Socioeconomic Background, Education, and Labour Force Outcomes: Evidence from a Regional U.S. Sample

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Abstract

This paper examines the long-term association of family socioeconomic status (SES), educational, and labour force outcomes in a regional U.S. longitudinal sample (N = 2,264). The results offer insights into the mechanisms underlying the role of family SES in transitions from secondary schooling to early work experiences. It was found that the academic achievement gap associated with SES widens during secondary schooling due in part to course level tracking. Family SES relates to college enrollment mainly via its association with academic gains in school, but also through family income and father's occupational status. Family SES is weakly but significantly related to adult offspring’s earnings but more strongly related to occupational status. Educational qualifications and cognitive skills make independent contributions to the explanation of labor force outcomes.

Keywords: SES, education, work, and transitions.
Introduction

Several longitudinal studies have investigated the effect of family socioeconomic status (SES) on adolescents’ academic achievement, educational qualifications, and later labor force success in the United States. The results indicate that inequalities related to family SES emerge early in life and prevail into adulthood. As early as pre-school age, children of low SES families are more likely to exhibit slower cognitive development than children of high SES families (Bradley and Corwyn 2002; Freijo et al. 2006). Once they enter school, they perform worse academically (Sirin 2005; White 1982) and are more prone to leave school early (Alexander, Entwisle, and Kabbani 2001; Battin-Pearson et al. 2000). As adults, they are less likely to pursue post secondary education and/or enter the labor market successfully (Kerckhoff, Raudenbush, and Glennie 2001; Rumberger 2010). As a cumulative result, children of low SES families are more likely to have low SES as adults (Duncan, Ziol-Guest, and Kalil 2010).

The intergenerational transmission of academic and professional success violates norms of equality of opportunity and meritocracy that are dominant in most Western societies (Bowles, Gintis, and Osborne 2005). Sociologists and economists have studied the extent to which family SES is transmitted from one generation to another over the last decades – predominantly for the United States. Early research found only a week connection between parents’ and children’s SES after becoming adults (Becker 1988; Blau and Duncan 1967), supporting the view of the United States as a country where professional and economic attainment is for the most part dependent on individual effort and merit. More recent empirical studies with more precise measurements, however, contend that social mobility in the United States is lower than previously thought.
Overall, there is no consensus among researchers on the degree of intergenerational persistence of inequality nor is there consensus on the mechanisms at work. Research relying on human capital theory (Becker 1975) emphasizes the contribution of educational qualifications and skills for success in life, but studies also show that similar individuals in terms of educational competences and experience are rewarded differently in the labor market, and that individual aspects unrelated to labor productivity, such as race, physical appearance, health status, and personality play a critical role in explaining adult socioeconomic attainment (Bowles, Gintis, and Osborne 2001; Osborne, 2005).

**Aims and contribution**

The present paper explores mechanisms related to the intergenerational persistence of family SES based on a regional sample in the United States surveyed longitudinally from the age of 11 to the age of 28. In particular, we examine the dominating gateways for the association between family SES, academic achievement in school, course-level tracking in high school, college enrollment, and labor force outcomes.

Drawing on Boudon’s theoretical model and previous related work we distinguish between direct and indirect influences of family SES (Boudon 1974; Jackson, Erikson, Goldthorpe, and Yaish 2007; Kerckhoff, Raudenbush, and Glennie 2001). Boudon (1974) originally introduced the distinction between primary and secondary influences of family
SES to explain the fact that social inequality tends to exacerbate at educational transition points during the formative period from early adolescence to young adulthood.

“Primary” are all those effects which directly influence educational competence. If, for example, low SES families tend to emphasize the importance of homework for the learning progress less, it would create a primary disadvantage compared to kids of more affluent parents because the students are more likely to have a weaker knowledge base which, in turn, affects outcome variables of interest at transitional points (e.g., track enrollment, college attendance). “Secondary” SES effects are those that create difference between students of different family background who have the same or comparable competences and educational credentials. For example, it is well documented that a student of high SES family is more likely to go to college than a low SES graduate with the same GPA and equal set of courses taken. In order to be consistent with common terminology in path analysis and mediation models, we refer to family SES influences mediated by educational outcomes as “indirect” (Boudon: primary) and those effects that persist even when indirect effects are controlled as “direct” (Boudon: secondary), irrespective of whether they occur at transitional points or not.

Economists have largely studied the intergenerational transmission of inequality by focusing on family income. But a single observation or a short-term average of family income poorly captures economic status and tends to underestimate intergenerational stability of economic status (Bowles and Gintis 2002; Mazumder 2005). We use family SES instead. The family SES variable is typically driven by parental education and parental occupational status, aspects that are less volatile than family income. Conceptually, in sociological research family SES is traditionally defined as the relative
position of an individual or family within a hierarchical social structure, based on their access to, or control over wealth, prestige, and power (Muller and Parcel 1981). As it is traditionally operationalised through measures of parental education, parental occupational prestige, and family income, the SES variable not only gives a more stable but also a more comprehensive measure of economic status than family income alone.

**Family SES and educational outcomes**

Family SES is positively related to literally every indicator of academic performance in school (Sirin 2005; White 1982). Compared to students from low SES background, students of high SES families tend to have higher test scores, better grades and are more likely to enroll in advanced placement courses, higher percentage of college enrollment, and better prospect of finishing it. Many effects later on the education pathway seem to be the result of earlier disadvantages (indirect effects). However, the empirical picture is more complex: For example, it has been shown that family SES affects track enrollment decisions in high school directly through family factors such as parental expectations and parental involvement (Condron 2007; Dauber, Alexander, and Entwisle 1996; Gamoran and Mare 1989). This direct effect, in turn, becomes an indirect effect down the road as different track enrollment produces differences in achievement gains (Gamoran, Nystrand, Berends, and LePore 1995; Hallinan 1994), due in part to better educational opportunities offered to students in higher tracks (Carbonaro 2005; Pallas, Entwisle, Alexander, and Stiuka 1994).

