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What Skills Can Buy: Transmission of advantage through cognitive and noncognitive skills

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Abstract

Parental income and wealth contribute to children's success but are at least partly endogenous to parents' cognitive and noncognitive skills. We estimate the degree to which mothers' skills measured in early adulthood confound the relationship between their economic resources and their children's postsecondary education outcomes. Analyses of NLSY79 suggest that maternal cognitive and noncognitive skills attenuate half of parental income's association with child baccalaureate college attendance, a fifth of its association with elite college attendance, and a quarter of its association with bachelor's degree completion. Maternal skills likewise attenuate a third of parental wealth's association with children's baccalaureate college attendance, half of its association with elite college attendance, and a fifth of its association with bachelor's degree completion. Observational studies of the relationship between parents' economic resources and children's postsecondary attainments that fail to account for parental skills risk seriously overstating the benefits of parental income and wealth.

Children of affluent parents can expect to attend better schools than their less advantaged peers, outperform their peers even in the same school, and attain appreciably higher levels of education (Alon 2009; Lucas 2001; Raftery and Hout 1993; Reardon 2011).[1] Much of the literature on the transmission of advantage suggests, either implicitly or explicitly, that income and wealth contribute directly to achievement through expenditures. More advantaged parents are thought to use their financial resources to help their children by paying for tutors, school tuition, residence in the catchment areas of desirable schools, books, enriching extracurricular activities, and cultural experiences (DiMaggio and Mohr 1985; Hao and Yeung 2015; Lareau 2003; Lareau and Goyette 2014; Orr 2003). We suggest that much of the observed relationship between parents' economic resources and children's postsecondary educational outcomes is confounded with parents' cognitive and noncognitive skills. Income and wealth reflect more than just luck; the traits that help parents accumulate

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Research Ethics

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[1]For a recent review, see Elliott, Destin, and Friedline (2011).

economic resources also help their children succeed in school. The same may be true for less advantaged parents: “whatever makes it difficult for parents to succeed in the labor market may also adversely affect the development of their children” (Jacob, Kapustin, and Ludwig 2014:2).

In this paper, we demonstrate the degree to which the observed association between parents’ economic resources and their children’s college attendance and completion patterns may be confounded with maternal cognitive and noncognitive skills. We seek to complement the evolving descriptive literature on parental investments in children (Hao and Yeung 2015; Kornrich and Furstenberg 2013) as well as the literature on educational returns to parental income grounded in natural experiments like state variation in the earned income tax credit (EITC) (Dahl and Lochner 2012), variation in other programs to reduce or eliminate dependence on welfare (Duncan, Morris, and Rodrigues 2011), and variation in increments to unearned income (Akee et al. 2015). The former literature typically lacks adequate controls to address the confounding effects of other nonpecuniary resources with parental spending. The latter literature offers well-identified estimates of the causal effects of income, but is limited almost entirely to a narrow range at the lower end of the income distribution.

Our analyses pertain to the broader distribution of income found in the population. We cannot claim to identify causal effects with the confidence of scholars evaluating natural experiments. Instead, we offer an empirical analysis of the extent to which maternal attributes developed during a mother’s own childhood and adolescence shape variation in both her economic resources and her children’s educational careers. Given increases in the importance and costs of higher education, we focus explicitly on the transition from high school into and through college, including pathways into elite colleges. We build on a substantial evidentiary foundation that demonstrates how cognitive skills—including quantitative and verbal ability—and noncognitive skills—including self-esteem, locus of control, and self-concept—contribute to (parental) income and wealth (e.g., Fletcher 2013; Hauser 2010; Heckman, Stixrud, and Urzua 2006; Mayer 1997; Zagorsky 2007). As we will show, these same parental skills contribute to children’s educational success, and thus to an appreciable degree confound the association between parents’ economic resources and children’s educational outcomes. Our contribution is not to document the relative importance of parents’ cognitive and noncognitive skills to the success of their children, but instead to estimate the degree to which the observed association between parental economic resources and children’s postsecondary outcomes is endogenous to parental skills, rather than a reflection of the purchasing power of parents’ economic resources to facilitate or constrain the educational attainment of the next generation.

Prior literature has not focused explicitly on the contribution of parents’ skills to these processes, but research typically incorporates proxies of these skills by conditioning estimates of returns to parents’ financial resources on parents’ levels of educational attainment (e.g., Blau and Duncan 1967; Mare 1981; Sewell, Haller, and Ohlendorf 1970). As Figure 1 shows, we regard parental education as an important component of the complex relationship among parents’ skills, parents’ financial resources, and children’s educational attainment. Parents’ educational attainment is shaped by the material, cultural, cognitive, and noncognitive resources of their own parents (the grandparents of our focal respondents), as

well as the skills and knowledge they acquired at earlier points in the life course. Further complicating the picture, education at one point in the life course begets later skills, which in turn contribute to further success in education. Given the ambiguity in the direction of the causal relationship between skills and education, the unique effects of each cannot be easily disentangled (Heckman and Vytlacil 2001).

In our primary models we assume that maternal educational attainment is endogenous to skills formed at earlier stages in the life course, and thus we privilege maternal skills over maternal education. However, we recognize that the skills we measure are themselves, in part, endogenous to education at earlier points in the mother's life course. We therefore offer two estimates of the extent to which maternal skills confound the relationship between parental economic capital and children's postsecondary outcomes: one excluding maternal education (an upper bound) and one conditioning on maternal education (a lower bound).

Using data from the National Longitudinal Survey of Youth (NLSY) 1979 cohort's female respondents and their children (CNLSY), we find that as much as half of the association between parents' income and children's college attendance, just over a fifth of the association between parental income and elite college attendance conditional on attending a baccalaureate college, and as much as a quarter of the association between parents' income and children's bachelor's degree completion conditional on any college attendance reflects the contribution of mothers' skills. About 30 percent of the association between wealth and college attendance, nearly half of the association between wealth and elite college attendance, and a fifth of the association between wealth and bachelor's degree completion can likewise be traced to mothers' skills.

Literature Review

Financial Resources and Transmission of Advantage

Much of the literature on transmission of social status focuses on parental income and wealth as key predictors of children's educational, economic, and occupational success (e.g., Aaronson and Mazumder 2008; Becker and Tomes 1979; Orr 2003; Reardon 2011). This research demonstrates a marked association between parental economic resources and children's outcomes. The causal pathway from parental resources to children's outcomes is unclear, but much work assumes that parents with more income and wealth are simply better able to provide the material, academic, and cultural goods that help children succeed in the competition for educational achievement and credentials (e.g., Elliott et al. 2011). The economic household production model, in particular, posits that "income matters . . . because it enables parents to purchase inputs that matter for the production of positive child outcomes" (Duncan et al. 2011:1264). More economically advantaged parents are also better able to afford rising college tuition, especially at elite colleges that may appear inaccessible to equally talented but less affluent students. Not only can different endowments of economic capital affect parents' ability to pay for these resources, but parents' willingness to financially contribute to the cost of college varies by income as well (Steelman and Powell 1991). Recent decades have seen a rise in income inequality coupled with increases in inequality in financial investments made in children across socioeconomic groups (Kaushal, Magnuson, and Waldfogel 2011; Kornrich and Furstenberg 2013; Western, Bloome, and

Percheski 2008). Income and wealth as financial resources do not tell the entire story, but they play an important role in enabling the transmission of advantage from parents to children.

