DISCUSSION PAPER SERIES

Educational Inequality and the Returns to Skills

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August 2013

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ABSTRACT

Educational Inequality and the Returns to Skills[*]

Research and policy discussion about the diverging fortunes of children from advantaged and disadvantaged households have focused on the skill disparities between these children – how they might arise and how they might be remediated. Analysis of data from the National Longitudinal Study of Adolescent Health reveals another important mechanism in the determinants of educational attainment – differential returns to skills for children in different circumstances. Though the returns to cognitive ability are generally consistent across family background groups, personality traits have very different effects on educational attainment for young men and women with access to different levels of parental resources. These results are consistent with a model in which the provision of focused effort in school is complementary with parental inputs while openness, associated with imagination and exploration, is a substitute for information provision by educated parents and thus contributes to resilience in low-resource environments. In designing interventions to improve outcomes for disadvantaged children, we need to be cognizant of interactions between a child's skills and their circumstances.

JEL Classification: I24, J24

Keywords: education, inequality, noncognitive skills

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1. Introduction

  Income inequality has been rising in the United States since at least the late 1970s (Gottschalk and Danziger, 2005; Piketty and Saez, 2003). There is also accumulating evidence that intergenerational economic mobility has decreased and fallen behind mobility levels in other developed countries (Corak, Curtis and Phipps, 2011; Long and Ferrie, 2013). This increase in the intergenerational persistence of economic status is mirrored in widening disparities in educational attainment: the gaps in both college entrance and college completion rates by family income level have risen from cohorts born in the early 1960s to those born around 1980 (Bailey and Dynarski, 2011). Education is a key mechanism by which economic privilege is passed down from parents to children and understanding the sources of inequality in educational attainment is important for designing policies that foster equality of opportunity.

  Most discussions of educational inequality focus on the skill deficits that youth from low income households bring to school, the sources of these deficits, and the possibility for interventions that can prevent or remediate inherited skill inequalities. There is increasing emphasis on the multidimensionality of these productive skills and capabilities, and recognition that success in school and in later life depend not just on cognitive abilities, but also on other traits that may run in families, such as physical and mental health, social skills, and personality (Heckman, 2008). Existing interventions and curricula that target achievement gaps tend to focus specifically on the development of persistence, self-control, and conscientiousness (U.S. Department of Education, 2013).

  A question that has received little attention in studies of education is whether there are important interactions between family background and skills; that is, whether individuals from advantaged and disadvantaged backgrounds experience the same payoffs to skills and traits associated with educational success.[1] The principal contribution of this paper is to show that skill-environment interactions in the returns to individual traits are substantively important. Some skills appear to be complementary with family resources while other traits act as substitutes, contributing to resilience for children from disadvantaged family backgrounds. In particular conscientiousness is not strongly associated with resilience, particularly for young men in low-resource environments, and this may have important implications for the design of policies addressing educational inequality.

  I examine the relationship between cognitive and noncognitive skills and educational attainment in a recent cohort of young American men and women, allowing for variation in the returns to these traits by family background. Personality traits, which are stable and reliable indicators of individual differences in response to life situations, provide the measures of noncognitive skills (Almlund, Duckworth, Heckman, and Kautz, 2011). Ordered logit models of educational attainment using the National Longitudinal Study of Adolescent Health (Add Health) show that personality traits, as well as cognitive ability, have distinct and substantial impacts on the educational attainment of the Add Health respondents. The returns to personality traits vary by family background, as measured by mother's education and family structure. Conscientiousness, which has been linked in past research to school success, has no significant impact on the education levels of disadvantaged men, while openness to experience is an important determinant of educational attainment for less-advantaged men and women. Some of the effect sizes are large: a one-standard deviation increase in openness increases the probability that students with less-educated mothers will achieve a higher level of education by 30 to 40 percent. In race-specific models of educational

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[1] A small number of studies of the effect of cognitive and noncognitive skills on earnings find that noncognitive skills matter more for earnings at the lower end of the earnings distribution (Lindqvist and Vestman, 2011; Duckworth et al., 2012).

attainment, being black acts as an additional dimension of disadvantage, reducing the payoff to conscientiousness and increasing the returns to openness. Variations in school quality and interactions between personality and cognitive ability do not appear to be important drivers of the relationship between family background and the returns to conscientiousness and openness.

A simple model of schooling choices is developed in which personality traits influence the costs of focused effort (conscientiousness) and information acquisition (openness), and in which parental inputs can either be complements with or substitutes for student inputs. In this model, students with identical skills who are in different situations, or who have access to different levels of parental resources, will have different educational outcomes. The predictions of this model are consistent with the pattern of returns that we observe if more educated parents are able to provide information which substitutes for the exploration and information acquisition of their children, and an orderly environment that enhances the returns to student conscientiousness.

The most important implication of these findings is that the returns to skills vary—some appear to be complementary with parental resources while others act as substitutes and allow students from relatively disadvantaged homes to achieve high levels of education. In particular, the qualities that promote resilience under the circumstances faced by recent cohorts of young Americans such as the Add Health respondents are not those that are associated with orderly, focused effort, but rather those traits that foster imagination and exploration. Openness to experience has been linked in the personality literature to geographic and relationship mobility and also seems to facilitate the crossing of educational boundaries. If college attendance is the default path for children with high-income, well-educated parents, then staying on that path may require only stability and persistence. For children of less-educated parents, on the other hand, breaking new educational ground appears to call on traits characteristic of migrants and explorers.

More research examining the mechanisms behind these relationships is necessary, but the Add Health results suggest that programs fostering behaviors related to conscientiousness may have limited educational payoffs for young men in low-resource environments. Improving these environments, or encouraging the exploration and imagination characteristic of those with high openness to experience, may be possible keys to success. In designing policies to assist disadvantaged children, we need to be cognizant of interactions between a child's circumstances and their skills. The particular qualities that help to make children resilient in low-resource environments may not be the same as those we associate with thriving in families of higher socio-economic status.

2. Family Background and Educational Inequality

Studies of intergenerational economic mobility examine the effect of socioeconomic advantage in the family of origin on adult outcomes such as education and income. Standard indicators of family background are parental education, father's occupational status, and income (preferably a longer-term average that can proxy "permanent" income as in Solon (1992)). A socioeconomic gradient in educational attainment among a recent cohort of young Americans is apparent in the latest wave of data from the National Longitudinal Study of Adolescent Health (Add Health).[2] The Add Health study began in 1994-95

with a nationally-representative, school-based survey of more than 90,000 students in grades 7 through 12. About 20,000 respondents were followed in subsequent surveys, the last of which (Wave IV) was conducted in 2007-08 when the respondents were between 24 and 32 years of age. At this point most, though not all, of these young men and women will have completed their formal education. The analyses that follow use a subsample of 6,709 women and 5,927 men for whom all key variables are non-missing.[3]

Figures 1a and 1b show substantial gaps in college attendance and college completion rates between men and women whose mothers had high levels of education (some college or more) vs. low (high school or less). Mother's education is a very simple measure of family background, but it is strongly correlated with father's education and with family income and has the advantage of being available for almost everyone in the sample.[4] Among men whose mothers had at least some college education, nearly 42 percent completed a four-year college degree and less than 23 percent possessed only a high school diploma or less by Wave IV. Men with less-educated mothers, in contrast, had college completion rates of only 18 percent, and nearly half achieved no more than a high school degree. Overall educational attainment for women in this cohort is substantially higher than that of men, but the same discrepancies by mother's education are apparent: only 24 percent of women with less-educated mothers completed college versus 54 percent of more advantaged women.[5]
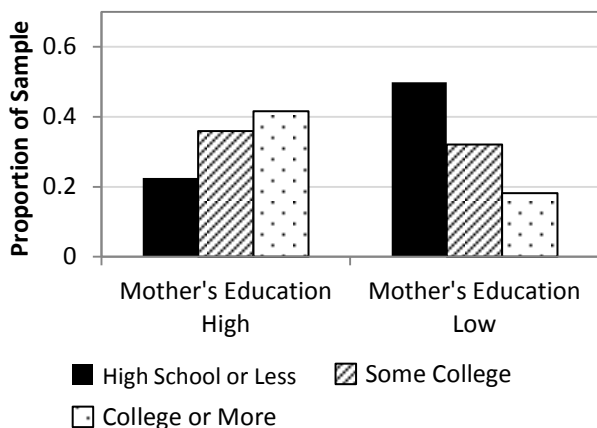
Figure 1a: Men's Educational Attainment, by Mother's Education

[3] Summary statistics for these samples are provided in Appendix Table A-1.

[4] Father's education, a better indicator of household income if the father is present in the household, is not available for a substantial proportion of the sample (including many of the 45 percent of the sample who were not living with both biological parents at Wave I). Household income is available only for a single year in the Wave I survey, making it a poor indicator of permanent income.

