Education is not about SES

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Abstract

A strong focus of Jaap Dronkers research work was on socioeconomic inequalities in education. One of his major contributions was to include cognitive ability in the analyses of educational inequalities, most commonly in the analysis of school tracking. This paper follows in this tradition by presenting evidence that the emphasis by both researchers and policymakers on students’ socioeconomic status (SES) is very much misplaced. It questions the validity of the concept SES, its measurement and the ability of theory to explain the relationships between SES and educational outcomes. It presents evidence showing that cognitive ability is a far more powerful influence on educational outcomes than SES and much of the variation in cognitive ability, student achievement and educational attainment is genetic. This evidence has important implications for both researchers in education and policymakers in educational bureaucracies.

Keywords: socioeconomic status, cognitive ability, socioeconomic inequalities

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Introduction

I spent three weeks at the European University Institute (EUI) in October 2006 sponsored by Jaap Dronkers. He invited me to the institute after some email correspondence about data from the OECD’s Programme for International Student Assessment (PISA). My employing organization at that time, the Australian Council for Educational Research was the lead organization for the PISA study. Since I access to the data and was involved in the development of the student and teacher questionnaire I had mined the PISA data as much as I could, publishing articles on students’ socioeconomic status (SES), ethnic, gender, between- and within-school, immigrant and family differences in student achievement. Our interests coincided because Jaap was also working on PISA specifically, immigrant-native differences in PISA scores from which he published several articles in high ranking journals. He was a good host: friendly, very knowledgeable and interesting to talk to. Since that time, I had sporadic email exchanges with Jaap, mainly about SES, ability and tracking until March 2016 when I received the news that he had passed away.

Early in my stay at the EUI, we talked about the PISA study and the obsession researchers and bureaucrats had with SES. The prominence of SES in the PISA study was partially my fault because I successfully advocated including questions on parents’ occupation in the PISA questionnaire so that analysts could use International Socioeconomic Index (Ganzeboom, de Graaf, & Treiman, 1992). Most previous international studies of student had collected, often very unreliable, data on parents’ education and/or possessions in the home. Given differences in the way education is organized in different countries and issues about possessions being a suitable measure of wealth, it was important to have a reliable internationally comparable measure of SES. In one conversation with Jaap, I clearly remember him saying something like “the whole of PISA is driven by student ability”. At this point, I thought “here is a guy I can really talk to” and we discussed why the concept of cognitive ability is hardly ever considered as relevant to student achievement or educational attainment. We agreed that the absence of ability in such research has much to do with political ideology; researchers wish to focus on SES inequalities because it is far more ideologically palatable.

Jaap had another important role in my academic work; he was the designated reviewer for my book, Education, Social Background and Cognitive: The Decline of the Social (Marks, 2014b) in which I argue that socioeconomic inequalities are much smaller than generally believed, that in most counties socioeconomic inequalities have declined and cognitive ability is, and has been for a long period, a much stronger influence on a range of educational outcomes. I never saw his review but I assume that it was positive. After the book was published, he contacted me and congratulated me on the book.

Jaap’s primary interest was on sociological inequalities in education; including immigrant, gender and family as well as SES differences. Like me he was interested in
the modernization thesis of declining socioeconomic inequalities (Dronkers, 1993; Faasse, Bakker, Dronkers, & Schiff, 1987). A considerable part of Jaap’s research was concerned with cognitive ability. He was particularly concerned with school tracks and the influence of SES vis-à-vis student ability. Vrooman and he (1986, p. 77) showed strong correlations (0.59 for the 1940 cohort and 0.66 for the 1965 cohort) between test score and advice on which secondary school to attend in the Netherlands. The impact of test scores in relation to advice on which secondary school to attend was larger in the 1965 cohort (β=0.58) than the 1940 cohort (β=0.44), net of social class (β=0.58 for both cohorts) supporting two key contention of the modernization thesis that educational success is much more about ability than SES and ability is becoming increasingly important. In the Netherlands he and Korthals (2016) found that ability was the dominant influence on track placement although there were effects for parental education. More generally, they found the effects of social background are minimized when track selection is based purely on prior performance (Korthals & Dronkers, 2016). The 1940 cohort was analyzed by Jaap to investigate the effects of early cognitive ability on educational attainment and subsequent labor market outcomes (Dronkers, 1998). He found that cognitive ability was important for educational attainment but had no direct effects for labor market outcomes; all its effects were mediated through education.

Therefore, this paper is a review of the literature regarding the inter-relationships among SES, cognitive ability, school tracking, student achievement and educational attainment. This paper develops ideas and updates evidence from my book and more strongly emphasizes genetics. Genetics is even more politically unpalatable than cognitive ability.

This paper provides empirical evidence that is contrary to much accepted wisdom regarding education. I question the validity of the concept SES, its measurement and the ability of theories the explain the relationships between SES and educational outcomes. The commonly used indicators of SES are not highly correlated and together do not constitute a reliable measure. SES, no matter the conceptualization or measure employed, is not a strong influence on educational outcomes, especially when considering prior performance or student ability. Cognitive ability is much stronger influence on both student achievement and educational attainment and all three concepts have sizable genetic components. The first part of the review discusses the central concepts: cognitive ability, student achievement, educational attainment and SES. The second part presents research conclusions supported by the available empirical evidence. Readers should be aware that the arguments are mine and should not be attributed to Jaap.