Both income and wealth reflect financial well-being, but they are conceptually and analytically distinct (Conley 2001; Kennickell 2009; Mayer 1997; Orr 2003). Income is a flow and includes all the money that accrues to an individual or household from all sources, including active (e.g., labor market earnings) and passive (e.g., interests, rents, public assistance) income. Income is relatively susceptible to shocks due to layoffs, other job changes, promotions, bonuses, and changes in the intensity of labor force participation. Wealth, on the other hand, is a stock that includes savings and other assets like homes, vehicles, stocks, and bonds. Wealth is relatively durable compared to income but often less immediately accessible. Compared with income, wealth provides a longer-term view of the stock of resources available to individuals and households, resources that can accumulate over time and across generations (Conley 2001).

Wealth captures underlying socioeconomic characteristics that may contribute to children's educational success in ways that income, education, and occupation do not. Orr (2003) argues that wealth influences academic achievement by facilitating children's exposure to cultural capital and goods. Conley (2001) finds that net of income, wealth is strongly predictive of college attendance and possibly completion. Like Orr, Conley looks toward the noneconomic benefits conferred by wealth that are not necessarily associated with income. In fact, he finds that income and wealth have distinct and independent ties to children's educational attainment, suggesting that the pathways through which they influence children's outcomes differ.

Cognitive and Noncognitive Skills and Financial Resources

Many authors focus on the role of financial resources in promoting children's outcomes, but they less frequently look at factors that may confound the effect of parents' resources themselves (e.g., Conley 2001; Hill and Duncan 1987; Reardon 2011). Although researchers often acknowledge the possibility that other characteristics associated with parental financial resources may be partially driving these effects, such characteristics are rarely central to the analyses (e.g., Fletcher and Wolfe 2016). As noted earlier, parental educational attainment reflects a variety of skills and values (Hyman 1953), and it is often included in models assessing the effects of financial resources on children's educational attainment. We argue that skills are not entirely endogenous to education: they have a unique confounding effect on the relationships among education, economic resources, and children's outcomes. We thus go one step further than conditioning on parental education and focus on mothers' cognitive and noncognitive skills, noting that parents earning more income and accumulating more wealth are quite likely to systematically differ from people earning and accumulating smaller pools of financial resources along these dimensions. By explicitly incorporating skills into our models, we can identify their role in the intergenerational transmission of advantage and work toward disentangling skills from the influences of education, income, and wealth.

In addition to contributing independently to children's outcomes, income and wealth are shaped in different ways and to different degrees by parents' skills. Income and wealth are strongly correlated ($r = .63$ in our sample), but they need not be mutually dependent because they can be derived from different sources. There is certainly overlap in the specific skills that produce income and those that produce wealth (e.g., cognitive ability promotes both), but the literature often looks at the two indicators separately and identifies different skills that drive variation in each. For instance, skills promoting employability or on-the-job success, such as conscientiousness, extraversion, and an internal locus of control, are positively associated with income (Fletcher 2013; Groves 2005). Wealth, although responsive to cognitive skills and traits like conscientiousness (Duckworth and Weir 2010), is also influenced by skills like risk tolerance, numeracy, and dedication of time and energy to decisions regarding investments and savings (Cole and Shastry 2009; Smith, McArdle, and Willis 2010). Beyond their effects on parental economic resources, these skills and attributes likely contribute directly to children's educational success.

Skills and their association with financial resources—The terms "cognitive" and "noncognitive" encompass a wide range of attributes, dispositions, and capacities that may enhance achievement in a variety of domains, including but not limited to education, the labor market, health, and interpersonal relationships. Here, we are particularly interested in understanding the degree to which specific instances of these skills contribute to variation in both parental income and wealth and children's educational attainment. Although we include measures of individual skills in our models as opposed to creating a single construct, we do not aim to estimate and understand the unique confounding power of particular skills or to assess the relative importance of parents' cognitive and noncognitive skills to children's patterns of educational attainment. Our choice of the specific skills we include in our analyses is motivated by the availability of data, extant research documenting the degree to which different skills are associated with wealth and income, and our intuitions about how these skills may contribute directly to patterns of college entry and persistence.

Skills and income—Cognitive ability is positively correlated with earnings, although the strength of this correlation and the degree to which the effect is direct or mediated by educational attainment is unclear (Cawley et al. 1997; Cawley, Heckman, and Vytlacil 2001; Gensowski 2014; Hauser 2010; Heckman et al. 2006). Heckman and colleagues (2006) estimate that cognitive ability explains 9 percent of the variance in men's wages and 12.4 percent of the variance in women's wages. Fletcher (2013) finds that each additional standard deviation in cognitive skills is associated with a 12 percent increase in earnings. Similarly, Gensowski (2014) observes that, net of educational attainment, each standard deviation increase in cognitive skills is associated with an 18 percent increase in lifetime earnings. Putting this advantage into dollar amounts, Zagorsky (2007) estimates that each additional IQ point is associated with between a $234 and $616 increase in income, conditional on potential confounders such as age, race, and family structure.

The correlation of cognitive skills with earnings is at least partially explained by educational attainment and occupational characteristics. Cawley and colleagues (2001:420) note that "measured cognitive ability and schooling are so highly correlated that one cannot separate

their effects without imposing strong, arbitrary parametric structure in estimation which, when tested, is rejected by the data." As for the magnitude of a combined effect of cognitive ability with education and experience, Cawley and colleagues (1997) find that these attributes account for up to a third of the variation in wages.

Cognitive skills are operationalized relatively consistently across studies, but noncognitive skills are broadly and inconsistently defined. Some researchers focus on central personality traits (e.g., the Big Five), whereas others refer to a broader set of attributes, including locus of control and self-esteem (for examples of the range of definitions of noncognitive skills, see Borghans et al. 2008; Fletcher 2013; Gensowski 2014; Groves 2005). Across studies, motivation, conscientiousness, and extraversion tend to be associated with higher earnings (Fletcher 2013; Gensowski, Heckman, and Savelyev 2011; Groves 2005; Mayer 1997). Of particular relevance for the present study are economic benefits of the traits observed in the NLSY: self-concept as measured with the Pearlin Mastery Scale, self-esteem as measured with the Rosenberg Self-Esteem Scale, and locus of control as measured with the Rotter Locus of Control Scale.

Using data from the NLSY, Heckman and colleagues (2006) created a composite measure of noncognitive skills derived from the Rotter Locus of Control Scale and the Rosenberg Self-Esteem Scale. They found that this composite score accounts for .9 and .4 percent of variance in men's and women's wages, respectively. These estimates are substantially smaller in magnitude than the corresponding estimates for cognitive skills, but the authors argue that noncognitive skills make an important contribution to income generation as well. Other researchers have analyzed skills individually rather than creating an index and report similar findings. Drago (2011), for instance, argues for a positive and direct effect of self-esteem on earnings. Zagorsky (2007) also finds positive associations of self-concept, as measured with the Pearlin Mastery Scale, with income, although his results for locus of control and self-esteem are mixed. These findings are not entirely consistent, but it is clear that the noncognitive skills we observe have a tie with income.