[5] As a comparison, 2011 Current Population Survey data shows 37 percent of women aged 25 to 34 with at least a 4-year college degree, and 29 percent of men.
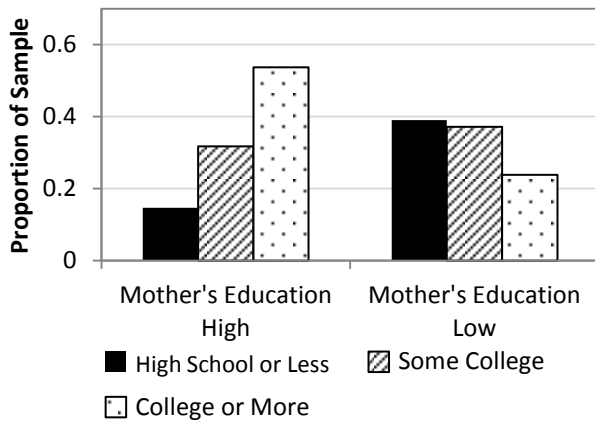
Figure 1b: Women's Educational Attainment, by Mother's Education

A more comprehensive measure of socioeconomic status can be defined by combining mother's educational attainment (some college or more vs. high school or less) with an indicator for whether the respondent lived with both biological parents at Wave I of the survey. Group 1, with high maternal education and residence with both biological parents, is the most advantaged, and Group 4, with low maternal education and non-residence with both biological parents, is the least advantaged. Group 2 includes respondents with high maternal education who did not live with both parents at Wave I, and Group 3 is defined by low maternal education and Wave I residence with both biological parents. This measure of SES status can be expected to be strongly correlated with household permanent income and with family stability throughout childhood—two key determinants of the material and emotional resources available to children. Figures 2a and 2b show a clear SES gradient in educational attainment for both men and women. Average educational attainment by Wave I family income quintile (not reported here) is almost identical to the pattern by SES group.[6]
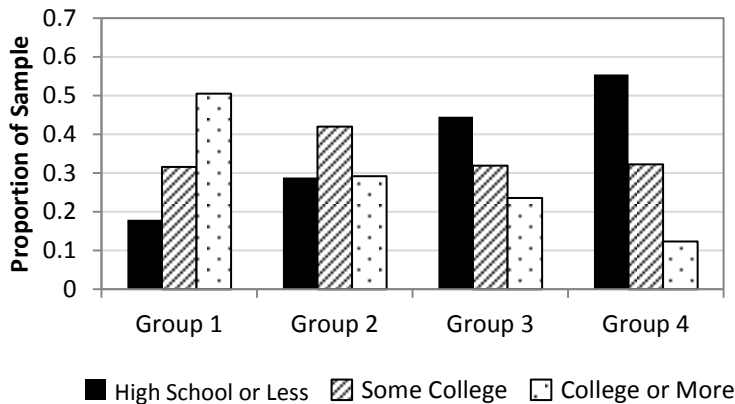
Figure 2a: Men's Educational Attainment, by SES Group (Group 1=high, Group 4=low)

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[6] Since only a single annual observation for family income is available at Wave I, this is likely to be a very error-ridden measure of household permanent income.
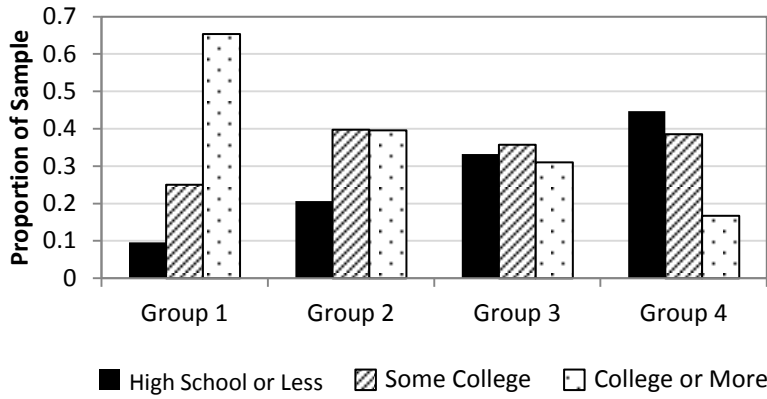
Figure 2b: Women's Educational Attainment, by SES Group (Group 1=high, Group 4=low)

3. Family Background and Skills

The educational inequality across family background groups that we find in the Add Health cohorts is consistent with a large literature on intergenerational mobility that has documented a strong (and possibly increasing) correlation between the earnings and education of parents and their children (Black and Devereux, 2011). In the standard economic model of educational attainment (in Becker's 1967 Woytinsky lecture, for example) family background influences the acquisition of human capital in two ways--through parental effects on individual capabilities (and thus the marginal return or demand for education), and through the impact of family resources on the marginal cost of financing education (the supply of investment funds). The likelihood that opportunities and capabilities in education decisions are positively correlated implies a distribution of education (and income) that is more unequal than in a world free of inherited advantage and disadvantage.

High-income parents can make direct investments in the earnings capacity of their children by purchasing high-quality education, providing jobs or job connections, or making business loans. Recent evidence shows that money does matter-- increases in family income or the relaxation of credit constraints, particularly early in life, affect child development and later educational attainment.[7] Belley and Lochner (2007) finds that the increasing association between family income and education appears to be attributable to the increased importance of borrowing constraints in limiting access to higher education.

Most research, however, has focused on another important pathway from parental achievement to child achievement -- the heritability of IQ and other traits that enhance productivity, such as persistence and social skills. This inheritance can be transmitted genetically or through a child-rearing environment in which parents can pass on skills and behavioral tendencies through training or example. One underpinning of the SES differences in educational attainment in the Add Health sample is likely to be the relationship between the cognitive and 'noncognitive' skills of parents and children.

Measures related to cognitive ability, such as IQ scores and academic achievement tests, are strongly predictive of educational attainment and also, both directly and indirectly, labor market outcomes such as wages (Cawley, Heckman, and Vytlacil, 2001; Gottfredson, 2008). However, economists' concept

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[7] See the references in Caucutt and Lochner (2012).

of productivity-enhancing 'skills' is becoming increasingly multi-dimensional as a growing body of research shows that individual traits other than cognitive ability, verbal and math skills are associated with key economic outcomes (Heckman, 2000). Perseverance, self-esteem, social competence and self-control can contribute to economic success through an individual's ability to interact effectively with others, to plan ahead and to behave in a controlled and purposeful manner. Collectively, these traits have been given a variety of labels, including noncognitive skills, socio-emotional traits, socio-behavioral skills, and soft skills. These characteristics have been found to be important contributors to achievement gaps,[8] and one study finds that noncognitive and cognitive skills are equally important in the determination of a variety of economic and social outcomes (Heckman, Stixrud, and Urzua, 2006).

Large socioeconomic status gaps in behavioral and social skills are present when children enter school, and these gaps tend to persist or to grow larger with age (Duncan and Magnuson, 2011). Heckman and his collaborators have emphasized the importance of noncognitive skills for the construction of economic inequality and have argued that early interventions that enhance such skills for disadvantaged children (such as the Perry Preschool) could have substantial social payoffs, relative to later remedial education and training (Heckman and Kautz, 2012; Heckman and Masterov, 2007).

Despite the growing evidence that the socio-emotional and other noncognitive traits are important determinants of economic outcomes, we currently know little about how to consistently and reliably measure such traits, or about the extent to which specific traits can be regarded as 'skills' in the sense that they are productive in all contexts.[9] In practical terms, the indicators of noncognitive skills that have been used in empirical studies have often been measures of convenience ranging from actual behaviors, such as the parent and teacher reports of externalizing and internalizing behavior by young children and the criminal actions of teenagers and adults, to self-reports that reflect an individual's sense of mastery, self-esteem, or experiences of depression and anxiety. However, positive beliefs and emotional states are linked to good economic outcomes in complex ways in which causality is likely to be bi-directional. The use of observed behaviors as measures of skill is particularly problematic from an economic point of view, since behaviors inevitably reflect both an individual's traits and his or her situation (or constraints).

One promising entry in the long list of identified noncognitive skill measures is the personality inventory, developed by psychologists as a reliable and consistent indicator of individual differences in behavioral tendencies. Psychological studies have found that personality traits are extremely stable across the adult lifespan, and that there are strong associations between personality and a broad range of behaviors and economic and social outcomes, including health and mortality, income, and relationship quality and stability (Roberts et al., 2007). Personality inventories are now available in several large, population-representative longitudinal surveys and economists are beginning to study personality traits as drivers of wages, wealth, and occupational choice.[10]

Personality inventories measure individual variation in "the relatively enduring patterns of thoughts, feelings, and behaviors that reflect the tendency to respond in certain ways under certain circumstances"

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[8] Heckman and Rubinstein (2001), for example, argue that the low returns to graduate equivalency diplomas (GEDs) in the United States is due to a deficit in noncognitive skills among GED-holders, as reflected in the higher prevalence of behaviors such as drug use, fighting, and shoplifting among this group. Other studies have shown that one apparent source of the gender gap in school success is the discrepancy between boys and girls in social skills and impulse control at school entry (DiPrete and Jennings, 2012; Bertrand and Pan, 2013).

[9] Another measurement issue concerns interactions between traits. For example, personality traits can explain a substantial portion of variance on achievement test scores (Duckworth et al., 2010 and Borghans, Golsteyn, and Heckman, 2010).

[10] See the literature survey in Lundberg (2012).

(Roberts, 2009). Five-factor models of personality have been constructed using a lexical approach, i.e. assuming that all relevant domains of individual personality are reflected in the words that are used to describe people. The variant known as the "Big 5" model, consisting of openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism, is broadly accepted in psychology as a meaningful and consistent construct for describing human differences (Goldberg, 1981). Cross-cultural studies have replicated five-factor structures for personality across languages and cultures, leading to a wide-spread conviction that the five-factor model is universal, and even biologically based (Bouchard and Loehlin, 2001; McCrae and Costa, 1997, Yamagata et al., 2006).[11] Similar and consistent personality structures have even been identified among non-human primates (Freemand and Gosling, 2010; Freeman et al., 2013). The five factors, with their definitions from the American Psychological Association Dictionary (2007), are:

Openness to Experience (Intellect) - The tendency to be open to new aesthetic, cultural, or intellectual experiences.
Conscientiousness - The tendency to be organized, responsible, and hardworking.
Extraversion - An orientation of one's interests and energies toward the outer world of people and things rather than the inner world of subjective experience; characterized by positive affect and sociability.
Agreeableness - The tendency to act in a cooperative, unselfish manner.
Neuroticism (vs. Emotional Stability) - A chronic level of emotional instability and proneness to psychological distress.

The relationship between personality and education has not received as much attention from economists as have personality effects on earnings and other labor market outcomes.[12] The study of personality originated as an attempt to understand why some highly-intelligent individuals perform well in school and in later life, while others do not. Pioneers in the development of IQ tests, such as Binet and Terman, were aware of the significance of qualities other than cognitive ability in determining success, and identified the key features of this dimension of 'character' as perseverance and attentiveness—aspects of the Big 5 trait, conscientiousness.[13] Almlund et al. (2011) include measures of fluid and crystallized intelligence in a model of educational attainment in Germany and find that, conditional on cognitive ability, conscientiousness is positively associated, and neuroticism negatively associated, with education. More generally, a large literature in psychology and education finds that conscientiousness and behaviors related to conscientiousness, such as persistence and self-control, are strongly predictive of grades in school, and other measures of educational success.