The following arguments about cognitive ability, SES and genetics are not particularly new stretching back nearly fifty years to Jensen’s (1969) How Much Can We Boost IQ and Scholastic Achievement? and Jencks et al.’s (1972). The issue became very prominent with the publication of Herrnstein and Murray’s (1994) The Bell Curve. It may have been possible, in say 1980, to critique arguments that SES only weakly effects educational
outcomes and that ability has much stronger effects and much of the variation in education is genetic on measurement or methodological grounds the accumulated evidence over the last fifty years is so large that it really cannot be ignored, although many researchers choose to do so.

Central concepts

Cognitive ability

Cognitive ability or intelligence is defined as “a very general mental capability that, among other things, involves ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly and learn from experience” (Gottfredson, 1997, p. 13). Similarly, Neisser et al. (1996, p. 77) define intelligence as the “ability to understand complex ideas, to adapt effectively to the environment, to learn from experience, to engage in various forms of reasoning, to overcome obstacles by taking thought”.

Source of cognitive ability is parents’ ability not SES

The main source of cognitive ability is parents’ ability, not SES. There are sizable correlations between parents and their children’s cognitive abilities. White’s (1982, p. 469) a meta-analysis of 102 studies calculated an average correlation between ability and SES of 0.4. Other studies found that the intergenerational correlations for cognitive ability range between 0.4 and 0.6 (Bouchard & McGue, 1981; Gronqvistb, Ocker, & Vlachosd, 2014; Plomin, DeFries, Knopik, & Neiderhiser, 2013, p. 195; Scarr & Weinberg, 1978). The observed parent-child correlations for cognitive ability of between 0.4 and 0.6 accord with a theoretical correlation of 0.5 that assumes ability is a continuous polygenetic human trait, and that parents and their biological child share, on average, 50% of their genomes.

In regression analyses of child’s IQ with parent’s ability and measures of students’ SES, parent’s ability has substantially stronger effects. Often the impact of SES is trivial or not statistically significant, net of parent’s cognitive ability. Scarr and Wienberg (1978, p. 681) found that only 11% of the variation in adolescent IQ was accounted for by four SES measures: father’s education and occupation, mother’s education and family income. Adding parents’ ability increased the explained variance to over 30% and the effects of the SES measures were not statistically significant.

Cognitive ability has a strong genetic component

A central concept in behavioral genetics is “heritability”, the proportion of variation in a trait due to genetic differences. Heritability allows a comparison of the relative importance of genes and environment to the variation of traits within and across populations (Visscher, Hill, & Wray, 2008). Heritability can be estimated from classical twin studies, identical twins separated at birth, adoption studies, extended kinship
designs (often based on twins) and molecular genetics studies. Generally, pairs of genetically more similar individuals exhibit stronger inter-correlations than pairs with weaker genetic relationships. Associated concepts are the common environment which includes the classic sociological concepts of social class and SES, indicators of SES such as parental education and occupation, family income and wealth. The third component is the unique or unshared environment which includes influences unique to individuals and measurement error. These three components are commonly referred to as A (Additive genetic), C (Common environment), and E (Error). Bivariate heritabilities are an extension of univariate heritability: the proportions of the correlation or covariation between two traits (or variables) due to genes.

Cognitive ability has a strong genetic component. A variety of studies estimate heritabilities of between 0.5 to 0.8 with a much smaller proportion of the variance, typically less than 0.2, attributed to the common environment (Deary, Johnson, & Houlihan, 2009; Nielsen, 2006; Plomin, Fulker, Corley, & DeFries, 1997; Plug & Vijverberg, 2003; Rowe, Jacobson, & Van den Oord, 1999; van Leeuwen, van den Berg, & Boomsma, 2008). Even critics of Bell Curve estimate inheritabilities for IQ of around 0.50 and a much smaller effect for the environment below 0.2 (Daniels, Devlin, & Roeder, 1997, pp. 54-58). Nielsen (2006) estimates ACE variance components for IQ at 0.53, 0.14 and 0.33. Plomin et al. (1997, p. 445) conclude that environmental transmission of cognitive ability from parent to child is negligible.

Student achievement

National assessments of educational achievement aim to provide evidence about the levels of student achievement in identified curriculum areas for example, in the domains of reading literacy, mathematics or science (Postlethwaite & Kellaghan, 2008). International assessments of student achievement allow comparisons between different educational systems aiming to identify what policies promote both higher achievement and equity. This review makes numerous references to the OECD’s Program for International Student Assessment (PISA) which focuses on student achievement in reading, mathematics and science of 15-year-olds. System-wide achievement studies include the Key Stage tests in the United Kingdom, CITO in the Netherlands and NAPLAN in Australia. Most US states have system-wide testing regimes.

Not only does student achievement serve to monitor education systems, student achievement is strongly predictive of subsequent educational and post-school outcomes. Student achievement as measured in the OECD’s PISA study is highly predictive of adult educational and labor market outcomes (Fischbach, Keller, Preckel, & Brunner, 2013; Marks, 2013; OECD, 2010). This is within the wider literature of the effects of test scores in achievement studies collected in adolescence on subsequent educational and labor market outcomes (Jencks et al., 1979; Jencks et al., 1972; Korenman & Winship, 2000; for a review see Marks, 2014b). Of course, the enduring effects of student achievement
are likely to be because student achievement is a proxy for cognitive ability which is important to adults' socioeconomic outcomes (Strenze, 2007).