After high school completion, the association of family SES with college enrollment is mainly an indirect effect of prior track enrollment and academic achievement in school: Students of low SES families are less likely to be academically
prepared for and enroll in college (Cabrera, Burkum, and La Nasa 2005; Rumberger 2010; Terenzini, Cabrera, and Bernal 2001). However, at this point there is empirical evidence for direct effects as well: Parental occupation and family income affect the decision to go to college even after controlling for achievement differences. Other things being equal, parents with college education and higher incomes encourage their children more to attend college than parents without college experience and can more easily provide the financial means to do so (Carneiro and Heckman 2002; Harrington and Sum 1999; Karlsen 2001). The latter is particularly important in societies like the United States where college tuition can be all but prohibitive for low income families. Not surprisingly, low SES students are also more likely to interrupt their college careers and this is mainly due to financial concerns (Goldrick-Rab 2006).

**Family SES and labor force outcomes**

Further down the road, due in part to their lower educational qualifications and poorer cognitive skills those coming from low SES background have lower incomes and have reached lower occupational status in their occupations (Bowles, Gintis, and Osborne 2001; Kerckhoff, Raudenbush, and Glennie 2001; Rumberger 2010). But education does not fully account for the intergenerational transmission of family SES. Parental SES variables often remain significant predictors of earnings and occupational status even after educational history, formal degrees, and cognitive skills variables are controlled.

**The contribution of cognitive skills**

Education is not sufficient to explain the intergenerational transmission of SES, but it is certainly a key intervening process. The literature is conclusive on the importance of qualifications to labor force outcomes, but there is little consensus
regarding the relative contribution of cognitive skills when educational qualifications are controlled.

Signaling theory (Spence 1974) states that even though employers seek to reward employees’ cognitive skills, they have limited information to go on and therefore prefer to use educational credentials as a proxy for actual cognitive skills. Human capital theory (Becker 1975) contends that earnings reflect cognitive skills at least as much as they reflect educational qualifications. Murnane, Willet, and Levy (1995) and Grogger and Eide (1995) showed that between the 1970s and the 1980s the relative importance of math skills in predicting earnings grew substantially. Johnson and Neal (1998) found that basic skills, as measured by the Armed Forces Qualification Test, are related to subsequent earnings. Kerckhoff, Raudenbush, and Glennie (2001) showed that, although educational qualifications and cognitive skill are closely linked measures, they contribute independently to the explanation of labor force outcomes.

**Research questions**

Figure 1 outlines the underlying theoretical and analytical model of interest. First, we explore possible routes for the reproduction of family SES during the school period (Grades 7 to 12). The composite SES measure allows us to identify the channels whereby family SES relates to educational and labor outcomes. Kerckhoff, Raudenbush, and Glennie (2001) hypothesized but did not test that the association of family SES and academic achievement reflects cultural capital and socialisation aspects while the association of family SES and educational qualifications reflects more financial resources. We are able to evaluate this hypothesis with our data.
First, we examine (1) to what extent family SES relates to track enrollment directly or indirectly via academic performance. We also evaluate (2) whether the achievement gap related to family SES widens over the course of schooling and the role of course-level tracking. Secondly, we analyse the association of family SES with college enrollment at age 20 and labor force outcomes at age 28. We explore (3) the extent to which family SES relates to college attendance indirectly through academic achievement in school and directly through family income and parental occupational status. We then assess (4) the association between family SES and labor force outcomes, namely, the intergenerational transmission of family SES. And finally, we evaluate (5) the mediating and independent roles of educational qualifications and cognitive skills. Associations with SES are analysed for the global SES measure and its constituent components separately (i.e., parental education, parental occupational status, and family income) to gain a better understanding of the mechanisms at work.

**Method**

**Data**

The data stem from the Michigan Study of Adolescent Life Transitions (MSALT; Eccles, Vida, and Barber 2004). This longitudinal study began in 1983 with students in Grade 6 (N=2,452, M age=11.5), their teachers, and their parents. Participants have been periodically surveyed, in a total of nine waves, up to the year 2000, when they had reached young adulthood (N=1,102; M age=28.1). The vast majority of the original sample consisted of lower middle and middle-class White (96.7%) students living in small industrial cities in Southeast Michigan who were recruited from 143 classrooms in 12 school districts. It included approximately 80% of the student population in these
classrooms, 95% of teachers in these districts, and 72% of parents of students sampled. Participants completed several questionnaires during the course of this study either at home or at school. Additionally, data on grades, test scores, and course enrollment were gathered from the school records.

Our analyses draw on data from 1983 (wave 1), 1985 (wave 4), 1988 (wave 5), 1990 (wave 6), 1992 (wave 7), and 2000 (wave 9). Sample sizes varied across analyses to include only those participants with non-missing data in the corresponding dependent variables. The academic achievement model included 2,264 participants; the track enrollment model was limited to a subset of 1,631. For the college status model, data of 1,601 participants were available, for the occupational status model 907, and for the earnings model 552.

Measures

Parental education. Father’s and mother’s education are interval variables taking values between 6 and 20 years of formal schooling. Parents reported their highest educational certificate obtained when students were in Grade 6, 10, and 12. Student reports were used in Grade 10 in cases where parents’ responses were missing. Self- and student reports correlated strongly (r’s > 0.73). These data were transformed into schooling years and averaged over time such that model coefficients reflect associations for an extra year of schooling.