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[11] However, most studies have been based on populations in literate, industrialized societies. A study by Gurven, von Rueden, Massenkoff, Kaplan, and Vie (2013) failed to replicate a five-factor model in a largely illiterate community of forager-horticulturalists in Bolivia, but instead find evidence of two principal factors: prosociality and industriousness. They also provide an excellent review of the cross-cultural personality literature and evolutionary speculation about sources of variation in personality structures.

[12] Though Nandi and Nicoletti (2009) decompose the routes through which personality traits can influence earnings, including educational attainment and occupational choice, they find that, while the positive effect of openness is completely explained by effects on education and occupation, the effects of extraversion, neuroticism, and agreeableness on earnings are not.

[13] Almlund et al. (2011) provide an extended discussion of the history of personality psychology and its connections with the study of intelligence and the development of the IQ test (p 10).

4. Data and Measures

The Add Health study is unusual in the richness of the data it provides on a recent cohort of young adults. The key independent variables in the empirical models of educational attainment are a measure of cognitive ability, personality traits as indicators of some aspects of noncognitive skills, and a measure of risk aversion.

Personality: During Wave IV, when the respondents were 24 to 32 years of age, the Add Health survey fielded a 20-item short-form version of the 50-item International Personality Item Pool-Five-Factor Model (IPIP-FFM) known as the Mini-IPIP. This instrument is discussed, and the specific items listed, in the Data Appendix. We assume that each item in the personality inventory is a noisy measure of a single unobserved latent trait. An individual *i* is characterized by a set of five personality traits T_{ij}, and their responses to the *K* survey questions generate:

$$t_{ijk} = \beta_{jk} T_{ij} + \varepsilon_{ijk} \qquad \text{for } k\text{=1,...,}K_j \text{ and } j\text{=1,...,5}$$

with measurement errors that are assumed to be independent of each other and of the personality trait T_j. K_j is equal to four for each trait in the Mini-IPIP instrument. Factor analysis of the items for each trait produces estimates of the β parameters as factor loadings, and in each case a single-factor model is supported by the data. We then use the factor loadings and error variances from each model to estimate factor scores that are unbiased estimates of each latent personality trait.

Figures 3a and 3b show the mean values of standardized personality traits for men and women in different SES groups defined by mother's education and whether the respondent lived with both biological parents in Wave I. The relationship between personality and SES varies by trait, with neuroticism strongly correlated with both mother's education and family structure and openness to experience positively associated with mother's education. Agreeableness is positively associated with family advantage for men, and more strongly so for women, but conscientiousness and extraversion have no significant SES gradient.[14] There are also pronounced (and well-known) gender gaps in the mean values of some personality traits—men are less agreeable, more open to experience, and more emotionally stable on average than women.

y-axis: Personality Score, Standardized (0.5 to -0.5)
x-axis: Group 1, Group 2, Group 3, Group 4

Legend: ■ Agreeableness, ▨ Emotional Stability, ▨ Conscientiousness, ▥ Extraversion, ▢ Openness

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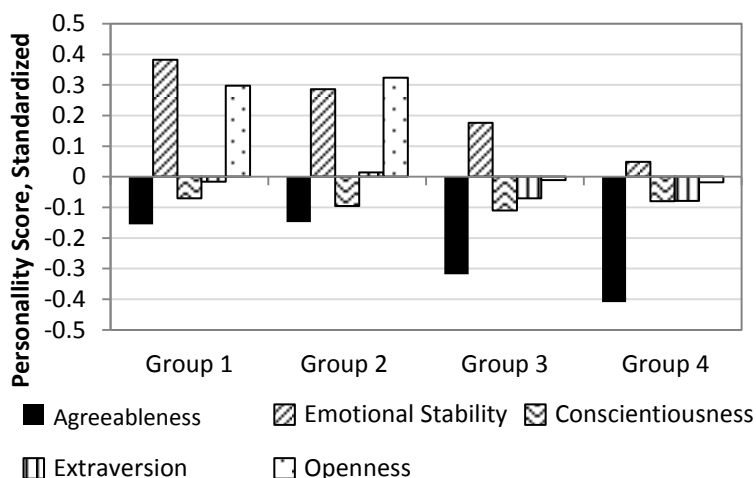
[14] In general, the SES gradients in personality will contribute to the intergenerational transmission of inequality. Neuroticism, which is more prevalent among men and women from disadvantaged households, is a consistent predictor of low earnings. Agreeableness also tends to be associated with low earnings, especially for women, but this pattern is less consistent. See the review in Lundberg (2012).

Figure 3a: Big Five Personality Scores for Men, by SES Group (Group 1=high, Group 4=low)
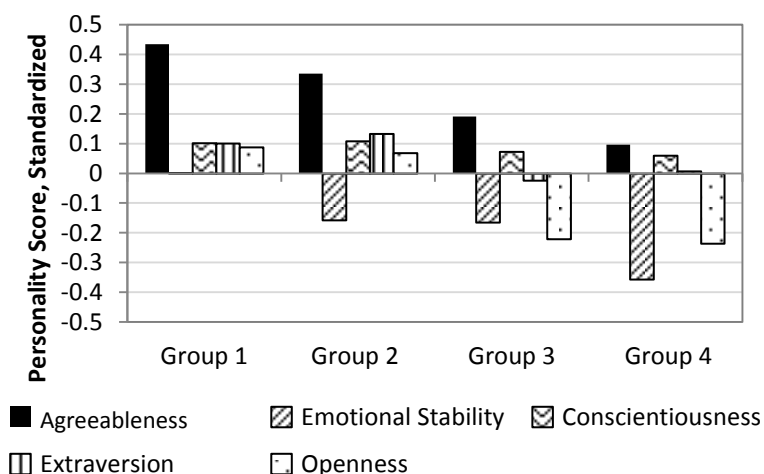
Figure 3b: Big Five Personality Scores of Women, by SES Group (Group 1=high, Group 4=low)

Cognitive Ability: Factor analysis is also used to construct a single index of cognitive ability, using a Wave I measure of verbal ability and a set of three Wave IV memory tests. The components and construction of this index are discussed in the Data Appendix, which also documents a positive association between cognitive ability and mother's education.

Risk Aversion: Evidence is accumulating that personality traits are not simply proxies for economic preference parameters. The empirical associations between personality and preferences are very weak (Almlund et al., 2011; Rustichini et al., 2012) and the two sets of variables have largely independent effects on a large set of outcomes, including health, life satisfaction, wage, unemployment, and education (Becker et al., 2012). The only economic preference measure available in the Add Health study to date is risk aversion, measured by a Likert scale response to the statement "I like to take risks" in the Wave IV questionnaire. Dohmen et al. (2011) examine the validity of a similar single-scale measure of general willingness to take risks in the German Socioeconomic Panel Study and show that it predicts actual risk-taking behavior well in investment, career choice, smoking, and other domains. Risk aversion is not associated with mother's education (see Data Appendix) or with other measures of family background.

5. Empirical Models of Educational Attainment

        The relationship between family background and educational attainment that is apparent in the descriptive analysis of section 2 persists after we control for measures of individual cognitive ability and personality. An ordered logit model of educational attainment is presented in Tables 1a and 1b. The dependent variable takes on one of six possible values: less than high school, high school graduate, some college with no degree, 2-year associate degree, 4-year bachelor's degree, and advanced post-graduate degree.[15] The independent variables include standardized indicators of personality traits, risk aversion, and cognitive ability, race and ethnicity and family background indicators (mother's education and a dummy variable for whether the respondent lived with both biological parents in Wave I). The proportional odds

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[15] The two groups with some college education are separated because men and women in this sample with associate degrees have significantly higher earnings than those with some college but no degree.

ratios, or exponentiated coefficients, are reported. For a one-unit increase in an independent variable (one standard deviation for most variables), the odds of a higher level of educational attainment are the proportional odds times higher.

The estimated effects of mother's education level and Wave I living arrangements on educational attainment are very large and highly significant for both men and women, whether they enter the model separately as in column 1 or through the SES groups defined in section 2. Adding the index of cognitive ability to the model reduces the impact of family background on educational attainment modestly, but these effects remain large and significant. The addition of personality traits and risk aversion to the model in the last column causes a similar reduction in family background effects, and has a small negative effect on the impact of cognitive ability. In general, controlling for measures of skill, both cognitive and noncognitive, has only a moderate impact on the SES gradient of education for this cohort.

The existing literature (Almlund et al., 2011) leads us to expect conscientiousness and neuroticism, of the Big 5 personality traits, to predict individual educational attainment and the results in Tables 1a and 1b are consistent with these expectations. The largest personality effects in this model, however, are unexpected—a one standard deviation increase in openness to experience or agreeableness increase the probability that an individual attains a higher level of education by 20 to 30 percent. Both conscientiousness and emotional stability (the converse of neuroticism) are related to self-control, and their association with an outcome that requires focused effort is intuitive. Agreeableness tends to reduce social conflict and so, though other studies have found that this trait is associated with lower earnings, may smooth a path through school by improving relations with teachers and classmates. The substantial positive role of openness is a surprise in a model that controls for cognitive ability, though Lundberg (2013) finds a similar pattern in the determinants of college graduation for this sample. One hypothesis is that openness, which "reflects the tendency to detect, explore, appreciate, and utilize patterns of abstract and sensory information" (DeYoung, 2010) may promote education by assisting with the acquisition of information.

Risk aversion is also associated with higher educational attainment for both men and women. The race/ethnicity effects are not surprising: Non-Hispanic blacks and Hispanics have lower levels of education than the omitted group (non-Hispanic whites), conditional on family background, and men of other (non-white) races have higher education (though this effect is not significant for women).

I begin with the simplest possible approach to allowing returns to cognitive ability and personality to differ by family background—splitting the sample by mother's education, with some college or more coded as 'high' and high school or less as 'low'. Table 2 shows that the determinants of educational attainment are very different for men and women with more- and less-educated mothers. The most notable result is that openness to experience has a very strong positive effect on education for disadvantaged men and women, but a relatively small effect for the advantaged. Conscientiousness, which is the personality trait most commonly associated with educational success, has a relatively small effect and, for men, is only significant for those from high-education homes. The effect of risk aversion follows a similar pattern—for men it has a significant effect only for more advantaged men, but a more consistently positive (though modest) effect on women's educational attainment. Cognitive ability has a large positive effect on educational attainment for all groups, and traits related to interpersonal skills (agreeableness and emotional stability) have relatively consistent positive effects, though low emotional stability (neuroticism) is generally more damaging for men and women with low-education mothers.