**Achievement and cognitive ability are conceptually similar**

General tests of literacy, numeracy and problem solving, and tests of cognitive ability are conceptually similar. Rindermann (2008, p. 128) maintains there is no important theoretical difference between student achievement and ability tests since they both assess “thinking and knowledge”. In PISA, literacy is defined generally as “concerned with the capacity of students to apply knowledge and skills in key subject areas and to analyze, reason and communicate effectively as they pose, solve and interpret problems in a variety of situations” (OECD, 2007, p. 16). This definition closely resembles definitions of intelligence. Baumert et al. (2009) point out that like intelligence tests, reading and mathematical assessments involve reasoning and making logical inferences. Armor (2003, p. 19) notes the similarities between achievement tests and IQ tests. Both include subset scores for types of mental skills: vocabulary, reading comprehension, mathematical concepts, numerical skills etc. He suggests that the substantial overlap between IQ and achievement scores indicates they are measuring something in common, general reasoning skills (Armor, 2003, p. 19).

The logic of modern test theory which is the basis for modern achievement tests such as PISA, TIMSS, and system-wide achievement tests is that the probability of correctly answering a test item is a function of student ability and the difficulty of the item. At the country level, there are sizable correlations between average PISA score and intelligence scores (Lynn & Meisenberg, 2010; Lynn & Mikk, 2009). It is surprising that the concept of “ability” is almost never mentioned in reports on academic articles based on PISA, TIMSS or system-wide tests of student achievement. To this today, I have yet to read an OECD PISA report that acknowledges that student performance in PISA may relate to students' cognitive abilities.

**Student achievement is very stable**

The stability of student achievement is well-known at least since the early 1970s. The over-time correlations of achievement range from 0.5 to nearly 0.9, depending on the age or grade level of the students, the achievement domain, the number of years between tests and the reliability of the test. In the US, the correlations of test scores of the same students measured at age 8 to 10 and age 18 were between 0.7 and 0.8 (Jencks et al., 1972, pp. 59-60). Reynolds and Walberg (1992, p. 318) reported a correlation of 0.73 between mathematics achievement in grades 7 and 8. Marks (2016) documents same-domain over-time correlations from more recent studies. Armor (2003, p. 33) presents correlations for combined reading and math achievement for New York City students from Grades 2 to 3. For adjacent grades, the correlations range from 0.8 at lower grade levels to nearly 0.9 at higher grades. The correlation of Grade 3 and Grade 8
scores was 0.73. Armor notes that the correlations at higher grades are so high, that very little true change occurs (after correcting for reliability).

Although the high stability for student achievement is well-established, it is not well-appreciated. There is a tendency for researchers not to consider what the high and increasing stability means, and examine social and educational influences on achievement as if they are entirely responsible for variation in student achievement. This leads to upwardly biased estimates and highly questionable policy recommendations (Carnoy, Khavenson, Loyalka, Schmidt, & Zakharov, 2016).

**Student achievement is highly correlated across achievement domains**

In a meta-analysis of studies conducted in the US, Aiken (1971, p. 306) concluded that the correlation between reading and mathematics achievement in primary school was between 0.45 and 0.55, tending to be larger in higher grades. In the UK’s 1958 birth cohort National Child Development Study (NCDS), the correlations between reading and mathematics test scores were 0.50 at age 7, 0.74 at age 11 and 0.65 at age 16 (McNiece, Bidgood, & Soan, 2004, p. 134). In the later 1970 British Cohort Study (BCS), Parsons (2014, pp. 27, 35) reports inter-domain correlations between 0.58 and 0.75 for spelling, reading and mathematics at age 10 and between 0.46 and 0.72 for spelling, reading and arithmetic at age 16. In PISA, the test scores have been “conditioned” to reduce the error component, so the correlations in student achievement across the three domains of reading, mathematics and science are very high between 0.8 and 0.9 (Bond & Fox, 2001, p. 259; Cromley, 2009). Such high correlations, means that each test score is essentially measuring the same underlying concept.

**Student achievement has a strong genetic basis**

The high stability of student achievement can be explained by the strong genetic component to student achievement. A meta-analysis of 61 twin studies from 11 cohorts of primary school children showed the average heritability estimates of around 0.7 for reading, 0.5 for reading comprehension, 0.6 for mathematics, 0.6 for language, 0.4 for spelling and 0.7 for general educational achievement. The contributions of the common environment were substantially smaller with estimates mostly around 0.10 (de Zeeuw, de Geus, & Boomsma, 2015). Extended kinship designs also show high heritabilities for student achievement (Dalliard, 2014). The heritability of student achievement in primary school is greater than that for cognitive ability (Kovas et al., 2013). There are sizeable genetic correlations between achievement domains with cognitive ability indicating common sets of genes (Hart, Petrill, Thompson, & Plomin, 2009; Petrill, 2016; Wainwright, Wright, Luciano, Geffen, & Martin, 2005). However, student achievement is not simply cognitive ability; there are other genetic traits involved (Krapohl et al., 2014). It is not clear what are relative contributions to student achievement of general cognitive ability, innate specific skills (for example in numeracy or spelling) and schooling and if these contributions change over the school career.
Furthermore, there are sizeable genetic correlations (i.e. correlations between latent genetic factors) between latent achievement domains and with cognitive ability indicating common sets of genes (Hart et al., 2009; Petrill, 2016; Wainwright et al., 2005). Grasby et al. (2016) conclude that covariation among the four domains tested in the Australian NAPLAN study was largely mediated by genes. The bivariate heritabilities were often over 0.8. Plomin et al. (2013, p. 228) settle on an average genetic correlations of 0.7 between domains and 0.6 between student achievement and cognitive ability. These overlaps explain the sizable inter-domain correlations in student achievement and the strong correlations between cognitive ability and student achievement.