Parental occupational status (SEI). Parents reported their occupations as students were in Grades 6, 10, and 12. These data was collected with an open question and coded in accordance to the Duncan Socioeconomic Index (Duncan 1961; Entwisle and Astone 1994). Father’s and mother’s occupational indexes were also averaged over time. In
Grades 10 and 12, if parents’ responses were missing, the respective information from the student was used.

*Family income.* Parents were asked to report their average yearly income in dollars from a set of interval categories. Their responses were recoded into an ordinal scale, ranging from 1 to 6: (1) less than 10 thousand dollars, (2) 10-20 thousand dollars, (3) 20-40 thousand dollars, (4) 40-60 thousand dollars, (5) 60-80 thousand dollars, and (6) more than 80 thousand dollars per year. Income information was reported by the father in Grade 6 and the mother in Grades 10 and 12. If mother’s responses were missing, they were replaced with information provided by the student, which were moderately correlated with mother’s responses ($r = 0.60$).

*Family SES.* Following standard operationalisations (Mueller and Parcel 1981), family SES is a composite of mother’s education, father’s education, mother’s occupational status, father’s occupational status, and family income. These variables were summarized into a single index using the standardised factor scores of the first principal component ($M = 0, SD = 1$ in the total sample). Given socioeconomic data availability, a family SES variable was computed in Grades 6, 10, and 12 (1983, 1988, and 1990).

Michigan exhibited a buoyant economy during this period. The economy grew 21% in real terms and unemployment in the largest city, Detroit, reduced from 15.7% in 1983 to 8.1% in 1990. Accordingly, reported family income also increased. But since family SES was driven mainly by parental education and parental occupational status, it remained relatively stable over this period (correlation between SES in Grade 6 and Grade 10 was $r = 0.84$ and between grade 6 and grade 12 $r = 0.79$). Family SES variation
over time did not substantially alter the findings, therefore family SES was averaged over
time and treated as time-invariant.

*Years of schooling.* Participants reported their highest educational level at age 28,
which was transformed into schooling years.

*Course-level track.* This dichotomous variable takes the value of one for students
on the academic track and zero for those on the general or vocational track. Track was
determined based on the math course enrollment for Grade 10 taken from the school
record. Three levels were distinguished: college track (e.g., algebra 2 and trigonometry),
general track (e.g., algebra 1, applied algebra, and applied geometry), or vocational track
(e.g., general/basic/remedial or no math class).

*GPA.* The grade point average (GPA) was obtained from school records in Grades
7, 10, and 12.

*Math and English achievement.* Standardized test scores in mathematics and
English for Grades 7 and 10 were taken from the school records based on the Michigan
Educational Assessment Program (MEAP). The tests have high content validity with
respect to the subject specific curriculum for the particular grade level in the State of
Michigan. MEAP scores are highly reliable (α ≥ 0.85; Office of Michigan Merit Award
Program 2000).

*College attendance.* This variable takes the value one if the participant was
enrolled in a full-time four-year college program at age 20 (about 50%) and zero for all
other participants.

*Earnings.* It is the natural logarithm of yearly earnings at age 28 (in 2000).
Annual and monthly earnings were considered and transformed into yearly earnings.
Occupational status (SEI). As with parental occupational status, participants’ responses of an open question on occupations were coded in accordance to the Duncan Socioeconomic Index (Duncan 1961; Entwisle and Astone 1994).

Multiple imputation

Missing data in independent variables were imputed with the multiple imputation method by chained equations (MICE; Royston 2005). We created 5 imputed versions of the family SES variables based on the sample of the academic achievement model. Father’s education data was imputed for 28% of the sample, mother’s education for 21%, father’s occupational status for 28%, mother’s occupational status for 37%, and family income for 18%. Subsequent models draw on the imputed data from this sample. Rubin’s rule (1987) was applied to estimate descriptive statistics and regression coefficients with corrected standard errors.

Attrition

The MSALT study covers a relatively long time span (17 years from 1983 to 2000) with a substantial attrition rate particularly in the post high school phase when mobility was high. For the academic achievement model 92% of the original sample provided sufficient data, for the track enrollment model 67% of the original sample was included, and for the college enrollment model still 65%. For the earnings model data were available for only 23%, and for the occupational status 37%. Table A reports multiply imputed descriptive statistics (mean and standard error) for independent variables included in each analytical model.

The academic achievement model is least affected by attrition. The track enrollment and college status models include less than 70% of participants in the original
Results

Family SES association with track enrollment and academic achievement

We first evaluated the association of family SES with course-level tracking and academic achievement in school. To this end, we estimated logit models of the probability of enrolling in the college track (i.e., taking advanced math courses in Grade 10) and panel data models of GPA in Grades 7 to 12, respectively. Effect sizes of logit and panel data models were calculated for a SD change in independent variables. They are reported in terms of odds ratios and unstandardised coefficients in Table 1 and 2, respectively.

*** INSERT TABLE 1 HERE ***

We find that family SES is related to course-level tracking in high school. Compared to lower SES students, higher SES students are more likely to enroll in advance courses that lead to college preparation (see column 1 in Table 1). The mean probability of enrollment in advance courses is 0.5 for students in the top SES quartile and 0.2 for students in the lowest SES quartile. Father’s education and father’s occupational status, to a lesser extent (90% confidence), are the major gateways for the
family SES gap in track enrollment (see column 2 in Table 1). Disparities related to family SES are explained indirectly via the academic achievement of students in Grade 7. Achievement variables account for 16% of the family SES coefficient. But even when these variables are controlled, a significant direct association with family SES persists (see column 3 in Table 1).