Tables 3a and 3b present models of educational progression that allow the skill demands of educational success to vary at different levels. These logit models examine the determinants of crossing

individual educational thresholds—graduating from high school, starting college, and completing a 4-year college degree. The impacts of personality (and in particular openness and conscientiousness) vary across these stages (and by gender). The finding that openness is particularly important for the disadvantaged generally holds for men (Table 3a). Particularly interesting are the results for college entrance--openness has a significant payoff for all men, including those with high-education mothers. Of these three transitions, conscientiousness affects only college graduation, and then only for men with high-education mothers. Table 3b reports the educational progression results for women, and reveals some distinct gender differences in the effects of personality. There are very large effects of conscientiousness on both high school and college graduation for women, but only for the more advantaged group. Openness also has a very large positive effect on college graduation for disadvantaged women and, like men, a more general positive effect on college entry for both groups (Table 3b), but no significant effect on high school graduation.

In general, the effects of openness on college entry are consistent with an interpretation of openness as a trait that facilitates the acquisition of information, since the process of college choice and acceptance presents substantial information barriers. Starting college, it appears, provides a novel challenge even for students with well-educated parents. The importance of information in decisions to enter college, suggested by the broad positive effects of openness on college enrollment, is supported by an experiment conducted by Hoxby and Turner (2012) in which the provision of semi-customized information on college applications and costs increased the enrollment of high-achieving, low-income students in selective colleges. Another experiment (Carrell and Sacerdote, 2013) finds substantial effects of college coaching and mentoring on the enrollment of women only.[16]

Alternative sample divisions:

Mother's education is a very simple and potentially error-ridden indicator of family resources and childhood disadvantage, but alternative sample decompositions yield results that are generally consistent with those in Tables 2 and 3. Tables 4a and 4b show only the coefficients on openness, conscientiousness, and cognitive ability for equivalent models of educational attainment by SES group (defined by mother's education and family structure in Wave I). Openness has a larger impact on education for lower SES groups; though the effect for the most advantaged men (Group 1) is significant, it is small. Conscientiousness is only significant for Group 1 men, but has more precisely estimated impacts for women in the two middle SES groups. Similar patterns emerge from estimating the education model separately by Wave I family income quintile (not reported here)—conscientiousness tends to be more important as a determinant of education in high-income families, while openness has significantly larger effects in low-income families.[17]

Add Health oversamples racial and ethnic minorities, permitting separate education models to be estimated for non-Hispanic blacks and whites, and for Hispanics. Table 5 presents the results for whites and blacks, since the Hispanic sample with high-education mothers is small. Several notable patterns

[16] Experimental studies have found that personality affects decisionmaking under uncertainty only through the type of information that the decision-maker seeks (Frechette, Schotter, and Trevino, 2013). A study of personality effects on overconfidence in the performance of cognitive tasks found that openness predicts confidence and accuracy in assessments, but not overconfidence (Schaefer, Williams, Goodie, and Campbell, 2004).

[17] Allowing for non-linear effects of openness and conscientiousness does not change these results in any important way. There are some positive returns to being in the top quartile of openness for advantaged men and women, but the returns are larger and begin lower in the distribution for disadvantaged groups.

emerge: conscientiousness is a significant determinant of educational attainment only for whites, and blacks with low-education mothers receive a particularly high payoff to openness. These patterns also appear in race-specific educational progression models. In this sense, being black acts as an additional dimension of disadvantage—reducing the payoff to traits that promote focus and self-control and increasing the return to exploration or information-gathering skills. Other differences across racial groups include the absence of a significant positive return on agreeableness for black men, and the positive effect of risk aversion for white, but not black, women. In fact, risk aversion has a negative return for disadvantaged black men—taking risks, for this group only, appears to be an effective educational strategy. Finally, disadvantaged black men are the only group for whom the return to cognitive ability is not significantly positive—a surprising and disturbing finding suggestive of an uneven playing field.

6. A Model of Skill-Environment Interactions: Traits, the Cost of Student Schooling Inputs, and Parental Contributions

The results in the last section reveal some distinct differences across SES groups in the rates of return to personality traits. There is little evidence that conscientiousness is a productive trait for disadvantaged students, particularly men, although this is the personality trait most closely associated with educational success in past research. It is possible that persistence and playing by the rules, behaviors typical of the conscientious, are of more use in educational environments that are themselves orderly and consistent, or that there are complementarities between conscientiousness and parental resources.

The other notable aspect of these results is the very strong and consistent role of openness to experience in sorting disadvantaged men and women among educational groups, though this trait has little impact on educational outcomes for those with more highly-educated mothers. The personality psychology literature has found few consistent behavioral effects of openness. Exceptions are studies of migration—Jokela (2009) finds that high openness predicts migration between and within states. Openness also has strong positive effects on marriage delay and divorce (Lundberg, 2012) and Add Health respondents with high levels of openness live farther from their parents, and have less frequent contact with them (Borgo and Lundberg, 2013). Thus openness, which encompasses imagination, creativity, and an interest in novel experiences, is associated with mobility across several domains. In an educational context, openness may act as a substitute for parental guidance and information provision in moving across schooling level thresholds, and therefore be a source of resilience in a low-resource environment.

Consider an educational production function in which the successful completion of a level of schooling, S, depends upon two inputs—focused effort, F, and information, I—and let that function take the simple form:

$$\ln S_i = \gamma_1 \ln F_i + \gamma_2 \ln I_i$$

The student is constrained by an endowment of energy, E that can be devoted to either focused effort or the acquisition of information at prices that depend upon the student's personality. The price of focused effort, p_1, is lower for more conscientious students, and the price of information acquisition, p_2, is falling in openness to experience.

$$p_{1i} F_i + p_{2i} I_i = E_i$$

We usually think about the role of parents in terms of their investments in children's skills, but they can also provide direct inputs to a child's school success by creating a rich, orderly environment or by directly providing information via coaching, tutoring, or counseling. Through these two different mechanisms, parental resources can be complementary with some child traits, and substitutes for others.

Model 1: Parents can contribute directly to information (θ_i) through their own knowledge or access to sources. Then the student's constraint is:

$$p_{1i} F_i + p_{2i}(I_i - \theta_i) = E_i$$

The demands for student focused effort and information are:

$$F_i = \frac{\gamma_1}{\gamma_1 + \gamma_2} \left[\frac{E_i}{p_{1i}} + \frac{p_{2i}}{p_{1i}} \theta_i \right]$$

$$I_i = \frac{\gamma_2}{\gamma_1 + \gamma_2} \left[\frac{E_i}{p_{2i}} + \theta_i \right]$$

Schooling is increasing in parental information inputs, and the cross partial of parent inputs and the price of child-acquired information is positive.

$$\frac{\partial S}{\partial \theta} > 0 \ and \ \frac{\partial^2 S}{\partial \theta \partial p_2} = \frac{(\gamma_1 + \gamma_2)E}{(E + p_2 \theta)^2} > 0$$

This implies that the marginal effect of parental contributions/resources on child school success will be greater for children who face a higher cost of acquiring information. Or, conversely, a low price for information (openness) will tend to insulate a child from the adverse educational effects of low-resource parents.

Also, in this simple log-linear model, there is no interaction between the cost of focused effort and parental information contributions:

$$\frac{\partial^2 S}{\partial \theta \partial p_1} = 0$$

Model 2: Alternatively, suppose that parental resources increase the return to a child's focused effort, so that $\gamma_{1i} = \gamma_1 + \Delta_i$. In this case, the cross-partial with the child's effort price is negative, so that a reduction in the student's price of focus (conscientiousness) increases the return to parental resources.

$$\frac{\partial^2 S}{\partial \Delta \partial p_1} = \frac{\partial^2 S}{\partial \gamma_1 \partial p_1} = -\frac{1}{p_1} < 0$$

If schooling success requires multiple inputs (such as both effort and information), then it seems likely that high-resource parents can provide different types of inputs that enhance their child's school success. Parental inputs such as information can be substitutes for student inputs while others, such as protected study time and an orderly environment, can complement student efforts. Student traits or skills that substitute for parental inputs will promote resilience in the face of limited family resources while others will have a limited payoff outside a supportive environment. The results above suggest that openness is a trait of the former variant and that conscientiousness is one of the latter.

The model in this section focuses on parental resources and parental inputs to a child's education as the key driver of the observed interactions between mother's education and personality traits in the determinants of educational attainment. However, family background measures such as mother's education will be correlated with other aspects of the environment affecting educational success, such as school quality. To examine this alternative mechanism, I constructed an index of school quality for the respondents who were in a school that included Grade 12 in Wave I. School administrator reports of class size, daily attendance, teacher qualifications, and the average dropout and college attendance rates of 12th graders were factor analyzed to yield a single quality indicator.[18]

Columns 1 and 2 and columns 7 and 8 of Table 6 are based on education models in which the Add Health men and women are divided by school quality quartile, and report results only for the top and bottom quartiles. Columns 3, 4, 9, and 10 report results for the same models for the disadvantaged (low mother's education) samples only. School quality appears to be an important mediating factor in determining the returns to some skills, but not others, and there are distinct gender differences in the responses to school quality. In general, the returns to conscientiousness and openness do not vary by school quality, for either the full or the disadvantaged sample, though the returns to openness are more precisely estimated for women in schools at the bottom of the quality distribution. These results indicate that the distinctive pattern of returns to openness and conscientiousness by mother's education are not due to the correlation between family background and school quality.

The returns to traits affecting interpersonal skills, on the other hand, are sensitive to school quality: women experience higher returns to emotional stability and agreeableness in poor schools, conditional on their own family background and cognitive ability. The effects of neuroticism for men are consistent with this pattern, but it is men in top quartile schools who receive a particularly large return on agreeableness. Notably, the returns to risk aversion are startlingly different for disadvantaged men in schools in the top and bottom quartile of quality. Risk-averse men in good schools achieve higher levels of education, while men in poor schools follow the pattern of disadvantaged black men, and appear to experience positive returns to risk-taking.

