Unequal Families: The Role of Cognitive and Non-cognitive Skills*

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Abstract: The widening gaps in marital status, relationship stability, and childbearing between socioeconomic groups in the U.S. raise concerns about child wellbeing and future inequality. This paper uses data from a recent cohort of young adults--Wave IV of the National Longitudinal Study of Adolescent Health—to investigate the role of cognitive ability and non-cognitive skills as possible contributors to this gap. Blinder-Oaxaca decompositions of differences in key family outcomes across education groups show that, though individual non-cognitive traits are significantly associated with relationship history and family status, they collectively contribute very little to socioeconomic gaps in relationship instability and single motherhood. Measured skills can explain 15-25 percent of the differences in these outcomes by family background (measured by mother's education), but this effect is either severely attenuated or disappears entirely when own education is added to the model. Both cognitive and non-cognitive skills are strongly predictive of education attainment but, conditional on education, explain very little of the socioeconomic gaps in family outcomes for young adults.

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1. Introduction

American families differ from families in other Western nations along several dimensions. Americans marry and cohabit at younger ages, and are more likely to marry at some point in their lives, but marital and cohabiting relationships are also much more likely to dissolve than is the case in other wealthy countries (Cherlin, 2009). Important outcomes of this relationship fragility include a very high rate of single parenthood in the United States, and a high probability that American children will experience the breakup of their parents.[1] There has also been a growing divergence in family behavior across socioeconomic groups in the United States, with much higher rates of early and single motherhood and marital dissolution among the less-educated and in low-income communities (McLanahan, 2004; Lundberg and Pollak, 2014). Both the level of family instability and its socioeconomic gradient raise concerns about the well-being of children subjected to disruption in both contact with parents and living arrangements, and about the persistence of economic inequality. In a recent descriptive analysis of intergenerational economic mobility in the U.S., Chetty et al. (2014) find a strong geographic correlation between upward mobility and local measures of family structure such as rates of single parenthood.

A rapidly growing literature has linked adult disparities in economic, health, and social outcomes to gaps in both cognitive and non-cognitive abilities, and has established that these gaps begin to emerge early in childhood (Cunha, Heckman, Lochner, and Masterov, 2006; Duncan and Magnuson, 2011; Conti and Heckman, 2010).[2] Various studies have documented the importance of non-cognitive attributes such as persistence, self-control, and social skills in contributing to positive adult outcomes and psychologists have shown that personality traits, in particular, are related to relationship quality and stability (Roberts et al., 2007; Lahey, 2009). These findings raise a further question: Can socioeconomic gaps in non-cognitive skills explain some part of the inequality in family outcomes, particularly differences in relationship instability and single motherhood?

A key finding from the Fragile Families and Child Wellbeing Study, which surveyed a large sample of unmarried couples who gave birth between 1998 and 2000, was that a very large fraction of unmarried parents were romantically involved and intended to marry at the time of the birth. Most of these relationships dissolved quickly, however, and only a small fraction actually married (Carlson et al., 2005). One explanation for this discrepancy between stated intentions and actual behavior is that low-income couples lack the relationship skills to overcome the economic and social challenges confronting their family-building efforts. Beginning in 2006, the federal government has funded programs designed to foster relationship skills, such as Building Strong Families, but the results have been disappointing in terms of

[1] Cherlin (2009) tellingly notes that American children born to married parents in the United States are more likely to see their parents break up than are Swedish children born to cohabiting parents (p. 18).
[2] More controversially, Chua and Rubenfeld (2014) attribute the differential success of ethnic groups in the U.S. to variation in culturally-induced traits such as impulse control.

measurable impacts on relationship quality and marriage (Wood, et al., 2012). However, even if existing programs are ineffective at augmenting relevant non-cognitive skills, individuals who possess psychological traits that enhance negotiating ability and self-control may experience more positive family outcomes.