Family SES is positively related to academic achievement in school (see column 1 in Table 2). Father’s education (99% confidence), father’s occupational status (95% confidence), and mother’s education (90% confidence), in that order, are the main contributors (see column 2 in Table 2). Achievement disparities related to SES tend to increase from the beginning of middle school to the end of high school. The family SES coefficient in Grade 7 of 0.57 (see column 3 in Table 2) significantly increases in Grade 10 and thereafter in about 0.11 points (see SES interaction coefficients in column 3, Table 2). In other words, the family SES gap in academic achievement widens by about 17% from Grade 7 to Grade 12.

The comparison of the SES x Grade interaction coefficients before and after including the track enrollment variable into the model indicates that track enrollment accounts for part of the SES widening gap (columns 3 and 4 in Table 2). Note that interaction coefficients are lowered by including track enrollment effects over time and, although not shown here, this reduction is statistically significant.

**Family SES association with college attendance at age 20**

In a second step, we examined the relationship between family SES and the probability of being a full-time college student two years after high school completion,
that is, roughly at the age of 20. We estimated logit models of college status as a function of family SES, track enrollment in high school, and academic achievement variables. Effect sizes were calculated for a SD change and are reported in terms of odds ratios in Table 3.

Students coming from a higher SES family are more likely to enroll in college (see column 1 in Table 3). Whereas the predicted probability of attending college for those in the top SES quartile is 0.8, it is 0.3 for those in the bottom SES quartile. More specifically, parental education, family income, and father’s occupational status, in that order, mainly account for the association with family SES (see column 2 in Table 3). As with track enrollment and academic performance models, the association with father’s education is the strongest. Different at this stage is the specific relevance of family income as a critical predictor of college enrollment.

Not surprisingly, college bound students in high school are, in fact, more likely to be enrolled in college four years down the road than those in the general/vocational track (see column 3 in Table 3). The association with track enrollment is partly accounted for by academic achievement (see column 4 in Table 3) and entirely explained by both academic achievement levels and gains (see column 5 in Table 3). We showed earlier that course-enrollment decisions in high school relate to differential achievement gains among tracks (see column 4 in Table 2). Additionally, results in Table 3 suggest that achievement levels and differential achievement gains among tracks fully account for the relationship between track enrollment and college attendance.

*** INSERT TABLE 3 HERE ***
When included in combination, track enrollment and academic achievement explain 16% of association between family SES and college enrollment (see model 5 in Table 3). Specifically, these variables account for 15% and 4% of the father’s and mother’s education coefficients, respectively (compare columns 2 and 5 in Table 3). Besides indirect associations via academic achievement, family SES is also related to the college enrollment decision directly. Family income and father’s occupational status coefficients remain significant even after academic achievement variables are controlled. For one SD increment in family income and father’s occupational status, the odds of attending college increase by a factor of 1.5 and 1.3, respectively (see column 5 in Table 3).

Family income and, to a lesser extent, father’s occupational status are directly related to the decision to go to college. But indirect associations with SES expressed via academic achievement are more important. Note that coefficient of achievement variables are greatest when academic achievement and family SES variables are included in combination (see column 5 in Table 2) and that the Pseudo $R^2$ increases from 0.10 to 0.30 from the family SES model to the full model including family SES and achievement variables (see models 2 and 5 in Table 3).

**Family SES association with labour force outcomes at age 28**

Finally, we examined the associations between family SES, years of schooling, and academic achievement with earnings and occupational status at age 28. Here, we looked at the extent to which years of schooling and academic achievement account for the relationship between family SES and labor force outcomes. Also, we assessed the extent to which academic achievement and years of schooling, together and
independently, explain earnings and occupational status when family SES is controlled. To this end, we estimated earnings and occupational status regression models with family SES, years of schooling, and academic achievement as predictors.

The earnings models include unemployed participants (i.e., the temporarily laid off, unemployed looking for work, and part time workers), that is, reported associations are independent of employment status. Unemployed were 15% of the total sample and their earnings were censored into the value of one. The censured nature of the earnings variable was handled with Tobit regressions. Occupational status, in contrast, fitted a normal distribution well and was modeled with OLS regressions. Table 4 and 5 report estimates of earnings and occupational status models in terms of unstandardized regression coefficients.

*** INSERT TABLE 4 HERE ***

Participants who grew up in lower SES families earn less and attain a lower occupational status at age 28 than those from higher SES families (see column 1 in Tables 4 and 5). The relationship with family SES is stronger for occupational status than for earnings (compare R²s in column 1 in Tables 4 and 5). The correlation of family SES with earnings is 0.14 and with occupational status is 0.31. Family SES accounts thus only for a small proportion of occupational status differences and even for a smaller proportion earnings differences. Mother’s education, family income, and father’s occupational status, in that order, explain the relationship between family SES and occupational status (see column 2 in Table 5). We have not been able to detect these mechanisms for earnings because none of the family SES constituent components turned
out statistically significant when the overall association with family SES was broken down.

Family SES is indirectly related to labor force outcomes via its relationship with years of schooling and academic achievement. Compared to academic achievement, years of schooling mediates the relationship between family SES and labor force outcomes to a greater extent. In particular, years of schooling and academic achievement, individually, account for 42% and 25% of the association between family SES and earnings (see columns 2 and 3 in Table 4). Similarly, these variables account for 81% and 42% of the relationship between family SES and occupational status model (see columns 3 and 4 in Table 5). When jointly included, they fully explain the relationship with occupational status and account for 45% of the relationship between family SES and earnings (see columns 4 and 5 in Tables 4 and 5).

Table 5 also reveals the mediating mechanisms of years of schooling and academic achievement. Whereas years of schooling fully accounts for the relationship between family income and occupational status, academic achievement reduces, but does not entirely account for this relationship (see columns 3 and 4 in Table 5). This is consistent with our results on the antecedents of college attendance and academic achievement. While family income was directly related to the decision of enrolling in college, its association with academic achievement was not significant (see column 5 in Table 3 and column 2 in Table 2).