Mother's education will also be correlated with child skills, and another alternative explanation for the varying returns to personality traits is an interaction between personality and cognitive ability. Table 6 also reports the results of running the education model separately for men and women with cognitive index scores above and below the gender-specific mean. Splitting the sample by cognitive ability yields no significant differences between the effects of conscientiousness and openness on education for high- and low-ability men and women. These results suggest that parental resources are the important factor that interacts with child skills to yield the distinctive pattern of returns to conscientiousness and openness that we observe.

7. Interpreting the Results: Is the Personality/Education Relationship Causal?

Educational attainment is the outcome of a long dynamic process involving parental and environmental influences that begin before birth (Currie, 2011; Del Bono et al., 2012), as well as individual endowments and decisions. Even birth weight and very early measures of cognitive ability are now regarded as potentially endogenous in models of child and adult outcomes and, if personality is at all malleable, a simple causal interpretation of the results presented above is inappropriate. Some part of the correlation

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[18] Details are presented in the Data Appendix.

between personality and education may be due to either the influence of education on personality or the effects of early-life unobservables on both personality and education. If this is the case, then what the education models show is that the joint process determining education and personality is systematically different for individuals in high- and low-resource environments.

It is important to note that data on personality measured earlier in life cannot solve this potential problem--the educational process that culminates in school dropout or graduation begins early in life and no indicator of personality or other traits can be treated as pre-determined. With this caveat, this section presents three pieces of evidence that support an interpretation of these results as showing causal effects of personality on education: personality traits are highly stable, personality traits measured earlier in life have very similar correlations with education as their adult counterparts, and adult traits "predict" Wave I measures of educational expectations.

a. The Stability and Exogeneity of Personality. A very large literature in psychology supports the temporal consistency of individual personality. These traits are strongly heritable, and twin studies find that 40-60 percent of variation in personality is genetic (Bouchard and Loehlin, 2001, Anger, 2012).[19] Longitudinal studies show that, though there are systematic mean-level changes in personality traits with age—conscientiousness and emotional stability tend to increase during young adulthood, for example (Roberts, Walton, and Viechtbauer, 2006)--the rank-ordering of individual personality is very stable (Roberts and DelVecchio, 2000). Temporal correlations in longitudinal studies usually exceed 0.9 (Costa and McCrae, 1994). There is some instability of personality during adolescence, and this suggests that maturational processes are important in personality development, but it is unclear to what extent these processes are biological or contextual. Some studies show a covariance between changes in social roles and changes in personality traits, but the direction of causality is unclear (Roberts, Caspi, and Moffitt, 2003). Longer-term continuities in personality across the life course are pronounced: observed child temperament at age 3 has been found to be strongly predictive of young adult personality (Caspi, 2000; Caspi, Harrington, Milne, Arnell, Theodore, and Moffitt, 2003). These correlations between early childhood and later life tend to be larger at age 26 than at age 18, indicating that some adolescent instability in personality is transitory.

A small number of studies directly examine the malleability of personality in response to events or shocks and find little or no evidence that personality is endogenous with respect to such occurrences. A longitudinal study of young adults (Magnus et al., 1993) finds that, though personality was predictive of future life events, identified life events had no significant influence on personality measures. Two important new studies are based on personality re-tests, over a fairly short (4 year) horizon, in the German Socioeconomic Panel Study (SOEP) and the Household, Income, and Labour Dynamics in Australia Survey (HILDA). Cobb-Clark and Schurer (2012) find little evidence that adverse life-events in employment, family, and health affect personality over a four-year window in the Australian data, while Specht, Egloff, and Schmukle (2011) find some significant correlations between individual events and personality traits (7 out of a possible 60), but no clear pattern of influences.

The meaning and stability of personality traits has been the topic of considerable controversy in psychology, however.[20] Roberts (2009), in an attempt to reconcile competing views and bodies of empirical evidence, has proposed a theory of personality development in which consistent environmental effects can change fundamentally stable personality traits "in a slow, incremental fashion." The mechanism for this

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[19] Personality measures that incorporate measures from multiple reporters or situations yield even larger estimates of genetic influences. See the review in Caspi, Roberts, and Shiner (2005, p. 462).
[20] See the discussion in Almlund et al. (2011) and Roberts (2009).

change is not a direct environment-trait interaction, but the effect of role-based experiences (a first job, for example, or a marriage) on "states" that include actual behaviors and feelings. These states, Roberts hypothesizes, can in turn affect traits just as stressful environments can lead to changes in brain structure. This theory is consistent with empirical evidence that personality is unaffected by "shocks" (since personality development is the product of consistent, long-term environments) and with studies of the co-evolution of traits and social roles (though the direction of causality is difficult to assess). An interpretation of the education results in this framework would include both a causal influence of personality traits on behaviors leading to school success, but also the possibility that the experiences of disadvantaged students who do well in school are more likely to enhance openness to experience, while the educational careers of more advantaged students reinforce conscientiousness.

b. Personality and Wave I School Outcomes. A possible concern with using Wave IV personality measures as predictors of educational attainment is that these traits may have been directly shaped by school experiences. There is no standard personality inventory available in Wave I, but psychologists Young and Beaujean (2011) used a set of Wave I survey items with a lexical relationship to Five Factor Model questions in standard scales to construct Wave I-based measures of neuroticism, conscientiousness, and extraversion. Their measures have reasonable levels of internal consistency and modest but correctly-signed correlations with the corresponding Wave IV measures. The extraversion measure, however, is constructed entirely from statements indicating satisfaction with the student's experience in school rather than self-assessments of extraversion ("I feel like I am a part of this school"), and so I have omitted it from this analysis.[21]

Table 7 reports the effects of both Wave I and Wave IV-based personality traits on a school problems index based on self-reported indicators of the student's school experience, including grades, perceived social acceptance, and problems with homework and paying attention. The effects of Wave I and Wave IV conscientiousness on the school problems index are essentially identical. The impact of Wave I neuroticism is stronger than the Wave IV measures, but the effects are surprisingly consistent. Wave IV openness has no significant effect on this measure of school problems, though it does have some significant effects on Wave I grades (not reported). The similarity in the ability of these personality measures to "predict" Wave I outcomes is reassuring, though the availability of a full personality inventory in Wave I would have been an asset.[22]

c. College Aspirations. In Wave I, respondents in grades 7 through 12 were asked about college hopes and expectations. The two key questions are:

"On a scale from 1 to 5, where 1 is low and 5 is high, how much do you want to go to college?"

"On a scale from 1 to 5, where 1 is low and 5 is high, how likely is it that you will go to college?"

Most children claim that they want to go to college and that they expect to do so. In fact, a majority of children in all SES groups answer 5 to the "want" question. Though most of the children in the disadvantaged groups will not, in fact, go to college, their responses to these questions are strongly predictive of both college attendance and college completion, especially for boys (see Table 9).

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[21] Though the results reported here are robust to its inclusion.

[22] Given the importance of human capital development early in life, however, no personality test could be administered early enough to eliminate a potential endogeneity problem.

Young and Beaujean do not identify a Wave I equivalent for the personality trait openness to experience, which appears to be so important for the educational attainment of more disadvantaged youth. If openness measured in young adulthood is a good proxy for openness earlier in life, however, we might expect to see a strong association between openness and the educational expectations and aspirations of that group. This is because one possible route through which openness affects educational attainment operates through these aspirations, which require that children have the imagination to see themselves take a path that their parents have not. Table 8 shows that, in fact, adult measures of openness to experience are strongly predictive of Wave I college hopes and expectations, and that these effects are in general larger for disadvantaged boys and girls.

8. Conclusions

Research and policy discussion about the diverging fortunes of children from advantaged and disadvantaged households have focused on the skill disparities between these children—how they might arise and how they might be remediated. This analysis of data from a recent cohort of young Americans reveals another important mechanism in the determinants of educational attainment—differential returns to skills for children in different circumstances. Though the returns to cognitive ability are generally consistent across family background groups, some personality traits have very different effects on educational attainment for young men and women with access to different levels of parental resources. Conscientiousness, which has been linked in past research to school success, has no significant impact on the education of disadvantaged men, while openness to experience is a very strong predictor of educational attainment for less-advantaged men and women. These results are consistent with a model in which the provision of focused effort in school is complementary with parental inputs while openness, associated with imagination and exploration, may be a substitute for information provision by educated parents.

Conditional on family background, openness has a higher educational return to disadvantaged black men and women, compared to non-Hispanic whites, but conscientiousness has no significant payoff in any black subsample. Though the returns to cognitive ability are consistently positive and significant across groups, there is no significant return to cognitive ability for disadvantaged black men. Alternative specifications are supportive of the interpretation of family background effects as reflecting the influence of parental resources: the returns to openness and conscientiousness do not vary by school quality, or by levels of cognitive ability. One possible mechanism for the effect of openness on the education of the disadvantaged may be through the child's educational aspirations—Wave I reports of wanting to attend college are strongly positively associated with openness for students with low-education mothers.

Many programs targeted at educational inequality, proposed and actual, focus on behaviors related to conscientiousness, such as self-control and persistence, and yet, for young men from disadvantaged backgrounds in this cohort and for black men in general, there was no apparent educational payoff to this trait. This pattern does not appear to be due to poor quality schools, or to complementarities between cognitive ability and conscientiousness. In order to design effective early investments in the skills of disadvantaged children, we need know more about the environments that children (and their parents) face as they progress through the school system and the behavior and capabilities that actually foster success in these environments.