Beyond explicitly measured dimensions of cognitive skills (as a first principal component to item responses on the Armed Forces Qualifying Test) and the noncognitive skills discussed earlier, students' high school grades offer important additional insights into their skills. Like achievement test scores, course grades are substantially influenced by student achievement (Brookhart 1997; Farkas et al. 1990; McMillan 2001; Willingham, Pollack, and Lewis 2002). However, grades also reflect different dimensions of students' noncognitive skills, including effort and engagement (Farkas et al. 1990; Kelly 2008; Willingham et al. 2002), self-discipline (Duckworth and Seligman 2005; Hofer et al. 2012; Wolfe and Johnson 1995), and focus (Kaiser and Diewald 2014). Among a nationally representative sample of 1994 to 1995 high school teachers, 97 percent indicated that effort was important or extremely important in determining student grades; 86 percent reported that absolute levels of student achievement were important or extremely important (Henke, Chen, and Goldman 1999). The relationship among student achievement, effort, and work habits is complex; effort and work habits influence grades directly and indirectly through achievement (Farkas 2003). It is thus unsurprising that the grades students earn in high school (Miller 1998) and in college (Gemus 2010; Jones and Jackson 1990) both predict labor market earnings. In fact, Miller

(1998) estimates that each grade unit in high school GPA is associated with as much as an 8.7 percent increase in men's earnings and a 13.3 percent increase in women's earnings nine years after high school graduation.

Skills and wealth—As with income, a number of studies demonstrate an association between cognitive ability and wealth. Both Smith and colleagues (2010) and Duckworth and Weir (2010) find that numeracy predicts wealth. Cole and Shastry (2009) document positive associations between cognitive ability and owning stocks, bonds, mutual funds, savings accounts, and a number of other financial instruments, even net of family background. They associate one standard deviation increase in ability with a 3.6 percent increase in accumulated assets. In contrast, Hauser (2010) finds that the effect of cognitive ability on wealth is attenuated to nonsignificance conditional on educational attainment. This is consistent with Zagorsky (2007), who finds that once one controls for background characteristics including education, IQ test score has no effect on wealth in spite of having a small positive relationship prior to adding the controls.

Research on the tie between the noncognitive skills observed in the NLSY and wealth is considerably less extensive than that on these skills' relationship to income or earnings, but the literature does identify some associations. Zagorsky (2007), for instance, finds a positive relationship of self-concept, self-esteem, and locus of control with net worth in the NLSY cohort. Griesdorn and Durband (2016) and Moffitt and colleagues (2011) also document positive ties of locus of control (and in the case of Griedson and Durband, self-concept) with wealth. To our knowledge, the literature does not address the influence of high school grades on subsequent wealth.

Data

We use data from the National Longitudinal Survey of Youth 1979 cohort (NLSY) and their children (CNLSY). The NLSY includes data from a nationally representative sample of 12,686 men and women who were between ages 14 and 22 at the time of their first interview in 1979 (National Longitudinal Surveys 2014). From 1979 through 1994, interviews were conducted annually. Since then, participants have been interviewed biennially. Starting in 1986, women in the cohort have also completed biennial interviews about their children. The CNLSY includes data on 11,504 children born to these mothers through 2010, ranging from newborns to adults. Children under the age of 15 receive an abbreviated survey, and mothers are responsible for reporting much of the information about their children. Children older than age 15 participate in a "young adults" survey that covers topics similar to those on the surveys their mothers have completed since 1979. Most of the women in the 1979 cohort are old enough to have children who are old enough to have attended or graduated from college. Many children of the NLSY are still close to the age at which they would have graduated from college, so we are able to look at relatively current patterns. Given the structure of these data, we directly observe characteristics of mothers but not fathers of children in the sample.

We exclude children under age 20 from our analytic sample, because much of that age group is unlikely to have had the opportunity to attend college. By age 20, the majority of

individuals who will ever attend college will likely have begun their enrollment. According to Bozick and DeLuca (2005), about 16 percent of people who will attend college do not begin their enrollment during the same calendar year in which they completed high school. We cannot look at these late-attendees with our sample, but approximately two years after high school graduation, we should still capture the majority of students who enter college in the traditional time frame. For elite college attendance, we restrict our analytic sample to respondents who ever attended a baccalaureate college. We define the colleges students attended as elite if Barron's 2004 *Profiles of American Colleges* classified the college as most, highly, or very competitive (Schmitt 2009). Our sample for analyses of college completion conditional on attendance also excludes respondents who were still enrolled between 2006 and 2010 and had not reported completing their degree by 2010. This restriction gives college attendees a minimum of six years following initial enrollment to complete their degree.

We address item nonresponse on our independent variables using multiple imputation with chained equations. For the majority of variables, we impute fewer than 10 percent of cases. However, mother's GPA is imputed for between 17 and 23 percent of cases in our three samples. Child's skills have considerably higher rates of missingness, and we imputed between 37 and 44 percent of the cases. The imputation gives us analytic samples of 4,162 for college attendance, 1,710 for elite college attendance, and 1,023 for college completion conditional on college attendance. Note that the latter two samples both condition on attendance, but our sample for college completion also censors on enrollment and thus has fewer observations than our sample for elite college attendance. Our analyses cluster observations by mothers to account for siblings, and we use the custom weights provided by CNLSY to adjust for differential probabilities of sample selection and attrition.

One potential concern about our data is that older children, including college age young adults, were born to relatively young mothers and are therefore more disadvantaged than the population on average (Chase-Lansdale et al. 1991). To assess the degree to which the age distribution of mothers in our sample differs from that of mothers in the general population, we calculated an index of dissimilarity comparing mother's age at first birth in our analytic sample with the CDC's data on mother's age at first birth.[2] The index of dissimilarity is 18 percent for our sample for college attendance, suggesting that although the two samples do differ in the age distribution of mothers, they are relatively similar. In fact, our sample may actually be somewhat more advantaged than the general population, given that some of these differences are attributable to a smaller portion of teen births in the NLSY than in the CDC estimates. Thus, although the CNLSY is often described as a disadvantaged population, we believe the sample is similar enough to the general population for results to generalize.

Measures

We focus on three key educational outcomes: baccalaureate college attendance when respondents were at least 20 years old, attendance at an elite college conditional on having ever attended a baccalaureate college, and bachelor's degree completion within six years of

[2]See Appendix A for calculations and further discussion of the index of dissimilarity.

matriculation, conditional on having ever attended any baccalaureate college. As noted earlier, we classify colleges as elite if they are regarded by Barron's *Profiles of American Colleges* as most, highly, or very competitive. Only 13 percent of our sample and 37 percent of college-attendees attended such a college.[3]

To measure our focal predictors, income and wealth, we take the natural logarithm of a household's five-year average of income and net worth in real 2010 dollars, respectively, during the five years leading up to and including the year the child was 16 years old. We chose to focus on income around this age because it is likely the time when children will be making decisions that influence college attendance.[4] We measure each year's income as the total income in thousands of real 2010 dollars from a detailed roster of sources of income for all household members who are related to the mother either biologically or through marriage.[5] We measure each year's wealth as total net worth, or the difference between assets and debts from a range of sources, also in thousands of real 2010 dollars.[6] We account for families that have either zero or negative average income or wealth by using constant substitution, assigning income and wealth of $500 for respondents falling into this group and including a dummy variable indicating which cases are assigned.[7] Less than 1 percent of respondents have an average income of zero. Considerably more have zero or negative wealth across this period: 13 percent in our college attendance sample and 7 percent in both our elite college and college completion samples.