*** INSERT TABLE 5 HERE ***

But besides mediating the relationship between SES and labor force outcomes, years of schooling and academic achievement are also directly associated to these
outcomes. Treating family SES as control variable, we found that academic achievement and years of schooling are positively related to earnings and occupational status (see columns 2 and 3 in Table 4 and columns 3 and 4 in Table 5). Apparently, they contribute to the explanation of earnings and occupational status in different ways. Years of schooling has a stronger association with occupational status than academic achievement. The explanatory power of occupational status increased to a greater extent when years of schooling is included instead of academic achievement.

Using one of the five imputed datasets, we found that the $R^2$ of an occupational status model on family SES alone increased from 0.10 to 0.39 when we included years of schooling and to 0.26 when we included academic achievement instead (see columns 3 and 4 in Table 5). For a SD change in years of schooling and GPA, respectively, occupational status increases by 11.29 and 5.84 points, which is equivalent to 62% and 31% of a SD in occupational status. Also, when years of schooling and academic achievement variables are included in combination, their specific coefficients are lowered, but for years of schooling to a lesser extent (see columns 3, 4, and 5 in Table 5). Altogether, these results point to a greater influence of years of schooling compared to academic achievement.

The relative contribution of these aspects is less obvious for earnings. Note that the explanatory power of years of schooling and academic achievement was fairly similar (see $R^2$ in columns 2 and 3 in Table 4). And, even though the coefficient for years of schooling is slightly larger than the academic achievement coefficient, unreported analyses showed that these differences are not significant. Thus, academic achievement seems to be as important as years of schooling to the explanation of earnings differences,
supporting the idea that academic achievement is more important for income than for occupational status.

Perhaps the most striking result from the earnings and occupational status models is the evidence of an independent association with academic achievement. The association between GPA and occupational status is positive and statistically significant even when family SES and years of schooling were held constant (see column 5 in Table 5). We were unable to detect similar evidence for the earnings models (see column 4 in Table 4), but additional analyses (not reported) suggest that GPA does contribute independently to the prediction of earnings but only for males. These results suggest that academic achievement and years of schooling make independent contributions to the explanation of earnings and occupational status.

Discussion

The purpose of the sequence of analyses presented above was to uncover some of the mechanisms underlying the intergenerational persistence of socio-economic inequality. To this end, we used a unique longitudinal data set from a regional U.S. study, the MSALT, which has surveyed participants from about the age of 11 to about the age of 28 years. Schnabel, Alfeld, Eccles, Köller, and Baumert (2002) analysed family SES associations on academic achievement and track enrolment with these data. Our analyses considerably extend their research. We have examined the reproduction of family SES in the transition from school to college and to the labour market, while distinguishing associations of family SES via educational variables from those that persist for comparable educational competences.
Our analyses, however, are constrained by several limitations. Probably the most important one is attrition. As already discussed, there is significant attrition in the post high school phase. Therefore, results of the earnings and occupational status models should not be easily generalised. Another is the sample restriction to mainly White participants in an industrial area in the Midwest. The dynamics for the intergenerational persistence of family SES might vary by race and regions. For example, research shows that the degree of class persistence is much higher among Blacks, who are more likely to remain in low-income across generations (Hertz 2005).

The study design also limits the inferences of causality. The longitudinal design produces stronger causal evidence than cross-sectional studies, but is still limited by its observational nature. Participants were not assigned to treatment and control groups and the variables and experimental conditions could not be manipulated. Therefore, other plausible explanations besides SES influences may lie behind the observed associations and cannot be ruled out. Omitted variables like family structure, student expectations, family social capital, and sex might contribute to explaining the associations with SES or how the reproduction of inequality varies for different groups. But their inclusion would had overcomplicated the discussion of findings of an already complex analysis including several outcome variables and life stages. Furthermore, the observational data and attrition prevent us from evaluating the causal mechanisms at work in detail. For these reasons the analysis is conceived as capable of providing evidence of associations, only.

Still another limitation is the absence of a proper mediational analysis. We can not claim mediation with the regression techniques employed. The analysis of how coefficients vary when variables are included in the model offers an indication of how
certain variables help explain or mediate the association with SES, but mediational analysis requires more formal techniques. Further research could consider available techniques and adaptations for limited dependent variables like the ones of our college enrollment and earnings models (McKinnon and Dwyer 1993; Wang and Shang 2011).

A final limitation is the use of student reports for parental education and SES measurement. Data reported by students has proved to be less reliable than the one collected through parental reports (Buchmann 2002). But we have used student reports only when parents reports were missing and have shown that they are considerably correlated with parental reports.

Having said that, in general, the findings align well with the literature on the SES reproduction and offer new important evidence to policy and research. We have found that family SES is positively related to academic achievement during the school period. Additionally, since higher SES students are more likely to take college preparatory courses while lower SES students tend to general or vocational track classes, the achievement differences between these students become amplified towards the end of high school. Track enrollment, however, does not seem to be the only reason for the widening gap. Other mechanisms produce diverging achievement trajectories among SES groups even within school tracks (e.g., Downey, von Hippel, and Broh 2004).

Students of higher SES families are more likely to enroll in college by the age of 20. Differential achievement gains arising from course-level tracking help explain differences in college participation rates. Higher SES students taking advanced courses grow faster in their academic skills and are therefore more likely to enroll in college. College enrollment is mostly driven by academic achievement levels and learning gains.
At first glance, this seems to support the notion of the meritocratic principle, but only if one ignores the strong indirect effects of family SES at prior stage of the educational pathway.