17

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	(1)	(2)	(3)	(4)
Table 1a. Educational Attainment, Family Background, and Skills: Men				
Mother High School Graduate	2.34***			
	(0.000)			
Mother Some College	4.38***			
	(0.000)			
Mother College Graduate	10.07***			
	(0.000)			
Lived with Both Biological Parents in Wave I	1.95***			
	(0.000)			
Mother's Education High, Lived with Both Biological Parents		7.12***	6.10***	5.39***
		(0.000)	(0.000)	(0.000)
Mother's Education High, Did Not Live with Both Parents		3.03***	2.67***	2.33***
		(0.000)	(0.000)	(0.000)
Mother's Education Low, Lived with Both Biological Parents		1.79***	1.81***	1.72***
		(0.000)	(0.000)	(0.000)
Cognitive Ability			1.67***	1.54***
			(0.000)	(0.000)
Openness				1.28***
				(0.000)
Conscientiousness				1.08**
				(0.025)
Extraversion				0.98
				(0.485)
Agreeableness				1.20***
				(0.000)
Neuroticism				0.82***
				(0.000)
Risk Aversion				1.08**
				(0.037)
Black	0.64***	0.62***	0.82**	0.76***
	(0.000)	(0.000)	(0.036)	(0.006)
Other Race	1.60***	1.66***	1.96***	1.96***
	(0.006)	(0.001)	(0.000)	(0.000)
Hispanic	0.93	0.71***	0.82**	0.82**
	(0.462)	(0.000)	(0.028)	(0.032)
Observations	5927	5927	5927	5927

Notes: Coefficients are odds ratios; p-values (for b=1) in parentheses. All regressions control for age.
* p < .1, ** p < .05, *** p < .0

Table 1b. Educational Attainment, Family Background, and Skills: Women

	(1)	(2)	(3)	(4)
Mother High School Graduate	2.56***			
	(0.000)			
Mother Some College	4.61***			
	(0.000)			
Mother College Graduate	12.18***			
	(0.000)			
Lived with Both Biological Parents in Wave I	2.11***			
	(0.000)			
Mother's Education High, Lived with Both Biological Parents		8.41***	7.47***	6.70***
		(0.000)	(0.000)	(0.000)
Mother's Education High, Did Not Live with Both Parents		3.24***	3.00***	2.76***
		(0.000)	(0.000)	(0.000)
Mother's Education Low, Lived with Both Biological Parents		2.02***	1.98***	1.90***
		(0.000)	(0.000)	(0.000)
Cognitive Ability			1.71***	1.61***
			(0.000)	(0.000)
Openness				1.25***
				(0.000)
Conscientiousness				1.12***
				(0.000)
Extraversion				0.96
				(0.205)
Agreeableness				1.25***
				(0.000)
Neuroticism				0.80***
				(0.000)
Risk Aversion				1.10***
				(0.003)
Black	0.84**	0.78***	1.04	1.07
	(0.020)	(0.001)	(0.627)	(0.389)
Other Race	1.30*	1.19	1.37**	1.39**
	(0.083)	(0.260)	(0.023)	(0.025)
Hispanic	0.88	0.70***	0.88	0.93
	(0.197)	(0.000)	(0.196)	(0.461)
Observations	6709	6709	6709	6709

Notes: Coefficients are odds ratios; p-values (for b=1) in parentheses. All regressions control for age.
 * $p < .1$, ** $p < .05$, *** $p < .01$

Table 2. Educational Attainment by Mother's Education: Ordered Logit

	Men			Women		
	All	Mother's Education		All	Mother's Education	
		High	Low		High	Low
	(1)	(2)	(3)	(4)	(5)	(6)
Openness	1.27***	1.12**	1.41***	1.23***	1.13**	1.31***
	(0.000)	(0.032)	(0.000)	(0.000)	(0.020)	(0.000)
Conscientiousness	1.08**	1.12**	1.03	1.11***	1.14***	1.08*
	(0.036)	(0.027)	(0.510)	(0.001)	(0.004)	(0.075)
Extraversion	0.98	1.00	0.96	0.96	0.94	0.97
	(0.606)	(0.983)	(0.398)	(0.220)	(0.204)	(0.514)
Agreeableness	1.20***	1.19***	1.21***	1.24***	1.22***	1.26***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Neuroticism	0.83***	0.88**	0.78***	0.81***	0.90**	0.75***
	(0.000)	(0.013)	(0.000)	(0.000)	(0.032)	(0.000)
Risk Aversion	1.07**	1.15**	1.02	1.10***	1.10*	1.10**
	(0.041)	(0.013)	(0.665)	(0.002)	(0.054)	(0.017)
Cognitive Ability	1.50***	1.52***	1.48***	1.57***	1.64***	1.54***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	5927	2607	3320	6709	2861	3848

Notes: Odds ratios reported; p-values (for b=1) in parentheses. Mother's education high=some college or more.
All regressions control for age, race and ethnicity, whether the respondent lived with both parents in Wave I, and detailed controls for mother's education.
* p < .1, ** p < .05, *** p < .01

	High School Graduation		College Enrollment Conditional on High School Graduation		College Graduation Conditional on College Enrollment	
	Mother's Education		Mother's Education		Mother's Education	
	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)
Openness	1.03	1.38***	1.19**	1.36***	1.00	1.19**
	(0.861)	(0.000)	(0.019)	(0.000)	(0.952)	(0.034)
Conscientiousness	1.10	1.11	1.08	1.00	1.16**	1.08
	(0.568)	(0.221)	(0.289)	(0.983)	(0.020)	(0.336)
Cognitive Ability	1.97***	1.38***	1.50***	1.56***	1.37***	1.19**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.029)
Observations	2607	3320	2494	2887	2030	1667

Table 3b. Educational Progression: Women

	High School Graduation		College Enrollment Conditional on High School Graduation		College Graduation Conditional on College Enrollment	
	Mother's Education		Mother's Education		Mother's Education	
	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)
Openness	1.24	1.11	1.24**	1.26***	1.05	1.46***
	(0.165)	(0.231)	(0.021)	(0.000)	(0.457)	(0.000)
Conscientiousness	1.50**	1.00	0.98	1.10*	1.30***	1.10
	(0.016)	(0.959)	(0.763)	(0.082)	(0.000)	(0.135)
Cognitive Ability	2.70***	1.72***	1.67***	1.47***	1.69***	1.34***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	2861	3848	2812	3522	2454	2362

Notes: Odds ratios reported; p-values (for b=1) in parentheses. Mother's education high=some college or more.
All regressions control for all personality traits, age, race and ethnicity, whether the respondent lived with both parents in Wave I, and detailed controls for mother's education.
* p < .1, ** p < .05, *** p < .01

Table 4a. Educational Attainment by SES Group: Men

	Mother's Education: High		Mother's Education: Low	
	Live with both Parents		Live with both Parents	
	Yes	No	Yes	No
	(Group 1)	(Group 2)	(Group 3)	(Group 4)
Openness	1.14*	1.08	1.27***	1.58***
	(0.050)	(0.388)	(0.001)	(0.000)
Conscientiousness	1.12*	1.14	1.00	1.07
	(0.068)	(0.139)	(0.991)	(0.384)
Cognitive Ability	1.50***	1.52***	1.57***	1.40***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	1536	1071	1728	1592

Table 4b. Educational Attainment by SES Group: Women

	Mother's Education: High		Mother's Education: Low	
	Live with both Parents		Live with both Parents	
	Yes	No	Yes	No
	(Group 1)	(Group 2)	(Group 3)	(Group 4)
Openness	1.09	1.23**	1.37***	1.26***
	(0.228)	(0.011)	(0.000)	(0.001)
Conscientiousness	1.10	1.19***	1.15**	1.02
	(0.124)	(0.009)	(0.025)	(0.736)
Cognitive Ability	1.55***	1.76***	1.52***	1.57***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	1576	1285	1907	1941

Notes: Odds ratios reported; p-values (for b=1) in parentheses. Mother's education high=some college or more.
All regressions control for all personality traits, age, race and ethnicity, whether the respondent lived with both parents in Wave I, and detailed controls for mother's education.
* p < .1, ** p < .05, *** p < .01

Table 5. Educational Attainment by Race: Ordered Logit

	Men				Women			
	Mother's Education				Mother's Education			
	High		Low		High		Low	
	White	Black	White	Black	White	Black	White	Black
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Openness	1.11*	1.24	1.35***	1.63***	1.18***	1.01	1.33***	1.55***
	(0.085)	(0.122)	(0.000)	(0.001)	(0.008)	(0.951)	(0.000)	(0.000)
Conscientiousness	1.18***	1.15	1.04	0.92	1.16***	1.07	1.10*	1.00
	(0.007)	(0.204)	(0.511)	(0.594)	(0.006)	(0.535)	(0.068)	(0.981)
Extraversion	1.00	0.98	0.96	1.03	0.97	0.86	0.99	0.84**
	(0.997)	(0.869)	(0.501)	(0.799)	(0.572)	(0.163)	(0.797)	(0.031)
Agreeableness	1.22***	0.86	1.24***	1.14	1.19**	1.28**	1.26***	1.19*
	(0.003)	(0.241)	(0.000)	(0.312)	(0.013)	(0.039)	(0.001)	(0.077)
Neuroticism	0.88*	0.77**	0.75***	0.84	0.93	0.78**	0.76***	0.69***
	(0.052)	(0.031)	(0.000)	(0.189)	(0.195)	(0.012)	(0.000)	(0.000)
Risk Aversion	1.13*	0.88	1.06	0.82**	1.15**	0.90	1.16***	0.95
	(0.068)	(0.234)	(0.347)	(0.043)	(0.022)	(0.328)	(0.007)	(0.540)
Cognitive Ability	1.42***	1.90***	1.50***	1.17	1.66***	1.71***	1.58***	1.44***
	(0.000)	(0.000)	(0.000)	(0.138)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	1577	552	1838	608	1701	699	2049	838

Notes: Odds ratios reported; p-values (for b=1) in parentheses. Mother's education high=some college or more.
All regressions control for age, race and ethnicity, whether the respondent lived with both parents in Wave I, and detailed
controls for mother's education.
* p < .1, ** p < .05, *** p < .01