**Educational attainment**

Educational attainment is usually measured in one of two ways. The first is to measure the number of years of formal education. Therefore, high school graduates in the US are assigned a score of 12 since they have spent 12 years at school and college graduates 16, 12 years of school plus 4 years of college. At the other end of the scale, no school education is assigned a score of zero and completion of elementary or primary school only is assigned a score of 6. Although crude, this linear measure is very convenient to analyze and appropriate for studies of single-path education systems in which individuals’ educational attainment is simply how far they progressed in the system. The second type of measure is the highest qualification obtained. For example, for the UK, ordinal measures of educational attainment often comprise: no qualification, O Levels (now GCSE or General Certificate of School Education), A levels, bachelor degrees and post-graduate degrees.

*Educational attainment also has a genetic component*

The general conclusion from twin and familial studies on educational attainment are that genes play a greater role than the common environment. After reviewing a number of twin and adoption studies, Sacerdote (2011, p. 12) concludes “Genetic effects play a large role, while there is only a small role for family environment”. From the National Longitudinal Survey of Youth (NLSY) Rowe, Vesterdal and Rodgers’s (1999) estimate a heritability of 0.68 for genes and 0.18 for the common environment. They estimated a genetic correlation of 0.63 between IQ and education. For Australia, Baker et al. (1996) estimated a heritability of 0.58 and an environmentality at 0.24 with no gender differences for either estimate. In later studies, heritability estimates range from 0.50 to 0.65 and environmentality estimates from 0.15 to 0.26 (Le, Miller, Slutske, & Martin, 2011, p. 132; Miller, Mulvey, & Martin, 2001). The most recent estimate for Australia was 0.55 (Marks, 2017). Using Italian parent and child data, Lucchini et al. (2013) estimate a heritability for educational attainment of 0.5 and question the usefulness of traditional sociological theories used to explain individual differences in education. For Norway, Tambs et al. (1989, p. 209) calculated an overall heritability for education at 0.51. For Finland, the heritability for educational attainment was 0.47 for men and 0.43 for women and the respective estimates for the common environment were 0.36 and
0.43 (Silventoinen, Kaprio, & Lahelma, 2000). Cesarini (2013) analyzing a very large Swedish data set that included seven different sibling types that differ in their degree of genetic relatedness and rearing status, which allowed the testing of various assumptions of the conventional twin model, consistently estimated heritabilities for educational attainment between 0.50 and 0.55. Branigan, McCallum and Freese’s (2013) meta-analysis of 15 samples and 34 subgroups differing by nationality, sex, and birth cohort reported averages for the ACE components of 0.40, 0.35 and 0.25, respectively, although there was much variation in the estimates. Heritability was generally higher among men than women and in younger cohorts (2013, p. 131). Recently, specific gene loci have been found associated with educational attainment (Okbay et al., 2016).

**Socioeconomic status (SES)**

SES is ubiquitous in both educational research and policy, in the academic literatures on education and social stratification, in OECD and national government-commissioned reports on student achievement and educational attainment and by journalists and commentators writing about education and other matters. SES is considered the major influence on a range of educational outcomes across the educational career including, test scores in system-wide or achievement and other cognitive tests, grades in different subject areas, GPA, school track in tracked educational systems, within-school track or stream, school non-completion, dropping out of school, college entry and overall level of educational attainment. The general impression is that the concept of SES is valid; it is reliably measured; it has strong and unchanging causal relationships with these educational outcomes. Because education is so important for subsequent socioeconomic outcomes among adults (e.g. unemployment, employment, occupational status, earnings, wealth), SES is understood as the crucial link for socioeconomic inequalities between generations. SES is also associated with a wide range of health, cognitive, and socioemotional outcomes in children, with effects beginning prior to birth and continuing into adulthood (Bradley & Corwyn, 2002).

There is little doubt that there are statistical relationships between SES, however measured, and educational outcomes. However, there are many issues—conceptual, theoretical, measurement and statistical—that undermine SES’s principal place in educational and policy research. This rest of this section details these issues and argues that SES is not a useful concept for educational research and policy. In fact, the obsession with SES is detrimental to both research and policy because it obscures the true processes involved in educational outcomes and direct policy away from individual students to social groups within which the variation in student needs, interests and abilities is enormous.