The meritocratic principle is also not sufficient in predicting college attendance. Irrespective of academic achievement in school, family income and father’s occupational status are positively related to college enrollment. The influence of family income was not significant for track enrollment or academic performance, but emerges as relevant at this point of transition from high school to college. That financial constraints at home are directly related to the college decision is particularly troubling as it suggests that highly skilled youths from low income families will not benefit from further educational opportunities and, consequently, will be less likely to enter the labor market at the educational level they could have mastered. Furthermore, inasmuch as tuition costs have increased in the United States at a disproportionate rate compared to family income over the last 20 years while returns to education have increased, it is not surprising that the increasing rate of college attendance and graduation during the same period was mainly carried by the increase of educational participation of the middle class.

And yet, the associations between academic performance on college enrollment is, overall, stronger than that of family income when the indirect association of the latter are ignored. This finding is in accordance with other studies (Carneiro and Heckman 2002; Harrington and Sum 1999; Mayer 2008) and suggests that long term family factors “crystallized” in skills, i.e., through long-lasting mediation effects, are the major gateway for the decision of attending college. Note that while financial constraints can be alleviated through financial aid or credits programs, it is more difficult to immediately
compensate for family influences at earlier stages of the academic career. Improving the financial situation for college students is therefore not enough to substantially reduce the career “tailwind” of a high SES upbringing (Dynarski 2000, 2003).

A possible explanation for the direct association between father’s occupational status and college enrollment lies in the association between father’s occupational status and the goals and aspirations of youths. Occupational preferences of fathers seem to be a source of class-based culture and values which, in turn, influence youths’ value attachment on educational outcome (Bourdieu 1973; Karlsen 2001). More generally, the persisting direct association between SES and college attendance might reflect that socioeconomically advantaged parents instill in their offspring favorable attitudes towards education which, in turn, positively affect their postsecondary plans and their actual college attendance decision (Crosnoe, Mistry, and Glen 2002; Eccles, et al. 2004; Hossler and Stage 1992). These attitudes and beliefs are configured at a relatively early age. According to Atanda (1999) they are manifest as early as Grade 8 when students select courses that predetermine whether they are considered college-bound or not. Eccles, et al. (2004) found that postsecondary educational plans are made already in elementary school. From this perspective, interventions at all levels of the educational career are important to substantially and sustainably reduce the intergenerational transmission of family SES.

The association with family SES prevails into young adulthood. As expected, education appears to be the critical channel for the transmission of family SES to the next generation. In combination, years of schooling and academic achievement fully account for the relationship between family SES and occupational status and explain about half of
the relationship with earnings. These aspects are associated with family SES differently and, similarly, contribute to explain family SES effects on labor force outcomes in different ways. As suggested, though not tested by Kerckhoff, Raudenbush, and Glennie (2001), our results indicate that the family SES association with years of schooling reflects more financial resources while the SES association with academic achievement reflects more the cultural capital and socialisation aspects.

Family SES and education, however, explain only a small proportion of earnings differences at age 28. In accordance with prior research, our results suggest that youths with comparable educational competences and family backgrounds obtain quite different earnings. Other personal characteristics unrelated to schooling such as physical appearance, personality, and non-cognitive skills may explain earnings differences to a greater extent (Bowles and Gintis 2002; Bowles, Gintis, and Osborne 2001; Osborne 2005). Inasmuch as some of these aspects might be partly transmitted from parents to children, our results might underestimate the intergenerational transmission of family SES.

Finally, we find evidence that years of schooling and cognitive skills (as represented by our academic achievement measures) make independent contributions to the explanation of earnings and occupational status and appear to be the main route for the intergenerational transmission of family SES. Previous literature led us to expect significant effects of years of schooling on labor force outcomes, but is less conclusive on the effects of cognitive skills when family SES and years of schooling are controlled. Our findings suggest that irrespective of years of schooling, the labor market does, in fact, also reward the cognitive skills and, apparently, it does so more for earnings than for
occupational status. Moreover, the role of cognitive skills might be underestimated at this early stage as young adults with greater skills are likely to engage in more education.
Acknowledgements

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Appendix A

*** INSERT TABLE A HERE ***
Figure 1. Conceptual and Analytical Model of Family SES Effects

Family SES:
- Parental education
- Parental occupations
- Family income

School period
Ages 13-18/Grades 7-12

Age 20
College status

Age 28
Labor force outcomes

SES effects
- Direct
- Indirect

Academic achievement
Track enrollment
Achievement gains

Age 13/Grade 7  Age 16/Grade 10  Age 18/Grade 12
Table 1. Predictors of course enrollment in the college preparatory track (odds ratios)

<table>
<thead>
<tr>
<th></th>
<th>(1) Total SES</th>
<th>(2) SES broken down</th>
<th>(3) Academic achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family SES</td>
<td>1.611*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father's education</td>
<td>1.438*</td>
<td>1.327*</td>
<td></td>
</tr>
<tr>
<td>Mother's education</td>
<td>1.077</td>
<td>1.014</td>
<td></td>
</tr>
<tr>
<td>Father's occupational status</td>
<td>1.125</td>
<td>1.069</td>
<td></td>
</tr>
<tr>
<td>Mother's occupational status</td>
<td>1.001</td>
<td>0.973</td>
<td></td>
</tr>
<tr>
<td>Family income</td>
<td>1.091</td>
<td>1.067</td>
<td></td>
</tr>
<tr>
<td>Achievement in Grade 7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPA</td>
<td>1.308*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading</td>
<td>1.255*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math</td>
<td>2.425*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pseudo R²</td>
<td>0.039</td>
<td>0.044</td>
<td>0.166</td>
</tr>
<tr>
<td>Proportion of SES explained</td>
<td></td>
<td></td>
<td>0.162</td>
</tr>
</tbody>
</table>

Note: Estimation method is logistic regression. Sample consists of 1,631 participants. Effect sizes for 1 SD change. *p<0.05
Table 2. Predictors of GPA (unstandardized regression coefficients)