We measure cognitive skills using the Armed Forces Qualifying Test (AFQT) percentile score, standardized on the age at which respondents took the test. The test was given to all participants in 1980, so we assume that one's position in the relative ranking of cognitive ability has not changed since then.

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[3]We also estimated a model in which we restrict "elite colleges" to only most or highly competitive schools (5 percent of our sample, 12 percent of college attendees). These results, available by request from the first author, are substantively similar to those presented here, although the estimated coefficients are somewhat attenuated.

[4]In addition to considering financial resources in adolescence, we also look at endowments of income and wealth when children were between 1 and 5 years old, to see whether and how timing of resource measurement affects the relationships we observe. The point estimates and degrees of confounding are slightly different depending on when resources are assessed, but the story remains similar for college attendance and college completion, suggesting that these findings are not largely sensitive to the timing of income and wealth measurement. For elite college attendance, however, the differences are more pronounced. Income, in particular, has a weaker tie to elite college attendance in Model 1a than when resources are measured later in life, although wealth's tie is similar in Model 1b regardless of timing. Upon adding both financial resource measures in Model 1, wealth is substantially less confounded by income in the model with earlier resources than with resources in adolescence. Although wealth's association maintains its magnitude in the models using earlier resources, it seems that income absorbs much of wealth's association and matters more for elite college attendance when children are older. This provides further evidence that the flow of income around the time of college attendance may be driving the associations of financial resources with elite college attendance that we observe. Results are available from the first author upon request.

[5]Possible sources of income include wages, salary, tips, unemployment compensation, military income, net business income, net farm income, child support, alimony, AFDC payments, food stamps, supplemental security income, other public assistance or welfare, educational benefits or scholarship, disability or veteran benefits, parental or relative support, inheritance, gifts, rental subsidies, and other income such as interests, rent, or dividends.

[6]Possible sources of assets include the market value of an owned home or apartment; value of financial assets; changes in value of savings; value of stocks and bonds; amount of money in an IRA/Keogh, 401k/403b, or CDs; value of rights to an estate or trust; market value of a vehicle; and value of items over $1,000. Possible sources of debt include amount owed on property or other home debt; debts on farms, businesses, or real estate; money owed on vehicles; and amounts owed over $1,000.

[7]To test the sensitivity of our results to this decision, we also ran our analyses without substituting $500 for families with zero or negative income or wealth. In these models, we created a spline for income and wealth, with variables for the log of the positive values of each and a variable for the log of the absolute value of negative values of wealth. We set the positive income and wealth log variables to zero if the value was zero or negative, and we set the negative wealth log variable to zero if the value was zero or positive. We also added dummy variables distinguishing families with zero income or zero wealth from other families. The results from these models (available from the first author upon request) are similar to those presented here, suggesting that our results are not contingent on this decision.

NLSY provides data on noncognitive skills including mother's locus of control, self-concept, and self-esteem. Our analyses include standardized measures of each of these three scales. The Rotter Locus of Control Scale aims to assess the degree to which individuals feel they have control over their own lives as opposed to the degree to which they feel that chance, fate, or luck controls their lives (Rotter 1966). Items are presented in pairs, and respondents must choose the options with which they more closely agree and specify whether it is much closer or only slightly closer to their own beliefs than the other statement. For instance, one pair asks respondents to choose between "In the long run, people get the respect they deserve in the world" and "Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries." The Pearlin Mastery Scale measures self-concept, assessing how much individuals believe they control forces influencing their lives (Pearlin et al. 1991). [8] Sample items include "I can do just about anything I really set my mind to" and "Sometimes I feel that I am being pushed around by life." Respondents answer on a four-point scale, ranging from "strongly agree" to "strongly disagree." Finally, the Rosenberg Self-Esteem Scale evaluates the degree to which respondents approve or disapprove of themselves (Rosenberg 1965). Items include statements like "I am a person of worth" and "I certainly feel useless at times." As with the Pearlin scale, responses are on a four-point scale ranging from "strongly agree" to "strongly disagree."

Different question batteries were administered at different points in time. The Rotter Locus of Control Scale was given in 1979, the Rosenberg Self-Esteem Scale was given in 1980, and the Pearlin Mastery Test was given in 1992. Both locus of control and self-esteem are measured either before the start of or early in individuals' labor market careers. This temporal ordering supports our assumption that measured skill levels in adolescence are exogenous to income and wealth during adulthood. Self-concept, on the other hand, may be partly endogenous to income, given that it is measured later in life. As our results will show, self-concept contributes little to our findings, so its potential endogeneity to income is a matter of theoretical speculation rather than substantive importance in this paper.

Finally, as discussed earlier, high school grades capture a mix of cognitive and noncognitive skills. Our measure of GPA is the average of all grades in science, math, reading, and social studies from 1981 high school transcripts. We measure mother's educational attainment in years of completed education and highest credential earned. Our nominal measure of education distinguishes among the following categories: less than 12 years, 12 years, 13 to 15 years, 16 years, and more than 16 years of school. We omit the measure of less than 12 years for identification.

We also explore the possibility that children's skills mediate the association between parents' skills and children's outcomes by conditioning on a small set of children's skills we observe. We use standardized measures of children's self-concept and self-esteem to assess children's noncognitive skills. Unlike mothers' noncognitive skills, those of children are measured frequently, so we take the average of the available scores during the years children

[8]The Rotter Locus of Control Scale and the Pearlin Mastery Test ask very similar questions, but because they are not highly correlated enough to seem to measure the same construct, we include both in the model. Change over time may contribute partially to this difference, but using data from High School and Beyond, we find that the two scales are not highly correlated even when assessed in the same year.

were 13 to 16 years old. Our indicator of children's cognitive skills is a child's score on the Peabody Individual Achievement Test (PIAT), standardized on age. Finally, we adjust our models for children's race (Hispanic, black, white) and gender. Table 1 lists the means and standard deviations of each variable in the analyses.

Methods

We estimate three sets of linear probability models to evaluate our hypotheses, one predicting baccalaureate college attendance, another predicting elite college attendance conditional on attending any baccalaureate college, and a third predicting baccalaureate degree completion also conditional on attending any baccalaureate college. We chose to use linear probability models over logistic regression to produce estimates of associations in the metric of probability across multiply imputed datasets. We find probabilities more intuitive than odds ratios, and we confronted technical challenges in our efforts to recover average marginal effects after estimating logistic regression models across our imputed datasets. The distinction between the estimates we produce and average marginal effects across individual imputed datasets is substantively trivial, however. Table 3 shows the results of models predicting college attendance, elite college attendance, and completion of a bachelor's degree.

Models

We begin by estimating two sets of models: one assessing the baseline relationship between parental income and a child's probability of each outcome, and one assessing the baseline relationship between parental wealth and a child's probability of each outcome. We next estimate the models conditional on both resource measures. From here, we add mother's skill measures to estimate the degree to which maternal cognitive and noncognitive skills confound the association of parental income and wealth with children's educational attainment. We then add controls for maternal education, and finally we adjust for children's skills. All models include controls for children's demographic characteristics.