*There is little consensus on the conceptualization of SES*

The first issue is conceptual: what is socioeconomic status? Everyone seems to know what SES is but the concept remains nebulous. SES is generally understood as indexing
advantage and disadvantage or deprivation. White (1982, p. 462) notes several instances where SES is defined tautologically by its constituent variables, rather than conceptually: family income, parents’ education and occupation, the quality of housing and the status of the area of residence. It is very common to define SES in terms of its consistent variables but use fancier names. Bradely and Crowyn (2002) claim that the concept of SES is really about capital; higher SES allows greater access to financial capital (material resources), human capital (nonmaterial resources such as education), and social capital (resources achieved through social connections). Similarly, Buchmann (2002, p. 150) argues that SES indexes the transmission of financial capital, cultural status and social capital. It is not clear where parental occupation fits in this conceptualization. According to the OCED, the rationale for their measure of SES, Economic, Social and Cultural Status (ESCS) is that it indexes the commonly used measures of SES based on education, occupational status and income (OECD, 2017, p. 36). According to the PISA 2014 technical report “Household assets are believed to capture wealth better than income because they reflect a more stable source of wealth” (OECD, 2014, p. 316). This is a highly questionable claim given that that the household items listed in the questionnaire are limited to cars, rooms with a bath or shower, mobile phones, computers, tablets, and e-book-readers which together are only weakly correlated with income or wealth. In an earlier publication, the OECD claims that ESCS indexes aspects of students, schools and education systems. At the individual level ESCS relates to parental attitudes to education and their involvement in their child’s education; at the school level to resources, a safe environment and proximity to the community’s cultural resources and at the system level, to national wealth and spending (OECD, 2013, p. 2). All these claims are post facto and quite dubious.

An alternative approach to SES is social class which is used more commonly in the United Kingdom. According to this approach the occupation of the head of the household, most often the father, is used to categorize students to a particularly social class. The focus is most often on working class and how communities, schools, teachers and parents contribute to the lower educational attainments of working or manual class students (Connell, Ashenden, Kessler, & Dowsett, 1982; Douglas, 1964; Goldthorpe, 1996; Willis, 1977).

No consensus on how to measure SES

SES is usually measured by father’s or mother’s education and occupation, and, if available, family income (Bradley & Corwyn, 2002; Buchmann, 2002; Orr, 2003). Some studies of SES inequalities in education focus on family income, family wealth and financial resources in the home (Orr, 2003; Reardon, 2011; Yeung & Conley, 2008). Other measures include possessions in the home as a proxy for wealth. However, there is no consensus of which of the commonly employed SES indicators is the most salient. Economists tend to focus on family income and wealth. Sociologists tend to emphasize parental occupation. Education researchers tend to focus on parental education.
The OCED’s measure of SES, Economic, Social and Cultural Status (ESCS), is a composite score constructed from parents’ education, highest occupational status of the parents, and measures of home possessions, cultural resources, educational resources and ‘books in the home’. The rationale for constructing such a complex measure is that socio-economic status is usually understood as comprising multiple components (OECD, 2017, p. 36). The problem with this omnibus measure is that conflates indicators of SES (parental education and occupation) with variables often employed to explain SES effects on education for example, cultural and educational resources.

**SES indicators are not highly correlated**

Although, the concept of SES is readily accepted, the most common SES indicators are not highly correlated. Mother’s and father’s education are the most highly correlated (at around 0.5 to 0.6) reflecting substantial educational homogamy. Across OECD countries, father’s and mother’s education and occupational status, books in the home and cultural aspects, have only moderate inter-correlations at around 0.4, often lower (see Marks, 2011, p. 227). Mueller and Parcel (1981, p. 16) argue against using parental education as a proxy for occupational status since the correlation is only around 0.5 to 0.6 and there is considerable heterogeneity in income and occupation within educational categories. Inter-correlations involving family income and wealth are also not strong: 0.31 for wealth and income, around 0.38 for both education and occupational status with income; and 0.18 for both wealth and education, and wealth and occupational status (Bowles, 1972, p. S225). Since the SES indicators are only moderately inter-correlated, composite measures do not constitute a highly reliable scalar measure. Furthermore, the only moderate inter-correlations undermine the commonly held assumption that SES is a one-dimensional concept measured interchangeably by a range of educational, occupational and economic indicators.

**The measurement of occupational class is just as problematic**

The measurement of social class is also highly problematic. First, there is the issue about which family member defines their social class, the father or the parent belonging to the highest social class (Erikson, 1984). Second, there is no consensus of the number or defining characteristics of, or even number of, classes in contemporary societies. These include self-employment, educational qualifications, white- or blue-collar job, number or type of supervisory and managerial tasks. Third, and relatedly, the class location of a variety of occupational groups—professionals, managers, lower white-collar workers, state employees—that have grown over the last century—is not at all clear. And finally, classes are too large and heterogeneous to be useful for educational research.

**No compelling theory why SES should matter**

There is a plethora of theoretical explanations for socioeconomic inequalities in education. These include SES differences in: community norms and values (Willis, 1977); the value of education (Brown & Iyengar, 2008; Hyman, 1966); educational plans
and expectations (Berthelsen & Walker, 2010; Brookover, Erickson, & Joiner, 1967); parenting style (Baumrind, 1989); risk aversion to failure (Breen & Goldthorpe, 1997; Goldthorpe, 1996); educational resources in the home (Pokropek, Borgonovi, & Jakubowski, 2015); codes of speech (Bernstein, 1971), the richness and complexity of the language used by parents to their child while they are learning to talk (see Rindermann & Baumeister, 2015); the home literacy environment (Brown & Iyengar, 2008); and between- and within-school tracking (Chmielewski, 2014; Oakes, 1985; van de Werfhorst & Mijs, 2010).