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Total SES</td>
<td>SES broken down</td>
<td>SES over time</td>
<td>Track enrollment</td>
</tr>
<tr>
<td>Grade 10</td>
<td>-0.259*</td>
<td>-0.259*</td>
<td>-0.259*</td>
<td>-0.258*</td>
</tr>
<tr>
<td>Grade 12</td>
<td>-0.241*</td>
<td>-0.241*</td>
<td>-0.241*</td>
<td>-0.241*</td>
</tr>
<tr>
<td>Family SES</td>
<td>0.570*</td>
<td></td>
<td>0.570*</td>
<td>0.440*</td>
</tr>
<tr>
<td>Father's education</td>
<td></td>
<td>0.295*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother's education</td>
<td></td>
<td>0.123</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father's occupational status</td>
<td></td>
<td>0.178*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother's occupational status</td>
<td></td>
<td>0.092</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family income</td>
<td></td>
<td>0.108</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SES x Grade 10</td>
<td></td>
<td>0.104*</td>
<td>0.073*</td>
<td></td>
</tr>
<tr>
<td>SES x Grade 12</td>
<td></td>
<td>0.105*</td>
<td>0.089*</td>
<td></td>
</tr>
<tr>
<td>Track enrollment</td>
<td></td>
<td></td>
<td>0.604*</td>
<td></td>
</tr>
<tr>
<td>Track enrollment x Grade 10</td>
<td></td>
<td></td>
<td>0.145*</td>
<td></td>
</tr>
<tr>
<td>Track enrollment x Grade 12</td>
<td></td>
<td></td>
<td></td>
<td>0.072*</td>
</tr>
<tr>
<td>R²</td>
<td>0.087</td>
<td>0.094</td>
<td>0.087</td>
<td>0.170</td>
</tr>
</tbody>
</table>

Note: Estimation method is panel data random effects regression.
Sample consists of 2,264 participants. Effect sizes for 1 SD change.
* p<0.05
Table 3. Predictors of college enrollment (odds ratios)

<table>
<thead>
<tr>
<th></th>
<th>(1) Total SES</th>
<th>(2) SES broken down</th>
<th>(3) Track enrollment</th>
<th>(4) Achievement</th>
<th>(5) GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family SES</td>
<td>2.242 *</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father's education</td>
<td>1.405 *</td>
<td>1.315 *</td>
<td>1.244 *</td>
<td>1.189</td>
<td></td>
</tr>
<tr>
<td>Mother's education</td>
<td>1.247 *</td>
<td>1.244 *</td>
<td>1.201 *</td>
<td>1.200 *</td>
<td></td>
</tr>
<tr>
<td>Father's occupational status</td>
<td>1.331 *</td>
<td>1.324 *</td>
<td>1.300 *</td>
<td>1.277 *</td>
<td></td>
</tr>
<tr>
<td>Mother's occupational status</td>
<td>0.991</td>
<td>0.990</td>
<td>0.967</td>
<td>0.929</td>
<td></td>
</tr>
<tr>
<td>Family income</td>
<td>1.338 *</td>
<td>1.330 *</td>
<td>1.373 *</td>
<td>1.470 *</td>
<td></td>
</tr>
<tr>
<td>Track enrollment</td>
<td></td>
<td>1.563 *</td>
<td>1.192 *</td>
<td>1.129</td>
<td></td>
</tr>
<tr>
<td>Math achievement</td>
<td></td>
<td></td>
<td>1.711 *</td>
<td>1.073</td>
<td></td>
</tr>
<tr>
<td>English achievement</td>
<td></td>
<td></td>
<td>1.706 *</td>
<td>1.526 *</td>
<td></td>
</tr>
<tr>
<td>GPA Grade 10</td>
<td></td>
<td></td>
<td></td>
<td>1.615 *</td>
<td></td>
</tr>
<tr>
<td>GPA gains (Grade 10 to 12)</td>
<td></td>
<td></td>
<td></td>
<td>1.254 *</td>
<td></td>
</tr>
<tr>
<td>Pseudo R²</td>
<td>0.099</td>
<td>0.107</td>
<td>0.137</td>
<td>0.221</td>
<td>0.297</td>
</tr>
<tr>
<td>Proportion of SES explained</td>
<td>0.059</td>
<td>0.130</td>
<td>0.159</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Estimation method is logistic regression. Sample consists of 1,601 participants.
Effect sizes for 1 SD change.
* p<0.05
Table 4. Predictors of the natural logarithm of annual earnings at age 28

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)Years of schooling</th>
<th>(3)Achievement</th>
<th>(4) Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>8.946*</td>
<td>8.946*</td>
<td>8.947*</td>
<td>8.947*</td>
</tr>
<tr>
<td>Family SES</td>
<td>0.722*</td>
<td>0.420*</td>
<td>0.538*</td>
<td>0.397*</td>
</tr>
<tr>
<td>Father's education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother's education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father's occupational status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother's occupational status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family income</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years of schooling</td>
<td>0.790*</td>
<td></td>
<td>0.635*</td>
<td></td>
</tr>
<tr>
<td>English achievement</td>
<td></td>
<td></td>
<td>0.028</td>
<td>-0.008</td>
</tr>
<tr>
<td>Math achievement</td>
<td></td>
<td></td>
<td>0.178</td>
<td>0.114</td>
</tr>
<tr>
<td>GPA</td>
<td>0.472*</td>
<td></td>
<td>0.199</td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>0.018</td>
<td>0.031</td>
<td>0.038</td>
<td>0.042</td>
</tr>
<tr>
<td>Proportion of SES explained</td>
<td>0.418</td>
<td>0.254</td>
<td>0.449</td>
<td></td>
</tr>
</tbody>
</table>