Results

Descriptive Results

Table 2 presents correlations of skills, both within and across generations. As expected, mothers' grades and AFQT scores are highly correlated ($r = .64$). Correlations among other skills are considerably lower but still statistically significant, ranging from .16 (self-concept and GPA) to .33 (self-esteem and AFQT). As for children's skills, self-esteem and self-concept are very highly correlated ($r = .63$), and PIAT score has correlations of .16 and .18 with each of these noncognitive traits, respectively.

Correlations of maternal and child skills vary by skill as well. The highest correlation is between maternal and child cognitive skills ($r = .32$). This falls slightly below the .38 to .43 correlations of parent and child IQs documented by Black, Devereux, and Salvanes (2009) and Bouchard and McGue (1981). Neither mother and child self-esteem nor self-concept are strongly correlated, both around .12. However, measurement error or differences in

measurement instruments might bias these correlations toward zero. Across different skills, child PIAT score has the strongest correlation with all of mothers' noncognitive skills, but the correlations are modest, ranging from .11 to .24.

Baccalaureate college attendance

Our initial model, shown in Table 3, estimates that a 10 percent increase in income is associated with a 1.51 percentage point (.158 × ln(1.10) = 1.51 percentage points)[9] increase in the probability of college attendance (±.19 percentage points). Conditioned on wealth, a comparable increase in income corresponds with a .91 percentage point increase in the probability that a child will attend college (±.27 percentage points). Net of mother's skills, the conditional association between family income and college attendance is attenuated by almost half, with a 10 percent increase in income now predicting only a .48 percentage point increase in the probability of attendance (±.27 percentage points). The inclusion of mother's education attenuates the association even further, such that the conditional effect of a 10 percent increase in income diminishes to only .36 percentage points (±.27 percentage points). The inclusion of children's skills attenuates the association slightly further. Across all the models, estimates of returns to economic resources are statistically significant.

The association of wealth with attendance is smaller than that of income in the first model, which shows that a 10 percent increase in wealth is associated with a .65 percentage point increase in the probability of attendance (±.11 percentage points). Conditioning on income somewhat weakens the relationship to a .42 percentage point increase in the probability that a child attends college (±.13 percentage points). More interestingly, the inclusion of skills attenuates the association between wealth and college attendance less than that of income and college attendance. Net of maternal skills, the estimated association declines by about a quarter to a .29 percentage point increased probability of attendance for a 10 percent increase in wealth (±.13 percentage points). The association retains much of this magnitude when conditioning on mother's education, where a 10 percent increase in income predicts a .27 percentage point increase in the probability of attendance (±.13 percentage points). Including children's skills decreases the estimate to .23 percentage points (±.13 percentage points). As with income, the estimates are statistically significant across all the models. These findings suggest that, although the benefits of both income and wealth are partially attributable to mothers' skills, the benefits associated with income are more strongly confounded by skills than are those associated with wealth. The full set of results for the attendance models are available in Table 1 of the online appendix. We stratify our models by gender but find no statistically significant differences between boys and girls (results not shown but available from the first author upon request).

Elite college attendance

Among respondents who attended college, Table 3 shows that a 10 percent increase in family income corresponds with a 1.16 percentage point increase in the probability of attending an elite college (±.32 percentage points). Conditioning on wealth attenuates the

[9]Note that our discussion focuses on transformations of the coefficients for income and wealth, rather than the coefficients displayed in Table 3. Because we use the natural log of income and wealth, we multiply each coefficient by ln(1.10) to properly reflect the association of a 10 percent increase in financial resources with each of our outcomes.

association to .98 percentage points (±.42 percentage points). Including mother's skills reduces the association by about a fifth to .77 percentage points (±.42 percentage points). This degree of attenuation is considerably smaller than for college attendance, indicating that money itself may be more of a driving factor when it comes to the type of college one attends than it is for whether one attends college at all. Net of mother's educational attainment, a 10 percent increase in income is associated with a .69 percentage point increase in attending an elite college as opposed to a non-elite college (±.42 percentage points). Adding children's skills further attenuates the association. The estimates are statistically significant across all models.

Elite college attendance in general appears to be less closely tied to parental wealth than it is to parental income. We estimate that a 10 percent increase in family wealth is associated with only a .41 percentage point increase in the probability that a child attends an elite college as opposed to a non-elite college (±.17 percentage points). Conditional on income, such an increase in wealth predicts only a .16 percentage point increase in the probability that one attends an elite college (±.21 percentage points). Adding skills, the coefficients drop considerably and are attenuated by nearly half, now predicting a .09 percentage point increase (±.21 percentage points). Mother's educational attainment further attenuates the estimate to .07 (±.21 percentage points). Children's skills ultimately decrease the association to .05 percentage points (±.21 percentage points). Unlike for income, only the unconditional estimate for wealth is statistically significant. Full results from the elite college attendance models are available in Table 2 of the online appendix. As is true for college attendance, differences in the role of economic resources for girls' and boys' postsecondary attendance patterns are not statistically significant (results not shown but available from the first author upon request).

Baccalaureate completion

Among respondents who attended a baccalaureate college, either elite or non-elite, a 10 percent increase in a family's income is associated with a 1.34 percentage point increase in the probability of completing a bachelor's degree (±.46 percentage points; see Table 3). Conditioning on wealth slightly diminishes the association to .71 percentage points (±.59 percentage points). When skills are included, the association is attenuated by about a quarter, dropping to .53 percentage points (±.57 percentage points). Controlling for mother's education further attenuates the estimate, such that a 10 percent increase in income is associated with a .48 percentage point greater probability of completion (±.59 percentage points).

As with college attendance and elite college attendance, wealth has a somewhat weaker association than does income and the confounding effect of skills is less pronounced. Without conditioning on income, a 10 percent increase in wealth is associated with a .67 percentage point rise in the probability that a child completes a bachelor's degree (±.19 percentage points). Net of income, a comparable increase in wealth predicts a .50 percentage point increase in the probability of completion (±.25 percentage points). The magnitude of the direct association between wealth and completion decreases by just over one-fifth when mother's skills are included in the model, so a comparable increase in wealth predicts only

a .39 percentage point increase in the probability of completion (±.25 percentage point). The estimate retains much of this magnitude through the final model. This suggests that skills mediate a smaller portion of the relationship between both income and wealth and college completion than they do for attendance, although skills still account for a notable portion of these effects. Table 3 in the online appendix shows the full set of results from the college completion models. Again, we find no statistically significant differences between boys and girls in the relationship between economic resources and college completion (results not shown but available from the first author upon request).

Estimating a lower bound on the degree of confounding

As we discussed in our introduction and illustrated in Figure 1, the role of maternal education in this process is ambiguous. We privileged maternal skills and treated education as if it were a downstream predictor of children's postsecondary pathways, but maternal skills are to some degree endogenous to maternal schooling prior to our window of observation. Given our data constraints, we have no way of evaluating the extent to which maternal skills are endogenous to maternal education. Instead, we estimated models privileging maternal education over maternal skills to offer a lower bound on the degree to which maternal skills confound the relationship between economic resources and children's postsecondary outcomes. These models parallel Models 1 and 2, as shown in Table 3, but they add controls for mother's education. The modified Model 1 thus includes maternal education in addition to income and wealth (as well as the child characteristics that we include in all our models). The modified Model 2 adds maternal skills to this modified first model.