The reason why there are many theories on why SES should matter, and that they go in and out fashion and none enjoy as consensus is because the hypotheses generated from the theories—and some theories do not easily lend themselves to hypotheses testing—lack substantial empirical support. This is in addition to the various conceptual and measurement issues referred to above. In addition, few theories entertain the idea that cognitive ability is involved, despite the blindingly obvious fact that everybody knows: smart kids do better at school. Almost none treat seriously the evidence from research in behavioural genetics which conclude that there are strong genetic components to cognitive ability, student achievement and educational attainment.

**Research conclusions**

**SES effects are confounded by parent's ability**

An alternative explanation to theories focusing on SES is that student's educational outcomes have little to do with parents' socioeconomic characteristics. Accordingly, the observed effects of family income, parental occupation and education on student achievement are due to their correlations with parental and student ability. Parents' socioeconomic characteristics are correlated with parental ability, parental ability is strongly associated with their children’s ability and student ability is a strong influence on educational outcomes. Therefore, the theories and explanations for the SES-relationship and that immense baggage of associated empirical research are irrelevant.

Parents’ ability is correlated with the most commonly used SES indicators. Scarr and Weinberg (1978, p. 678) reported correlations of 0.56, 0.37 and 0.38, for father's IQ with father’s education, father’s occupational status and family income. The correlations for mother's IQ with mother’s education (0.46) and family income (0.19) were lower. Torres (2013, p. 166) reported a correlation of 0.53 between mother's AFQT score and a composite measure of family SES. According to Strenze's (2007, p. 411) meta-analysis, ability measured between ages 3 and 23 correlates at 0.56 for educational attainment, 0.45 for occupational status and 0.23 for income during adulthood. Focusing on college education in the US, failing to account for the mother’s ability seriously overestimates the relationship between parents' economic resources and children’s postsecondary attainments (Doren & Grodsky, 2016).
The point here is that the SES-education relationships are less about economic resources, parenting, socialization etc., but much more about the transmission of cognitive ability from parents to their children. This explanation is consistent with large heritabilities for student achievement, educational attainment and cognitive ability and the strong relationships between cognitive ability and educational outcomes.

**SES is not a major influence on student achievement**

The argument that SES is the major source of educational inequality is wrong. Despite the large literature on the effects of SES on children’s cognitive outcomes such as test scores and student achievement are not particularly strong. Sirin’s (2005, p. 437) meta-analysis, found that the average effect size (the adjusted correlation coefficient) for the bivariate relationship between commonly used SES indicators (family income, parental education and occupation) and student achievement was 0.30, lower than the estimate of 0.34 using a replication sample from White’s (1982) meta-analysis. The most recent meta-analysis concluded that relationship is surprisingly modest, with an average SES-achievement correlation of 0.22 (Harwell, Maeda, Bishop, & Xie, 2017).

The OECD’s broad measure of SES, ESCS which comprises many SES indicators and correlates, on average across OECD countries, accounts for 12.9% of the variation in students’ PISA scores (OECD, 2016, p. 402). This is equivalent to a (multiple) correlation of 0.36. So even if the SES measure comprises many constituent variables it explains less than 15% of the variation in student achievement.

**SES has only very weak relationships with student performance, when considering prior achievement**

The influence of SES on student performance is very small when considering prior achievement. In the presence of prior achievement, the effects of students’ SES are quite small. For the US, Benner, Boyle and Sadler (2016, p. 1059) reported standardized effects on students’ GPA of 0.44 for achievement score compared to 0.09 for family SES. For Germany, Baumert et al. (2010, pp. 159-160) report no significant effects for the International Socio-Economic Index (a measure of occupational status) on mathematics score and only one significant (but trivial) effect for parental education, net of prior achievement in mathematics (from PISA) and cognitive ability. For Australia, two recent studies of student performance conducted on state-wide data estimated standardized effects for students’ SES ranging from 0.05 to 0.15 when controlling for prior achievement (Lu & Rickard, 2014, pp. 31-32; Marks, 2014a, p. 241).