Table 6. Educational Attainment by School Quality and Cognitive Ability

	Men						Women					
	Top Quartile Schools (All)	Bottom Quartile Schools (All)	Top Quartile Schools (Mother's Education Low)	Bottom Quartile Schools (Mother's Education Low)	Cognitive Ability High	Cognitive Ability Low	Top Quartile Schools (All)	Bottom Quartile Schools (All)	Top Quartile Schools (Mother's Education Low)	Bottom Quartile Schools (Mother's Education Low)	Cognitive Ability High	Cognitive Ability Low
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Openness	1.20**	1.29**	1.61***	1.56***	1.28***	1.27***	1.09	1.18**	1.19	1.27**	1.24***	1.24***
	(0.044)	(0.015)	(0.005)	(0.000)	(0.000)	(0.000)	(0.334)	(0.026)	(0.218)	(0.012)	(0.000)	(0.000)
Conscientiousness	1.04	1.10	0.96	1.09	1.06	1.09	0.90	1.05	0.91	1.06	1.11**	1.10**
	(0.718)	(0.244)	(0.810)	(0.436)	(0.259)	(0.107)	(0.192)	(0.543)	(0.412)	(0.489)	(0.012)	(0.025)
Extraversion	0.98	1.02	1.11	0.97	0.95	1.01	0.91	0.98	0.87	1.02	0.96	0.95
	(0.827)	(0.825)	(0.484)	(0.776)	(0.270)	(0.871)	(0.264)	(0.754)	(0.259)	(0.837)	(0.412)	(0.316)
Agreeableness	1.29***	1.20*	1.69***	1.28**	1.13**	1.27***	1.26**	1.44***	1.13	1.43***	1.12**	1.32***
	(0.001)	(0.050)	(0.000)	(0.033)	(0.011)	(0.000)	(0.022)	(0.000)	(0.393)	(0.001)	(0.041)	(0.000)
Neuroticism	0.97	0.78***	1.07	0.76**	0.82***	0.83***	0.85**	0.79***	0.88	0.73***	0.87***	0.76***
	(0.695)	(0.004)	(0.628)	(0.011)	(0.000)	(0.001)	(0.023)	(0.001)	(0.282)	(0.000)	(0.001)	(0.000)
Risk Aversion	1.23**	0.93	1.32**	0.80**	1.08	1.06	0.94	1.08	1.08	1.04	1.15***	1.05
	(0.023)	(0.355)	(0.041)	(0.021)	(0.140)	(0.221)	(0.451)	(0.271)	(0.550)	(0.623)	(0.001)	(0.298)
Cognitive Ability	X	X	X	X	X	X	X	X	X	X	X	X
School Quality	X	X	X	X			X	X	X	X		
Family Background	X	X	X	X	X	X	X	X	X	X	X	X
Race/Ethnicity	X	X	X	X	X	X	X	X	X	X	X	X
Observations	863	1449	367	893	2888	3039	896	1685	405	1079	3223	3486

Notes: Coefficients are odds ratios; p-values (for b=1) in parentheses.
* p < .1, ** p < .05, *** p < .01

Table 7. Wave I School Problems Index

	Men				Women			
	Wave I Personality		Wave IV Personality		Wave I Personality		Wave IV Personality	
	Mother's Education				Mother's Education			
	High	Low	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Openness			1.01	0.98			1.00	0.98
			(0.853)	(0.458)			(0.967)	(0.384)
Conscientiousness	0.89***	0.87***	0.87***	0.86***	0.85***	0.92***	0.88***	0.88***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Extraversion			1.06**	1.04			0.99	1.02
			(0.042)	(0.198)			(0.831)	(0.270)
Agreeableness			0.92**	0.98			0.95*	0.97
			(0.012)	(0.479)			(0.079)	(0.301)
Neuroticism	1.32***	1.30***	1.16***	1.19***	1.29***	1.27***	1.06**	1.17***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.014)	(0.000)
Cognitive Ability in Wave I (AHPVT)	0.90***	0.92***	0.93**	0.96	0.94**	0.92***	0.95	0.95**
	(0.002)	(0.009)	(0.037)	(0.189)	(0.013)	(0.001)	(0.109)	(0.030)
Observations	2512	3147	2531	3175	2788	3634	2811	3674

Notes: Odds ratios reported; p-values (for b=1) in parentheses. Mother's education high=some college or more.
All regressions control for age, race and ethnicity, risk aversion, whether the respondent lived with both parents in Wave I, and detailed controls for mother's education.
School problems index includes Wave I student reports of number of days absent without an excuse, English and Math grades, and how often they had trouble: getting along with teachers, paying attention in school, getting homework done, and getting along with other students.
* $p < .1$, ** $p < .05$, *** $p < .01$

Table 8. Wave I Reports of Wants/Expects to Attend College: Ordered Logit

	Men				Women			
	Wants to Attend College		Expects to Attend College		Wants to Attend College		Expects to Attend College	
	Mother's Education				Mother's Education			
	High	Low	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Openness	0.99	1.31***	1.03	1.20***	1.15*	1.30***	1.14*	1.17***
	(0.902)	(0.000)	(0.593)	(0.001)	(0.083)	(0.000)	(0.064)	(0.002)
Conscientiousness	1.13**	1.00	1.15**	1.04	0.97	1.10*	1.06	1.17***
	(0.050)	(0.991)	(0.014)	(0.407)	(0.688)	(0.074)	(0.353)	(0.001)
Cognitive Ability	1.20***	1.16**	1.43***	1.17***	1.23**	1.22***	1.47***	1.35***
	(0.006)	(0.017)	(0.000)	(0.005)	(0.014)	(0.000)	(0.000)	(0.000)
Observations	2600	3305	2599	3300	2857	3839	2856	3834

Notes: Odds ratios reported; p-values (for b=1) in parentheses. Mother's education high=some college or more.
All regressions control for all personality traits, age, race and ethnicity, whether the respondent lived with both parents in Wave I, and detailed controls for mother's education.
* p < .1, ** p < .05, *** p < .01

Table 9. Effect of Wave I College Expectations on Educational Attainment: Ordered Logit

	Men		Women	
	Mother's Education		Mother's Education	
	High	Low	High	Low
	(1)	(2)	(3)	(4)
Wants to Attend College	1.34***	1.12**	1.13	1.24***
	(0.000)	(0.024)	(0.145)	(0.000)
Expects to Attend College	1.75***	1.53***	1.85***	1.51***
	(0.000)	(0.000)	(0.000)	(0.000)
Cognitive Ability in Wave I	1.69***	1.80***	1.65***	1.89***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	2729	3495	3026	4141

Notes: Odds ratios reported; p-values (for b=1) in parentheses. Mother's education high=some college or more.
All regressions control for age, race and ethnicity, whether the respondent lived with both parents in Wave I, and detailed controls for mother's education.
* p < .1, ** p < .05, *** p < .01

Data Appendix

National Longitudinal Survey of Adolescent Health

National Longitudinal Study of Adolescent Health (Add Health) study began in 1994-95 with a nationally-representative, school-based survey of more than 90,000 students in Grades 7 through 12. About 20,000 respondents were followed in subsequent surveys, the last of which (Wave IV) was conducted in 2007-08 when almost all respondents were between 24 and 32 years of age. The survey content is very rich, initially focusing on the forces influencing adolescent health and risk behaviors and then broadening in scope as the respondents transitioned into adulthood. The study design includes oversamples of ethnic minorities, disabled students, and saturation school samples for the study of social networks. A genetic sample of siblings living in the same household includes twins, siblings, half-siblings, and unrelated pairs such as step- and adopted siblings.

Table A-1 presents summary statistics for key variables for the analysis samples of men and women. The mean age of respondents was 29 at the time of the Wave IV survey (2008). The sample is 56-58% non-Hispanic white, 20-23% non-Hispanic black, 16% Hispanic, and 6-7% non-Hispanic other races. At Wave I, 52% of girls and 55% of boys lived with both biological parents. Wave IV sampling weights are used in all analyses.

Educational Attainment

The dependent variable in most of the educational attainment models is an education index that takes values from 0 (less than high school) to 5 (post-graduate degree), based on respondent reports in Wave IV. Tables A-2 and A-3 report the distribution of educational attainment by race-ethnicity and by family background measures (mother's education, SES group, and Wave I family income quartile) for men and women in the analysis samples. Particularly notable is the size of the some college/associate degree group: one-third of the sample falls in this intermediate education group. Regressing log annual earnings at Wave IV on education categories (for those with positive earnings) provides a rationale for separating associate degree holders from the some college/no degree group in the educational attainment models—their earnings are higher and women with associate degrees are also more likely to have positive earnings than women who have attended college but not received a degree.

Log Earnings	Men	Women
High school graduate	0.31 (0.07)	0.51 (0.12)
Some college-no degree	0.42 (0.08)	0.60 (0.12)
Associate degree	0.58 (0.09)	0.83 (0.12)
College graduate	0.71 (0.07)	1.10 (0.12)
Post-graduate degree	0.84 (0.09)	1.27 (0.12)
Observations	5754	5778

Standard errors in parentheses. Model includes controls for age and race.

Mother's Education

The variable called 'mother's education' is the self-reported education level of the individual answering the parent questionnaire in Wave I if that individual is the child's biological mother, step/adoptive/foster mother, or grandmother (80% of cases). If the parent questionnaire was completed by the father, or someone else not in one of these categories, then the respondent's own Wave I report of their resident

mother's education is used (15%) or, if this is missing or skipped, their report of biological mother's education level (4%).

Cognitive Ability

In Wave I, respondents were given the Add Health Picture Vocabulary Test (AHPVT), a computerized, abridged (87 items) version of the Peabody Picture Vocabulary Test—Revised. In this test, the interviewer reads a word aloud and the respondent selects the illustration that best fits its meaning. A repeat of this test in Wave III has been excluded from the cognitive ability index because it is missing for about 13% of observations with valid measures for the Wave I AHPVT. The word recall test measures short-term memory (recalling a list of 15 words upon hearing) and long-term memory (recalling the same list after 5 minutes). The number recall test also is a test of short-term memory, that requires the respondent to repeat progressively longer (2 to 8) series of digits backwards. The immediate and delayed word recall tasks are standard measures (very similar to the word recall tasks in the Health and Retirement Study) that can be used to study the effect of aging on memory.