Note: Estimation method is tobit regression.
Sample consists of 552 participants and is unconditional on employment.
Effect sizes for 1 SD change.
R²s are derived from OLS regressions on the sample conditional on employment.
* p<0.05
Table 5. Predictors of occupational status at age 28

<table>
<thead>
<tr>
<th></th>
<th>(1) Total SES</th>
<th>(2) SES broken down</th>
<th>(3) Years of schooling</th>
<th>(4) Achievement</th>
<th>(5) Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>57.089*</td>
<td>57.091*</td>
<td>57.088*</td>
<td>57.087*</td>
<td>57.087*</td>
</tr>
<tr>
<td>Family SES</td>
<td>5.776*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father's education</td>
<td>1.001</td>
<td>-0.501</td>
<td>-0.236</td>
<td>-0.783</td>
<td></td>
</tr>
<tr>
<td>Mother's education</td>
<td>2.061*</td>
<td>0.140</td>
<td>1.280</td>
<td>0.094</td>
<td></td>
</tr>
<tr>
<td>Father's occupational status</td>
<td>1.995*</td>
<td>0.483</td>
<td>0.932</td>
<td>0.293</td>
<td></td>
</tr>
<tr>
<td>Mother's occupational status</td>
<td>1.093</td>
<td>0.929</td>
<td>1.226</td>
<td>1.020</td>
<td></td>
</tr>
<tr>
<td>Family income</td>
<td>2.017*</td>
<td>0.595</td>
<td>1.684*</td>
<td>0.677</td>
<td></td>
</tr>
<tr>
<td>Years of schooling</td>
<td></td>
<td></td>
<td>11.292*</td>
<td>9.564*</td>
<td></td>
</tr>
<tr>
<td>English achievement</td>
<td></td>
<td></td>
<td></td>
<td>1.372</td>
<td>0.218</td>
</tr>
<tr>
<td>Math achievement</td>
<td></td>
<td></td>
<td></td>
<td>1.860*</td>
<td>1.222</td>
</tr>
<tr>
<td>GPA</td>
<td></td>
<td></td>
<td></td>
<td>5.835*</td>
<td>2.272*</td>
</tr>
<tr>
<td>R²</td>
<td>0.095</td>
<td>0.097</td>
<td>0.394</td>
<td>0.257</td>
<td>0.415</td>
</tr>
<tr>
<td>Proportion of SES explained</td>
<td>0.813</td>
<td>0.422</td>
<td>0.861</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Estimation method is OLS. Sample consists of 907 participants. Effect sizes for 1 SD change.

* p<0.05
Table A. Descriptive statistics of independent variables by analytic model

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Academic achievement</th>
<th>Track enrollment</th>
<th>College enrollment</th>
<th>Earnings</th>
<th>Occupational status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SE</td>
<td>Mean</td>
<td>SE</td>
<td>Mean</td>
</tr>
<tr>
<td>Family SES</td>
<td>-0.022</td>
<td>(0.021)</td>
<td>0.032</td>
<td>(0.025)</td>
<td>0.042</td>
</tr>
<tr>
<td>Father's education</td>
<td>13.749</td>
<td>(0.055)</td>
<td>13.801</td>
<td>(0.063)</td>
<td>13.871</td>
</tr>
<tr>
<td>Mother's education</td>
<td>13.283</td>
<td>(0.044)</td>
<td>13.369</td>
<td>(0.053)</td>
<td>13.388</td>
</tr>
<tr>
<td>Father's occupational status</td>
<td>52.233</td>
<td>(0.401)</td>
<td>52.978</td>
<td>(0.456)</td>
<td>53.027</td>
</tr>
<tr>
<td>Mother's occupational status</td>
<td>47.126</td>
<td>(0.321)</td>
<td>47.677</td>
<td>(0.374)</td>
<td>47.763</td>
</tr>
<tr>
<td>Family income</td>
<td>3.695</td>
<td>(0.031)</td>
<td>3.766</td>
<td>(0.032)</td>
<td>3.747</td>
</tr>
<tr>
<td>Track enrollment</td>
<td>0.315</td>
<td>(0.015)</td>
<td>0.346</td>
<td>(0.013)</td>
<td>0.346</td>
</tr>
<tr>
<td>Achievement in Grade 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math</td>
<td>22.802</td>
<td>(0.108)</td>
<td>23.107</td>
<td>(0.116)</td>
<td>23.362</td>
</tr>
<tr>
<td>Reading</td>
<td>20.497</td>
<td>(0.077)</td>
<td>20.633</td>
<td>(0.085)</td>
<td>20.942</td>
</tr>
<tr>
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<td>10.203</td>
<td>(0.043)</td>
<td>10.346</td>
<td>(0.049)</td>
<td>10.409</td>
</tr>
<tr>
<td>Achievement in Grade 10</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math</td>
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<td>(0.153)</td>
<td>23.690</td>
<td>(0.150)</td>
<td>25.169</td>
</tr>
<tr>
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<td>(0.098)</td>
<td>21.407</td>
<td>(0.109)</td>
<td>22.549</td>
</tr>
<tr>
<td>GPA</td>
<td>9.655</td>
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<td>9.997</td>
<td>(0.070)</td>
<td>10.788</td>
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<tr>
<td>GPA gains (10-12)</td>
<td>0.038</td>
<td>(0.045)</td>
<td>0.029</td>
<td>(0.052)</td>
<td>0.1582</td>
</tr>
<tr>
<td>Years of schooling</td>
<td>14.590</td>
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<td>1.601</td>
<td>552</td>
</tr>
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<td>Sample size</td>
<td>2,264</td>
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<td>1,631</td>
<td>1,601</td>
<td>552</td>
</tr>
<tr>
<td>% of original sample</td>
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<td>67</td>
<td>65</td>
<td>23</td>
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