**Family income has little or no relationship with educational outcomes**

Family indicator is the most policy relevant aspect of SES. Government policies can do little to change the effects of parental education and occupation but can supplement the incomes of, or provide additional services to, poor families. However, family income is only a very weak predictor of educational outcomes. For the United States, Mayer (1997,
estimates conventional standardized effects of 0.13 for family income on PPVT test scores, 0.06 for mathematics scores in the Peabody Individual Achievement Test (PIAT) and 0.14 for PIAT reading. Her ‘true effects’ of family income, estimated by comparing income effects at different time points, were usually smaller and not statistically significant. Analyzing mathematics achievement, Orr (2003, pp. 291, 293) reported no effect for family income (averaged over 5 years) on mathematics achievement, net of father’s occupational status, mother’s education, mother’s ability and other variables. Carlson and Corcoran (2001, p. 789) analysis of reading scores in children aged 7 to 10 found that family income had an impact but it was relatively weak. A doubling of family income increased child’s reading score by about 3.2%. For Britain, Violato et al. (2011) concluded “a weak or absent direct effect of family economic resources on child development”. Similarly, Aughinbaugh and Gittleman (2003, p. 429) analysis of children’s test scores in the US and Britain found that the effects of family income on test scores were quite small, the maximum effect was 0.08 of a standard deviation, net of other predictors including mother’s ability. Analyzing data from South Africa, Cherian and Malehase (1998, p. 431) concluded there was “no relationship between financial conditions at home and scholastic achievement of children from single-parent and two-parent families”. Analyzing student achievement in the Danish PISA study, Humlum (2011, p. 994) noted that the effects of family income were small and statistically insignificant. Even a substantial change of 100,000 Danish Krone (equivalent to about $US15,000) was associated with a difference of only 2.6 PISA score points.

**Cognitive ability has much stronger effects on student achievement than SES**

Cognitive ability has stronger relationships with student achievement than students’ SES. Walberg (Walberg, 1984, p. 23) computed an average correlation of 0.71 between various IQ measures and academic achievement. Duckworth, Quinn and Tsukayama (2012, p. 443) reported correlations between 0.7 and 0.8 for IQ measured in grade 4, and grade 5 and 9 achievement tests. For New Zealand, the correlation between IQ at measured at ages 8 and 9 with academic performance at age 13 was 0.83 (Fergusson, Horwood, & Boden, 2008, p. 285). Kaufman et al. (2012) calculated a mean correlation of 0.8 between latent factors of cognitive ability and student achievement. The correlations increased with student’s age which may reflect the increasing heritability of intelligence. The US Scholastic Assessment Test (SAT) and the American College Readiness Assessment (ACT) are highly correlated with cognitive ability (Coyle, 2015, p. 18; Frey & Detterman, 2004; Koenig, Frey, & Detterman, 2008).

In a study of 178,599 pupils attending English state schools the correlation between general factors derived from a cognitive ability test and attainment scores on national Key Stage 2 tests in English, mathematics and science of 11-year-olds was 0.83 (Calvin, Fernandes, Smith, Visscher, & Deary, 2010). In a study of over 80,000 16-year-old students, Deary et al. (2007) calculated a correlation of 0.81 between a latent intelligence trait measured at 11 years of age with a latent trait of subject performance.
in the GCSE. For the Netherlands, the correlations between IQ and CITO achievement test scores increase with age: 0.41, 0.50, 0.60, and 0.63, at ages 5, 7, 10, and 12 respectively (Bartels, Rietveld, Van Baal, & Boomsma, 2002). Roth et al.’s (2015) cross-national meta-analysis of over 100,000 students calculated a correlation of 0.54 between intelligence and student performance. Again, the correlations increased with level of schooling, 0.45, 0.54 and 0.58 for elementary, middle and high school students, respectively (Roth et al., 2015, p. 123).

Detterman (2016, p. 1) in a review article about the relatively small influence of schools and teachers on students’ educational outcomes writes:

I further argue that the majority of the variance in educational outcomes is associated with students, probably as much as 90% in developed economies. A substantial portion of this 90%, somewhere between 50% and 80% is due to differences in general cognitive ability or intelligence. Most importantly, as long as educational research fails to focus on students’ characteristics we will never understand education or be able to improve it.

He (2016, p. 6) concludes that “Human intelligence or general cognitive ability accounts for at least half and probably more of academic achievement attributable to student characteristics.”

**Ability is the major determinate of tracking and streaming, not SES**

Educational differentiation does not provide a strong nexus between students’ SES and educational outcomes. Ability plays a much greater role than students’ SES in the allocation of students to educational locations both within- and between-schools, that is tracking and streaming. Alexander and Cook (1982, p. 631) found that the coefficient for ability measured in the fifth grade had “by far the largest impact” for senior high school curriculum placement several years later. Ability had stronger effects for academic track placement than a composite measure of SES, net of grades and educational expectations both of which are at least moderately correlated with ability (Jones, Vanfossen, & Ensminger, 1995).

When students were allocated to distinct school types in the UK, the correlation between secondary schooling type and ability was estimated at around 0.6 (Halsey, Heath, & Ridge, 1980, pp. 160-161). As Skopek and Dronkers (2015) point out, not considering student ability in analyses of school tracking exaggerates the effects of students’ SES.

Educational differentiation does not necessarily increase SES inequalities in education. Analyzing PISA data, Marks (2006) found that the relationships between within- and between-school educational differentiation and PISA test score was largely unchanged when controlling for parents’ education and occupational status. Analyzing more recent PISA data from 185,000 students from 31 countries, Korthals and Dronkers (2016)
conclude that equality of opportunity is best provided for systems with many tracks where schools always consider prior performance.