<div align="center">Construction of Cognitive Ability Index</div>

Question	Factor Loading	Unique Variance	Scoring Coefficients
Cognitive Ability			
AHPVT (Wave I)	0.4042	0.8366	0.17977
Word Recall, Short term (Wave IV)	0.7325	0.4634	0.58809
Word Recall, Long term (Wave IV)	0.7330	0.4627	0.58950
Number Recall (Wave IV)	0.3842	0.8524	0.16769

Big-5 Personality Traits

The Add Health survey fielded a 20-item short-form version of the 50-item International Personality Item Pool-Five-Factor Model (IPIP-FFM) known as the Mini-IPIP (Donnellan et al., 2006) in the Wave IV survey. Brief personality instruments designed to be included in long surveys tend to have weaker psychometric properties than do full-length personality scales, with some tradeoff between choosing items that provide both construct breadth and high reliability. A recent assessment finds that the Mini-IPIP does have a 5-factor structure, and that most of the scales have acceptable reliability despite the brevity of the instrument (Baldasaro et al., 2013). The Cronbach's alpha scores for the personality scales in the Add Health sample range from .62 (Neuroticism) to .72 (Extraversion).

Factor analysis of the survey items included in each personality trait produces the factor loadings reported in the table below, and the scoring coefficients generated by the Bartlett method are used to construct an estimate of each latent trait. [23]

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[23] The Bartlett prediction method (Bartlett, 1938) produces unbiased factors that may be less accurate that the those produced by the alternative regression method, which minimizes the mean squared errors from the true factors but may be biased. Aizer and Cunha (2012) use this method to construct a measure of parental investment using several observer ratings of mother/child interaction.

Construction of Personality Indices

Personality Question	Factor Loading	Unique Variance	Scoring Coefficients (Bartlett)
Openness (α=.65)			
I have a vivid imagination	0.5469	0.7008	0.42232
I am not interested in abstract ideas (reversed)	0.5548	0.6923	0.43366
I have difficulty understanding abstract ideas (reversed)	0.5448	0.7032	0.41929
I do not have a good imagination (reversed)	0.5972	0.6433	0.50234
Conscientiousness (α=.66)			
I get chores done right away	0.5238	0.7257	0.42702
I often forget to put things back in their proper place (reversed)	0.5956	0.6452	0.54615
I like order	0.4715	0.7777	0.35864
I make a mess of things (reversed)	0.5681	0.6772	0.49627
Extraversion (α=.72)			
I am the life of the party	0.5375	0.7110	0.30302
I don't talk a lot (reversed)	0.5746	0.6699	0.34380
I talk to a lot of different people at parties	0.6422	0.5875	0.43814
I keep in the background (reversed)	0.6870	0.5281	0.52141
Agreeableness (α=.71)			
I sympathize with others' feelings	0.5658	0.6799	0.36154
I am not interested in other people's problems (reversed)	0.6441	0.5851	0.47831
I feel others' emotions	0.5736	0.6710	0.37143
I am not really interested in others (reversed)	0.6221	0.6130	0.44095
Neuroticism (α=.62)			
I have frequent mood swings	0.6332	0.5991	0.61822
I am relaxed most of the time (reversed)	0.4550	0.7930	0.33557
I get upset easily	0.6195	0.6162	0.58802
I seldom feel blue (reversed)	0.3680	0.8646	0.24891

School Quality

The index of school quality is based on a Wave I self-administered questionnaire completed by school administrators of participating schools. Included in the index are categorical reports of daily attendance (from 75%-79% to 95% or more), average class size, the proportion of full-time classroom teachers who are new/in the school 5 years or more/hold Master's degrees or more, the proportion of children who have a family member in the school's parent organization (=0 if there is no such organization), the average percentage of 12th graders who will drop out before the end of the school year, and the percentage of 12th graders who will attend a 2- or 4-year college next year. Questions about the proportion of students scoring at or above grade level on standardized tests are not used because close to 30% of respondents report that the school does not administer standardized tests.

Factor analysis of school characteristics produces a single factor with an eigenvalue greater than 1, and all variables have the expected sign except for teacher experience and education, which have smaller scoring coefficients than the other variables and opposing signs. An alternative index that excludes teacher characteristics is very highly correlated with this index, and generates very similar results. The samples used for the analyses in Table 6 are students who attended a school in Wave I for which we have a valid school quality index, and is therefore restricted to those who attended a school that included grade 12.

School Problems Index

The index of school problems is based on Wave I student reports of their grades in mathematics and English or language arts during the most recent grading period, how many times that year they were absent without an excuse, and categorical responses to how frequently they had trouble getting along with teachers, paying attention in school, getting homework done, and getting along with other students (from 'never' to 'every day'). Factor analysis produces a single factor model with the largest (Bartlett) scoring coefficients on trouble paying attention and completing homework, and the smallest on absences and math grades.

Table A-1: Summary Statistics

Table A-1: Summary Statistics

	Men						Women					
	Total		Mother's Education				Total		Mother's Education			
			Low		High				Low		High	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Age in 2008	29.20	1.72	29.24	1.74	29.14	1.70	29.05	1.72	29.14	1.72	28.93	1.71
Race/Ethnicity												
White	0.58	0.49	0.55	0.50	0.60	0.49	0.56	0.50	0.53	0.50	0.59	0.49
Black	0.20	0.40	0.18	0.39	0.21	0.41	0.23	0.42	0.22	0.41	0.24	0.43
Hispanic	0.16	0.37	0.21	0.41	0.09	0.29	0.16	0.36	0.21	0.41	0.08	0.28
Other	0.07	0.25	0.05	0.22	0.09	0.28	0.06	0.23	0.04	0.20	0.08	0.27
Personality Traits												
Openness	0.13	1.01	-0.00	0.99	0.30	1.01	-0.09	0.97	-0.22	0.94	0.09	0.99
Conscientiousness	-0.08	0.97	-0.09	0.96	-0.07	0.99	0.09	1.01	0.08	0.99	0.10	1.05
Extraversion	-0.04	1.00	-0.07	0.98	0.01	1.03	0.05	1.00	-0.00	0.99	0.12	1.00
Agreeableness	-0.26	1.02	-0.36	1.01	-0.14	1.02	0.26	0.90	0.16	0.92	0.39	0.87
Neuroticism	-0.22	0.95	-0.12	0.95	-0.35	0.93	0.17	1.01	0.25	1.00	0.06	1.00
Risk Aversion	-0.20	0.98	-0.19	0.99	-0.22	0.97	0.18	0.99	0.20	0.98	0.16	0.99
Cognitive Ability Index	-0.13	0.99	-0.28	0.97	0.06	0.97	0.13	0.99	-0.01	0.97	0.32	0.99
Wave I												
Live with Both Parents	0.55	0.50	0.52	0.50	0.59	0.49	0.52	0.50	0.50	0.50	0.55	0.50
Verbal Ability	0.08	0.99	-0.12	1.00	0.34	0.90	-0.03	0.99	-0.26	0.95	0.28	0.95
School Problems Index	0.12	1.02	0.12	1.07	0.12	0.96	-0.10	0.96	-0.11	0.99	-0.09	0.92
School Quality Index	-0.18	1.06	-0.35	1.01	0.04	1.08	-0.21	1.05	-0.37	1.00	0.01	1.08
Observations	5927		3320		2607		6709		3848		2861	

Table A-2: Distribution of Educational Attainment, Men

	All	Mother's Education		Race/Ethnicity				Socioeconomic Status Group				Family Income Quartile			
		High	Low	White	Black	Hispanic	Other	1	2	3	4	4	3	2	1
Less Than High School	9.21	4.33	13.04	7.88	12.41	12.34	3.96	2.73	6.63	9.49	16.90	6.48	5.25	10.54	18.36
High School Graduate	28.41	17.80	36.75	27.58	31.90	31.33	18.56	14.91	21.94	35.24	38.38	21.90	26.31	35.26	38.19
Some College-No Degree	27.10	28.58	25.93	26.24	29.14	30.06	21.53	23.96	35.20	25.12	26.82	26.45	28.00	28.97	25.55
Associate Degree	6.34	6.98	5.84	6.68	4.48	7.49	6.19	7.16	6.72	6.83	4.77	6.36	8.29	5.69	4.89
Bachelor's Degree	22.27	31.95	14.67	24.39	16.29	14.87	38.86	37.37	24.18	19.10	9.86	28.82	25.80	15.38	10.89
Post-graduate Degree	6.66	10.36	3.77	7.23	5.78	3.90	10.89	13.87	5.32	4.22	3.27	9.98	6.35	4.16	2.12
Education Index Mean	2.24	2.75	1.84	2.34	1.98	1.93	2.90	3.03	2.36	2.03	1.62	2.59	2.42	1.93	1.58
Observations	5927	2607	3320	3415	1160	948	404	1536	1071	1728	1592	2484	1182	1177	1084

Note: The education index takes values of zero if the individual's education is less than high school, through 5 if the individual has a post-graduate degree.

Table A-3: Distribution of Educational Attainment, Women

	All	Mother's Education		Race/Ethnicity				Socioeconomic Status Group				Family Income Quartile			
		High	Low	White	Black	Hispanic	Other	1	2	3	4	4	3	2	1
Less Than High School	5.59	1.71	8.47	5.33	6.12	6.81	2.63	1.21	2.33	4.72	12.16	4.37	2.28	6.75	10.42
High School Graduate	22.63	12.51	30.15	21.07	24.40	27.16	18.42	8.31	17.67	27.37	32.87	18.88	19.63	25.41	31.32
Some College-No Degree	26.99	23.98	29.24	25.68	29.99	29.08	22.11	17.51	31.91	26.90	31.53	23.28	26.71	30.90	31.87
Associate Degree	7.86	7.79	7.90	8.05	6.25	9.12	8.95	7.74	7.86	9.28	6.54	7.03	8.06	9.25	8.14
Bachelor's Degree	25.76	35.83	18.27	28.21	22.64	19.77	30.53	42.77	27.32	23.39	13.24	31.75	30.46	20.00	13.23
Post-graduate Degree	11.18	18.18	5.98	11.65	10.61	8.06	17.37	22.46	12.92	8.34	3.66	14.68	12.87	7.69	5.01
Education Index Mean	2.59	3.18	2.15	2.68	2.47	2.32	2.98	3.50	2.79	2.44	1.87	2.87	2.83	2.33	1.97
Observations	6709	2861	3848	3750	1537	1042	380	1576	1285	1907	1941	2929	1228	1275	1277

Note: The education index takes values of zero if the individual's education is less than high school, through 5 if the individual has a post-graduate degree.