Communications*, **16**, 4461.

Engzell, P. and Tropf, F. C. (2019). Heritability of education rises with intergenerational mobility. *Proceedings of the National Academy of Sciences of the United States of America*, **116**, 25386–25388.

Engzell, P., Mood, C. and Jonsson, J. (2020). It's all about the parents: inequality transmission across three generations in Sweden. *Sociological Science*, **7**, 242–267.

Erikson, R. *et al*. (2005). On class differentials in educational attainment. *Proceedings of the National Academy of Sciences of the United States of America*, **102**, 9730–9733.

Erikson, R. and Goldthorpe, J. H. (2002). Intergenerational inequality: a sociological perspective. *The Journal of Economic Perspectives: A Journal of the American Economic Association*, **16**, 31–44.

Fagereng, A., Magne, M. and Rønning, M. (2021). Why do wealthy parents have wealthy children?. *The Journal of Political Economy*, **129**, 000–000.

Freese, J. (2008). Genetics and the social science explanation of individual outcomes. *The American Journal of Sociology*, **114**, S1–S35.

Ganzeboom, H. B. G., Treiman, D. J. and Ultee, W. C. (1991). Comparative intergenerational stratification research: three generations and beyond. *Annual Review of Sociology*, **17**, 277–302.

Gatt, J. M. *et al*. (2014). The heritability of mental health and wellbeing defined using COMPAS-W, a new composite measure of wellbeing. *Psychiatry Research*, **219**, 204–213.

Goldthorpe, J. H. (1996). Class analysis and the reorientation of class theory: the case of persisting differentials in educational attainment. *The British Journal of Sociology*, **47**, 481–505.

Gregg, P. and Kanabar, R. (2022). Intergenerational wealth transmission in Great Britain. *Review of Income and Wealth*, **69**, 807–837.

Haegeland, T. *et al*. (2010). Why children of college graduates outperform their schoolmates: a study of cousins and adoptees. *NHH Dept. of Economics Discussion Paper*, **22**, 1– 53.

Hällsten, M. and Thaning, M. (2022). Wealth as one of the 'Big Four' SES dimensions in intergenerational transmissions. *Social Forces*, **100**, 1533–1560.

Hansen, M. N. (2014). Self-made wealth or family wealth? Changes in intergenerational wealth mobility. *Social Forces; a Scientific Medium of Social Study and Interpretation*, **93**, 457–481.

Hansen, M. N. and Toft, M. (2021). Wealth accumulation and opportunity hoarding: class-origin wealth gaps over a quarter of a century in a Scandinavian Country. *American Sociological Review*, **86**, 603–638.

Harden, K. P. (2022). *The Genetic Lottery*. Princeton, NJ: Princeton University Press.

Harris, J. R., Magnus, P. and Tambs, K. (2002). The Norwegian Institute of public health twin panel: a description of the sample and program of research. *Twin Research: The Official Journal of the International Society for Twin Studies*, **5**, 415–423.

Heckman, J. J. (2006). Skill formation and the economics of investing in disadvantaged children. *Science*, **312**, 1900–1902.

Helland, H. and Wiborg, O. N. (2019). How do parents' educational fields affect the choice of educational field?. *The British Journal of Sociology*, **70**, 481–501.

Hertz, T. *et al*. (2008). The inheritance of educational inequality: international comparisons and fifty-year trends. *The B.E. Journal of Economic Analysis & Policy*, **7**, 1– 46.

Holmlund, H., Lindahl, M. and Plug, E. (2011). The causal effect of parents' schooling on children's schooling: a comparison of estimation methods. *Journal of Economic Literature*, **49**, 615–651.

Kong, A. *et al*. (2018). The nature of nurture: effects of parental genotypes. *Science*, **359**, 424–428.

Lareau, A. (2011). *Unequal Childhoods: Class, Race, and Family Life*. 2nd edn. Berkeley, CA: University of California Press.

Lundborg, P., Plug, E. and Rasmussen, A. W. (2024). On the family origins of human capital formation: evidence from donor children. *Review of Economic St*, **00**, 1–31.

Massey, D. S. (1990). American apartheid: segregation and the making of the underclass. *The American Journal of Sociology*, **96**, 329–357.

Mastekaasa, A. and Birkelund, G. E. (2023). The intergenerational transmission of social advantage and disadvantage: comprehensive evidence on the association of parents' and children's educational attainments, class, earnings, and status. *European Societies*, **25**, 66–86.

McAdams, T. A. *et al*. (2018). Revisiting the children-of-twins design: improving existing models for the exploration of intergenerational associations. *Behavior Genetics*, **48**, 397–412.

Mobius, M. M. and Rosenblat, T. S. (2006). Why beauty matters. *The American Economic Review*, **96**, 222–235.

Mogstad, M., and Torsvik, G. (2023). Family background, neighborhoods, and intergenerational mobility. In *Handbook of the Economics of the Family*, Vol. **1**. Amsterdam: Elsevier, pp. 327–387.