**Cognitive ability has stronger correlations with educational attainment than SES**

The correlations between ability and educational attainment range from 0.5 to over 0.6. These are substantially stronger than the correlations between SES and educational attainment which are generally between 0.3 and 0.4 (Hertz et al., 2007, p. 25; Marks, 2014b, pp. 188-189) Hauser et al. (2000, p. 207) reported correlations of 0.66 and 0.62 between AFQT test scores and years of education for non-black men and women. For all NLSY respondents in 2007, the correlation between IQ measured by adjusted AFQT test scores and years of education was 0.62 (Zagorsky, 2007, p. 493). As mentioned previously, Strenze’s (2007) meta-analysis estimated an average correlation of about 0.56 between ability and educational attainment.

Similar sized correlations have been found in other countries. In the Scottish Lothian Birth 1936 Cohort study the correlation between IQ measured at age 11 and total years of education was 0.42 (Johnson, Brett, & Deary, 2010, p. 275). In the 1958 NCDS study, Schoon (2008, p. 77) reported correlations of around 0.55 between general cognitive ability and educational attainment measured by highest qualification. For New Zealand, the correlation between IQ at age 8 and 9 with a measure of educational achievement at 25 years of age (a seven-point scale ranging from no high school qualification to the completion of a university bachelor degree) was 0.54 (Fergusson et al., 2008, p. 285). For Sweden, the correlation between general intelligence and educational attainment was 0.56. For Norway, Tambs et al. (1989, p. 215) reported correlations over 0.5 for cognitive ability with years of education and highest education level attained.

**The effects of ability on educational attainment cannot be dismissed as a proxy for SES**

The association of ability with educational attainment can only partially be attributed to socioeconomic background. Jencks et al. (1979, p. 104) analyzing several data sets concluded that only 12 to 21 percent of the effect of ability on educational attainment can be attributed to measured family background variables. Using sibling studies to control for the total effect of family background, they found that unmeasured family characteristics could explain another 15 to 20% of the correlation between test scores and educational attainment. They conclude that a large “57 to 68% of the observed correlation between test scores and education is independent of family background” (1979, p. 104). The remaining 32 to 43% dependent on family background includes both social and genetic components since it is derived from studies of brothers and twins. Sewell et al. (2001, p. 27) conclude that “less than one-fifth of the association between ability and schooling could be attributed to the mutual dependence of these variables on socioeconomic background”.

**Cognitive ability has stronger effects on educational attainment than SES**
Multivariate analyses show substantially stronger effects of ability for educational attainment than that for SES. Therefore, the SES estimates from persistent inequality studies that do not include ability are upwardly biased. Analyzing educational attainment in several US studies, Jencks et al. (1983, p. 8) report effects of academic aptitude between 0.37 and 0.46 compared to standardized effects below 0.15 for father’s occupation and education, mother’s education and income with statistically insignificant effects for some of these SES indicators. With the addition of academic aptitude, the variance in education attainment accounted for doubled from 15 to 30%. In an exercise using a variety of techniques aiming to show weaker effects of ability than those published in *The Bell Curve*, ability remained a stronger influence vis-à-vis a composite measure of social background that included SES indicators and other aspects of social background, family structure and the number of siblings (Korenman & Winship, 2000, pp. 155-159). Although correcting for measurement error increased the SES effect on years of schooling by up to 50% from 0.20 to 0.24 or 0.29, depending on the amount of measurement error assumed, ability remained a substantially stronger influence with a standardized effect of 0.61 (2000, pp. 153-154).

For the UK, Thienpont and Verleye (2004, p. 344) reported a standardized coefficient of 0.7 for test scores predicting educational attainment (corrected for measurement error) compared to 0.4 for parents’ education with no effect for social class. Chevalier and Lanot’s (2002) analyses of age completed formal schooling concluded that “early ability tests have a large positive effect on schooling achievement” (2002, p. 174). They also found very limited effects for family income. Bukodi, Erikson and Goldthorpe (2014, p. 298) found that the addition of cognitive ability quintiles to a model comprising parental class and education doubled the variance explained for educational attainment in both Britain and Sweden. The effects of the SES indicators decline by about one-third. In a large study of over 140,000 Norwegian males born between 1961 and 1971, the standardized coefficient for ability on educational attainment was relatively large: 0.46 compared to 0.15 for parents’ education and 0.10 for parental income (Kristensen, Gravseth, & Bjerkedal, 2009, p. 809).

**Conclusions**

It should be clear to the reader that the emphasis on SES by educational researchers and policy bureaucrats is severely misplaced. Educational researchers working in bureaucracies or universities should not interpret the correlations or regression coefficients between SES and educational outcomes as evidence for the importance of the family of origin’s economic, cultural resources, socialization, parenting practices or whatever theory is currently *in vogue*. SES does not have powerful effects on student achievement or educational attainment, even when not considering the far more powerful influences, cognitive ability and prior achievement. Much of the variation in student outcomes is due to cognitive ability. The effects of SES, net of reliable measures of cognitive ability or prior achievement are trivial so should not provoke policy responses. Cognitive ability cannot be naively dismissed as simply a function of SES.
This evidence presented here has important implications for educational research and policy. It is all too easy to focus on SES and recommend SES based policies which will further waste public money and not benefit students. For the conclusions from educational research to be valuable they must consider the stability of student achievement, its sizable inter-domain correlations, and the importance of cognitive ability for achievement, educational differentiation and educational attainment. Instead of focusing on SES, the focus should be lifting standards for all students and ensuring that students have flexible and appropriate educational and labor market pathways given their abilities, interests and skills.

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