Table 4 presents estimates of the degree of confounding of the income and wealth coefficients when skills are added in each pair of models. The attenuation of these coefficients with the addition of skills in the focal models, discussed earlier and presented in Table 3, represents the upper bound. The attenuation of these coefficients in the modified Models 1 and 2, where maternal education is added to the model prior to adding skills, represents the lower bound.[10]

If we assume that maternal skills are endogenous to maternal education, we find that 28 percent of the relationship between family income and children's college attendance is attenuated by mother's skills, compared with 47 percent when we do not first condition on mother's education (Table 4). Similarly, 18 percent of the relationship of children's college attendance with family wealth is attenuated with the assumption of full endogeneity, compared with 32 percent in our primary model. In our analyses of elite college, privileging maternal education over maternal skills suggests notably smaller attenuations of the role of financial resources. Under these assumptions, skills attenuate income's relationship with elite college attendance by only 7 percent, compared to 21 percent, and wealth's relationship with attendance by 30 percent as opposed to 47 percent. For college completion, attenuation

[10]These percentages are based on two pairs of models we estimated. The first pair is presented in Table 3, labeled Models 1 and 2. Model 1 does not control for skills; Model 2 does. We calculated the percentages of the effects that are attenuated as follows: percent attenuated = $1 - (\beta_{Model2}/\beta_{Model1})$. Similarly, the second pair of models (available from the first author upon request) mirrors Models 1 and 2, but both include controls for mother's educational attainment. We follow the same procedure to calculate the percent attenuated in this second pair of models.

is again weaker when we assume full endogeneity of skills to education. Mother's skills attenuate 12 percent of the relationship between family income and children's college completion, and 9 percent of the relationship between family wealth and children's college completion, compared with 25 and 21 percent, respectively. These more conservative estimates suggest that even among similarly educated women, maternal skills still confound the relationship between family financial resources and children's educational attainment, particularly with respect to college attendance.

Discussion

Much of the literature on economic stratification in educational outcomes assumes, either implicitly or explicitly, that economic resources influence children's educational attainment through the purchasing power those resources confer on parents (Blanden and Gregg 2004; Conley 2001). If anything, the advantages associated with higher levels of parental economic resources appear to be increasing over time (Bailey and Dynarski 2011; Kornrich and Furstenberg 2013; Reardon 2011). In this paper, we considered the possibility that the relationships of parental income and wealth with children's educational attainment are largely spurious due to the confounding of parental economic resources with the skills parents accrue prior to entering the labor market. Consistent with our hypotheses, we find that mothers' skills in late adolescence account for between approximately 20 and 50 percent of the association of family financial resources with children's college attendance, elite college attendance, and college completion. Even if we assume that mothers' skills are fully endogenous to their educational attainment, between 7 and 30 percent of the association of financial resources with children's postsecondary outcomes is confounded by skills.

The fact that mothers' skills confound the relationship of resources with college attendance, elite college attendance, and completion comes as no surprise. What may be surprising to some is the magnitude of confounding. Given these findings, researchers studying the relationship of families' economic resources with children's educational attainment should be more cautious in making claims about the nature of that association. Our results suggest that the maternal skills we measure, which themselves reflect a modest subset of relevant skills, are related to both parental assets and children's postsecondary outcomes. Observational studies that highlight the magnitude of the relationships between parents' economic resources and children's postsecondary participation and completion appreciably overstate those relationships to the extent that they lack sufficient controls for parental skills. Parents with high endowments of financial resources are not only able to use their money to help their children succeed, but they can use their skills as well. These skills are associated with income and wealth, but the skills themselves may be able to help children succeed beyond the role of money alone.

Differences between income and wealth

Why do maternal skills seem to more strongly attenuate the association of income than the association of wealth with children's postsecondary outcomes? One possibility is that wealth reflects the skills and luck of more distal ancestors rather than parents, whereas income more

closely reflects the productive skills of parents themselves. Adjudicating between inherited and respondent-generated wealth may help identify whose skills were tied to its accumulation. Still, without a truly causal model or a full understanding of where mothers' skills come from, we cannot test these claims. Another possibility is that wealth is simply less accessible than income—for example, much of it is often tied up in home ownership—and thus is less likely to be used for educational expenses. Although Conley (2001) argues that it is fairly easy for parents to take out home equity loans if they need money for tuition, income flows are still likely a preferable source of money for tuition bills. Also, given that wealth is largely concentrated among the wealthiest Americans, money flows from income are likely to be substantially larger than flows from assets for the vast majority of families (Keister and Moller 2000). A comparable percentage increase in income as opposed to wealth may thus have a larger influence on a family's purchasing power.

Whether and where to attend college

Even net of maternal skills, children with more affluent parents are still more likely than children with less economically successful parents to attend elite colleges. The association between income and elite college attendance is also not as strongly confounded with maternal skills as the associations for either attendance at any baccalaureate college or completion of a bachelor's degree. This suggests that although skills do matter, income itself matters more for attending an elite college than it does for attending a baccalaureate college more generally. As for wealth, the association with college type is considerably smaller than with either attendance or completion and, given the small magnitude of the initial association, the percent accounted for by skills is larger. The variation in the degree of attenuation across types of colleges may be tied to real or perceived differences in tuition at elite versus non-elite colleges. Because income is more easily accessible than wealth, this may also explain the larger role it plays in distinguishing between the types of colleges students attend.

Still, our results do not necessarily suggest that it is the purchasing power of parental income that drives its conditional association with elite college attendance. More affluent parents or their children may have a stronger taste for elite college than do people who are less financially advantaged. Affluent families may also have easier access to information about elite colleges from network contacts or relatives, or may be less averse to encouraging their children to attend residential colleges some distance from home. Although we cannot speak to *why* income matters, income seems to matter more for elite college attendance and to be less confounded with maternal skills than is the case for college attendance more generally or for college completion.

Differences between college attendance and completion

The associations of income and wealth with children's outcomes are relatively similar in the baseline attendance and baseline completion models, but skills have less of a confounding effect on resources for completion than they do for attendance. Although we can neither test this mechanism nor rule out others, this may be due to the fact that children assume more agency in the processes leading to college completion than to those leading to college entry. Upon attending college, children become more independent from their parents, both

physically and socially. They may not have as ready access to the parental skills that had previously given them an advantage (Lareau 2011). Mothers may step in to help children early in their school careers, but much less can be done when children no longer live at home: unlike grade school teachers, professors are not as likely to respond to worried parents (cf. Hamilton 2016). However, children typically continue benefitting from their parents' financial resources while attending college. Alternatively, children may have already realized much of the benefit of mothers' skills by the time they begin college, so the confounding effect is less pronounced at this phase of life.

Limitations of observing only (some) maternal skills

To an unknown degree, data constraints may lead us to understate the confounding role of parental skills in the association between economic resources and postsecondary outcomes. First, we observe a small but important subset of maternal skills, and we observe those skills with some unknown degree of error. We have more confidence in our measure of general cognitive skill (AFQT) than we do in our measures of noncognitive skills. We would prefer to have measures of additional skills and traits, including, at a minimum, attributes like conscientiousness, self-control, and motivation. To the extent that omitted skills and errors in measures of observed skills are correlated with students' postsecondary outcomes and maternal income, we understate the degree of confounding with these data.