Narayan, A. *et al*. 2018. *Fair Progress?: Economic Mobility Across Generations Around the World*. Washington, DC: World Bank Group.

Neale, M. C. *et al*. (2016). OpenMx 2.0: extended structural equation and statistical modeling. *Psychometrika*, **81**, 535–549.

Nilsen, T. S. *et al*. (2013). The Norwegian twin registry from a public health perspective: a research update. *Twin Research and Human Genetics: The Official Journal of the International Society for Twin Studies*, **16**, 285–295.

Pfeffer, F. T. (2014). Multigenerational approaches to social mobility. a multifaceted research agenda. *Research in Social Stratification and Mobility*, **35**, 1–12.

Plug, E. (2004). Estimating the effect of mother's schooling on children's schooling using a sample of adoptees. *American Economic Review*, **94**, 358–368.

Polderman, T. J. C. *et al*. (2015). Meta-analysis of the heritability of human traits based on fifty years of twin studies. *Nature Genetics*, **47**, 702–709.
Pronzato, C. (2012). An examination of paternal and maternal intergenerational transmission of schooling. *Journal of Population Economics*, **25**, 591–608.
Raftery, A. E. and Hout, M. (1993). Maximally maintained inequality: expansion, reform, and opportunity in irish education, 1921-75. *Sociology of Education*, **66**, 41–62.
Røed, K. and Raaum, O. (2003). Administrative registers–unexplored reservoirs of scientific knowledge?. *The Economic Journal of Nepal*, **113**, F258–F281.
Roksa, J. and Potter, D. (2011). Parenting and academic achievement. *Sociology of Education*, **84**, 299–321.
Sacerdote, B. (2002). The nature and nurture of economic outcomes. *American Economic Review*, **92**, 344–348.
Sacerdote, B. (2007). How large are the effects from changes in family environment? A study of Korean American Adoptees. *The Quarterly Journal of Economics*, **122**, 119–157.
Sauder, M. (2020). A sociology of luck. *Sociological Theory*, **38**, 193–216.
Steenstrup, T. *et al*. (2013). Heritability of health-related quality of life: sf-12 summary scores in a population-based nationwide twin cohort. *Twin Research and Human Genetics: The Official Journal of the International Society for Twin Studies*, **16**, 670–678.
Stocke, V. (2007). Explaining educational decision and effects of families' social class position: an empirical test of the breen goldthorpe model of educational attainment. *European Sociological Review*, **23**, 505–519.
Swift, A. (2004). Would perfect mobility be perfect?. *European Sociological Review*, **20**, 1–11.
Thaning, M. (2021). Resource specificity in intergenerational inequality: the case of education, occupation, and income. *Research in Social Stratification and Mobility*, **75**, 100644.
Trampush, J. W. *et al*. (2017). GWAS meta-analysis reveals novel loci and genetic correlates for general cognitive function: a report from the COGENT consortium. *Molecular Psychiatry*, **22**, 336–345.
Treiman, D. J. (1970). Industrialization and social stratification. *Sociological Inquiry*, **40**, 207–234.
Turkheimer, E. (2000). Three laws of behavior genetics and what they mean. *Current Directions in Psychological Science*, **9**, 160–164.
Zietsch, B. P., Abdellaoui, A. and Verweij, K. J. H. (2023). Burt uses a fallacious motte-and-bailey argument to dispute the value of genetics for social science. *The Behavioral and Brain Sciences*, **46**, e231.

Arno Van Hootegem is Postdoctoral Fellow at the Centre for Fertility and Health at the Norwegian Institute for Public Health. He currently works on mental health among adolescents and social science genetics. Other research interests include welfare state preferences, social policies and political attitudes.

Adrian Farner Rogne was until recently a PhD research fellow in sociology at the University of Oslo, and now works as a senior research fellow at the Institute for Social Research in Oslo. His research interests lie at the numerous intersections between the welfare state, social inequalities, education, migration, labour market, demography, and health. He has previously published in journals such as Urban Geography, European Sociological Review, Drug and Alcohol Dependence, and European Journal of Population.

Caroline Tveter Cros is a PhD candidate at the European University Institute, where she works on social and genetic explanations of socioeconomic outcomes.

Ole Rogeberg is a Senior Research Fellow at the Frisch Centre in Oslo, Norway. Current research interests comprise social inequality, addiction, and fertility. His work has been published in the Proceedings of the National Academy of Sciences (PNAS), Economic Journal, Intelligence, and American Journal of Political Science.

Torkild Hovde Lyngstad is Professor of Sociology at the Department of Sociology and Human Geography at the University of Oslo, Norway. His research interests include demography, social stratification, and social science genetics. He has recently published in prominent journals as PNAS, Demography, European Sociological Review, and Journal of Marriage and the Family