Second, we do not observe fathers' skills, so we must rely on mothers' skills to proxy both parents' skills. Although the literature on educational homogamy is well-developed (Schwartz 2013), we are not aware of many studies of correlations between maternal and paternal skills. The few studies we have found report correlations between .20 and .45 in couples' cognitive ability, and correlations of personality traits range from .07 to .24 (Mascie-Taylor 1989; Mascie-Taylor and Vandenberg 1988; Watson et al. 2004). These estimates, however, are largely based on small samples drawn from non-representative populations. To the extent that (1) paternal skills matter in the same ways as maternal skills and (2) paternal and maternal skills are weakly correlated, we understate the confounding of resources and postsecondary attainment relationships due to parental skills.

Conclusions

Our results suggest that the apparent relationship of parental financial resources with children's outcomes is due, in large part, although certainly not entirely, to mothers' skills rather than purchasing power per se. The subset of maternal skills we observe when mothers were young adults accounts for about 20 to 50 percent of the association between household financial resources and children's postsecondary outcomes. Under the assumption that a mother's skills are fully endogenous to her educational attainment, skills still account for 7 to 30 percent of the association. The advantages of income, in particular, seem to be substantially driven by mothers' skills, most notably in the case of college attendance.

Studies using experimental and quasi-experimental designs have helped identify the causal effects of financial resources on children's educational outcomes, but they have focused, perhaps appropriately, on the impacts of transfers to families at the lower end of the economic distribution. Social scientists typically rely on nonexperimental data to evaluate

the relationships between parental economic resources and children's outcomes, and they are often interested in the influence of economic resources for children's educational trajectories across the population, not only children whose parents have limited means. Our findings provide a cautionary note for studies that are not able to condition on parental skills: researchers trying to understand the pathway from parents' resources to children's educational outcomes should be cognizant of skills and other parental characteristics that contribute directly to both economic resources and children's outcomes.

Skills are an important confounder in the relationship between economic resources and college attendance in general, but skills play much less of a confounding role in the relationship between economic resources and *elite* college attendance among attendees. If the dispersion in economic resources or maternal skills differed across outcomes, the lack of attenuation could simply be mechanical, but the descriptive statistics shown in Table 1 suggest this is not the case. Standard deviations of maternal skills change little across samples, and the standard deviation of economic resources declines by less than 10 percent conditional on baccalaureate attendance. A second possibility is that the purchasing power of money—through consumption during primary and secondary school years, or paying the tuition, fees, and housing expenses associated with attending elite schools that are usually further from home—may account for the association between economic resources and elite college attendance. Alternatively, the apparent advantages associated with money could reflect variation in the taste for elite education across the income and wealth distributions. Although we cannot test specific mechanisms or adjudicate between these possible pathways, our findings suggest that when differentiating along the lines of college type, the story looks different than when we consider only attendance. Barriers to entering elite colleges are inherently higher, both in terms of the monetary requirements for tuition and the information requirements for gaining admission.

We want to be very clear: we are not arguing that money itself does not matter for children's postsecondary outcomes. It likely does. Instead, we wish to highlight the degree to which the skills that parents have, skills that likely helped them generate their financial resources, confound the observed associations of financial resources with their children's educational outcomes. Our findings are consistent with previous studies, including Mayer (1997) and Jacob and colleagues (2014), suggesting that financial resources are only partially responsible for disparities in children's outcomes. In fact, the advantages well-off children enjoy may have as much to do with their parents' skills as they do with their parents' economic resources. To the extent that qualities beyond financial resources themselves allow affluent parents to help their children on the path to and through college, financially disadvantaged children will also need access to resources beyond money alone to help equalize outcomes.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Appendix A: Index of Dissimilarity

To calculate the index of dissimilarity, we use the Centers for Disease Control and Prevention's data on age of mother at first birth for all races in 1970 to 1990, the years during which children in our sample were born. We compare this with mother's age at first birth in our analytic sample from CNLSY. We use the following equation to calculate the index: $I_D = .5 \times \Sigma|\text{Proportion}_{CDC} - \text{Proportion}_{CNLSY}|$. The estimate refers to the percent of individuals that would need to be in a different age group for the age distributions to look identical. Table 1 in Appendix A shows calculations for our college attendance sample.

Appendix A Table 1

Index of Dissimilarity calculating differences in mothers' ages at first birth between NLSY and the CDC's national statistics

	NLSY	CDC	Index of dissimilarity
10–14	0.000	0.008	0.007
15–19	0.120	0.277	0.157
20–24	0.352	0.359	0.006
25–29	0.409	0.242	0.167
30–34	0.119	0.089	0.030
		I_D	18.4%

Source: National Longitudinal Survey of Youth 1979 cohort, NLSY79 Children and Young Adults, and Centers for Disease Control and Prevention. The NLSY sample is restricted to respondents at least 20 years old in 2010 with no missing data on college attendance.

Note: NLSY estimates are weighted using child weights.

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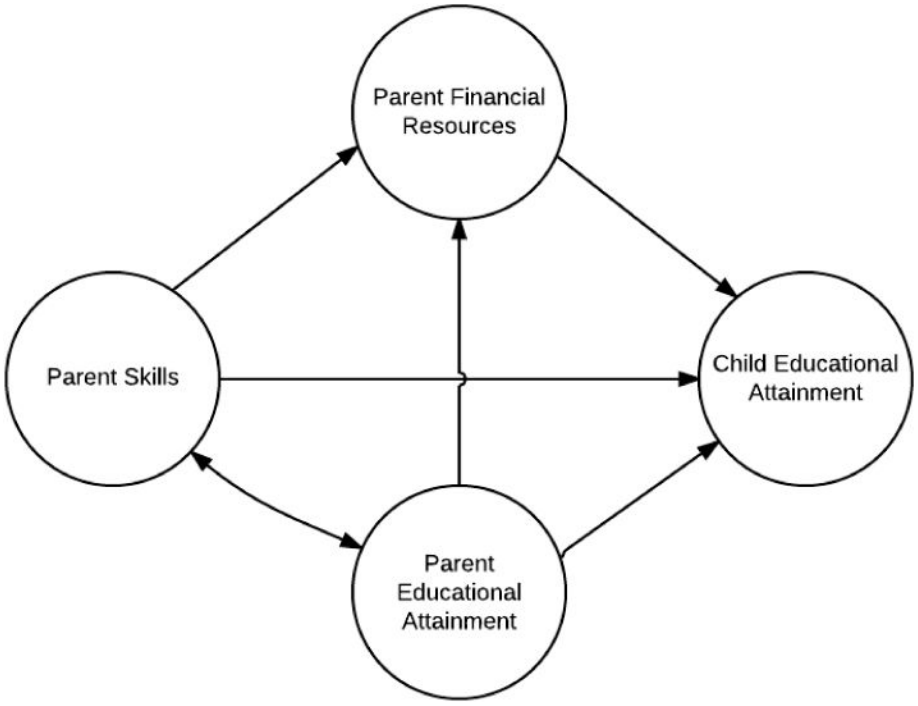

Figure 1.

Conceptual Model of the relationships among parents' skills, parents' educational attainment, parents' financial resources, and children's educational attainment

Table 1

Means and standard deviations of outcome variables and covariates for each analytic sample

	College Attendance		Elite College | Attendance		Completion | Attendance	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
Outcome Variable	48.57%		36.97%		69.22%	
Financial Resources						
Log of income	3.91	0.93	4.22	0.86	4.20	0.84
Income <= 0	0.42%		0.26%		0.23%	
Log of wealth	3.44	2.41	4.22	2.19	4.21	2.15
Wealth <=0	12.74%		6.98%		7.28%	
Mother's Skills						
High School GPA	2.27	0.89	2.58	0.83	2.58	0.84
Standardized AFQT score	0.37	1.04	0.76	1.03	0.72	1.02
Standardized Self-concept	0.12	0.98	0.28	0.96	0.28	0.95
Standardized Self-esteem	0.13	1.00	0.35	0.99	0.35	0.99
Standardized Locus of control	0.11	1.02	0.31	1.04	0.32	1.02
Mother's Educational Attainment						
Years of Education	13.51	2.45	14.36	2.52	14.35	2.49
Less than High School	10.69%		4.42%		4.75%	
High School	33.73%		27.97%		27.09%	
Some College	33.19%		31.65%		33.18%	
College	12.09%		18.28%		18.21%	
More than College	10.29%		17.68%		16.77%	
Child's Skills						
Standardized PIAT score	0.21	0.98	0.42	0.96	0.51	0.95
Standardized Self-esteem	−0.03	0.98	0.10	0.99	0.20	0.96
Standardized Self-concept	0.01	0.98	0.15	0.97	0.22	0.97
Race						
Not Black, Not Hispanic	69.81%		77.43%		78.24%	
Hispanic	8.76%		6.11%		5.90%	
Black	21.42%		16.47%		15.86%	

	College Attendance		Elite College | Attendance		Completion | Attendance	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
Male	47.80%		48.19%		45.31%	
N	4,162		1,710		1,023	

Source: National Longitudinal Survey of Youth 1979 cohort and NLSY79 Children and Young Adults. All samples are restricted to respondents at least 20 years old in 2010 with no missing data on the outcome variables. Other missing values are imputed using multiple imputation with chained equations. The elite college attendance sample is restricted to respondents who reported any college attendance. The college completion sample is restricted to respondents who reported any college attendance as well, but it also excludes respondents who were still enrolled between 2006 and 2010 and had not yet reported degree completion by 2010.

Note: Data are weighted using child weights.

Table 2

Correlations of skills within and across generations

		Mother Skills					Child Skills		
		GPA	**AFQT**	**Self-concept**	**Self-esteem**	**Locus of control**	**PIAT**	**Self-concept**	**Self-esteem**
	GPA	1							
	AFQT	0.64**	1						
Mother	Self-concept	0.16**	0.25**	1					
	Self-esteem	0.28**	0.33**	0.32**	1				
	Locus of control	0.23**	0.29**	0.21**	0.31**	1			
	PIAT	0.24**	0.32**	0.12**	0.19**	0.11**	1		
Child	Self-concept	0.10**	0.09**	0.12**	0.12**	0.08**	0.18**	1	
	Self-esteem	0.05**	0.04**	0.08**	0.12**	0.05**	0.16**	0.63**	1

Source: National Longitudinal Survey of Youth 1979 cohort and NLSY79 Children and Young Adults. Sample is restricted to respondents at least 20 years old in 2010 with no missing data on college attendance. Other missing values are imputed using multiple imputation with chained equations.

Note: Data are weighted using child weights.

+ $p < .1$;

* $p < .05$;

** $p < .01$

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Table 3

Linear probability models predicting college attendance, elite college attendance conditional on any college attendance, and college completion conditional on any college attendance

	Model 1a	Model 1b	Model 1	Model 2	Model 3	Model 4
	Income only	Wealth only	Income and Wealth	Model 1 + Mom's Skills	Model 2 + Mom's Education	Model 3 + Child's Skills
College Attendance						
Financial Resources						
Log of income	0.158**		0.095**	0.050**	0.038**	0.033*
	(0.010)		(0.014)	(0.014)	(0.014)	(0.015)
Log of wealth		0.068**	0.044**	0.030**	0.028**	0.024**
		(0.006)	(0.007)	(0.007)	(0.007)	(0.007)
Observations	4,162	4,162	4,162	4,162	4,162	4,162
Elite College Attendance | Any College Attendance						
Financial Resources						
Log of income	0.122**		0.103**	0.081**	0.072**	0.070**
	(0.017)		(0.022)	(0.022)	(0.022)	(0.022)
Log of wealth		0.043**	0.017	0.009	0.007	0.005
		(0.009)	(0.011)	(0.011)	(0.011)	(0.011)
Observations	1,710	1,710	1,710	1,710	1,710	1,710
Bachelor's Degree Completion | Any College Attendance						
Financial Resources						
Log of income	0.141**		0.075*	0.056+	0.050	0.051+
	(0.024)		(0.031)	(0.030)	(0.031)	(0.030)
Log of wealth		0.070**	0.052**	0.041**	0.039**	0.040**
		(0.010)	(0.013)	(0.013)	(0.013)	(0.012)
Observations	1,023	1,023	1,023	1,023	1,023	1,023

Source: National Longitudinal Survey of Youth 1979 cohort and NLSY79 Children and Young Adults. All samples are restricted to respondents at least 20 years old in 2010 with no missing data on the outcome variables. Other missing values are imputed using multiple imputation with chained equations. The elite college attendance sample is restricted to respondents who reported any college attendance. The college completion sample is restricted to respondents who reported any college attendance as well, but it also excludes those who were still enrolled between 2006 and 2010 and had not yet reported degree completion by 2010.

Note: All models include child demographic traits and use child weights. Full results are available in the Online Appendix. Data are weighted using child weights. Robust standard errors are in parentheses.

$^{+}p < .1$;

$^{*}p < .05$;

$^{**}p < .01$

Table 4

Differences in attenuation from Model 1 to Model 2 under different assumptions

	Attendance		Elite college | Attendance		Completion | Attendance	
	Upper Bound: Skills first	**Lower Bound: Education first**	**Upper Bound: Skills first**	**Lower Bound: Education first**	**Upper Bound: Skills first**	**Lower Bound: Education first**
Log of income	47.4%	28.3%	21.4%	6.5%	25.3%	12.3%
Log of wealth	31.8%	17.6%	47.1%	30.0%	21.2%	9.3%

Source: National Longitudinal Survey of Youth 1979 cohort and NLSY79 Children and Young Adults. All samples are restricted to respondents at least 20 years old in 2010 with no missing data on the outcome variables. Other missing values are imputed using multiple imputation with chained equations. The elite college attendance sample is restricted to respondents who reported any college attendance. The college completion sample is restricted to respondents who reported any college attendance as well, but it also excludes those who were still enrolled between 2006 and 2010 and had not yet reported degree completion by 2010.

Note: Upper bound Model 1 includes measures of income, wealth, and child demographic traits. Lower bound Model 1 includes measures of maternal education in addition to income, wealth, and child demographic traits. Model 2 for both the upper and lower bound estimates adds maternal skills to the respective Model 1. Full Results are available from the first author upon request. Data are weighted using child weights.