In this paper, I examine the determinants of young adult relationship histories and current family status from Wave IV of the National Longitudinal Study of Adolescent Health (Add Health). This survey includes a rich set of individual traits related to motivation, interpersonal styles, and emotional responses, including a Big 5 personality inventory. There are distinct socioeconomic gradients in these traits: less educated individuals (and those with less-educated parents) tend to be less emotionally stable, optimistic, and agreeable, and to have a more external locus of control. There are also significant differences across education groups, as expected, in relationship stability and single motherhood. However, variation in non-cognitive traits explains none of the education gap in family outcomes for men and at most about 10 percent of the gaps between the highest and lowest education groups for women. Cognitive skills are also unimportant in explaining gaps in family outcomes across education groups. Non-cognitive traits explain a higher proportion of the divergence across family background groups, but these effects appear to be primarily due to the strong relationship between non-cognitive skills and own educational attainment (Lundberg, 2013ab). Educational attainment itself and the opportunities that are associated with education appear to be an important driver of family outcomes, but there is little evidence that non-cognitive skills have substantial effects on family outcomes independent of education.

2. Socioeconomic Divergence in Family Outcomes

There have been dramatic changes in American family life since the post-war years of the baby boom: increasing age at first marriage and declining marriage rates, a divorce rate that peaked around 1980 and remains high, and decreasing fertility that is more likely to occur outside of marriage. This retreat from marriage has been much more pronounced among men and women with lower levels of education (Lundberg and Pollak, 2014). Both marriage and remarriage rates have risen for women with college degrees relative to women with less education, and the fall in divorce rates since 1980 has been much larger for the college educated (Isen and Stevenson, 2011). This implies that long-term marital stability also has a pronounced education gradient: the probability that a first marriage will remain intact for 20 years is sharply higher for women with a college degree (78 percent) than for women with a high-school diploma (41 percent) or some college (49 percent) (Copen et al., 2012). The prevalence of cohabitation is strongly decreasing in education and cohabitation tends to play different roles in the lifecycles of women with high and low levels of education. For high-education couples, cohabitation is usually a precursor to marriage that rarely includes childbearing, while for less-educated couples it is often a (relatively unstable) context for bearing and rearing children (Lundberg and Pollak, 2014).

The growing divergence in marriage, cohabitation, and fertility behavior across educational groups has potentially important implications for inequality and the intergenerational transmission of economic disadvantage. The rise in single-parent families and changing patterns of relationship instability and maternal age have resulted in growing disparities in the parental resources, both time and money, received by the children of more- and less-educated mothers (McLanahan, 2004). The children of the non-college educated are particularly disadvantaged by the instability in living arrangements and parental ties that result from the more frequent partnering and re-partnering of their mothers (Cherlin, 2009).

The increasing socioeconomic discrepancies in marriage, non-marital childbearing and marital stability have been extensively documented, but their source remains somewhat of a mystery. One possibility is that, as the sources of marital surplus have altered with the decrease in gender specialization, there has been a relative decrease in the surplus available to low-income couples. An alternative explanation would emphasize the increasing importance of social and behavioral skills—self-control, conflict resolution, etc.—in maintaining marriages, as rigid social norms about cohabitation and childbearing outside marriage have weakened.

Declining Marital Surplus

As women's educational attainment, wages, and hours of market work have risen relative to men's, the opportunities for gains from trade within a household, which depend to a large extent upon the segregation of men and women in market and home sectors, have diminished—and so have the potential gains to marriage. Gender specialization in married couple households has decreased dramatically during the past 60 years and, it has been argued, the source of marital gains have shifted from production complementarities associated with home and market work to the consumption complementarities of the "hedonic" marriage (Stevenson and Wolfers, 2007; Lundberg and Pollak, 2007). The decline in the value of the productive marriage may have been particularly acute at lower income levels, where men's economic prospects have deteriorated more than those of women.

A related story about marital surplus focuses on the role of marriage as a context for childrearing (Lundberg and Pollak, 2014). Although college-educated couples are much less likely than in the past to require marital commitment to support a sharply gender-specialized division of labor, high-education couples may choose marriage as a commitment device that supports joint investments in children. Intensive investment is a characteristic parenting pattern among the well-educated and well-off, and these investments are increasing in absolute terms and relative to the investments made by those with less education and fewer resources. These increases are probably due to some combination of rising returns to human capital as income inequality rises, increasing real incomes at the top of the distribution, and improved information about the payoffs to early child enrichment activities—perhaps reinforced by evolving class-specific parenting norms.

Marital Skills Gap

Alternatively, the socioeconomic divergence of marital and childbearing behavior may be due to skill gaps between high- and low-income couples. As rigid norms about marriage weaken, the maintenance of a successful marriage may be more dependent on personal skills such as the ability to commit to an agreement or to negotiate in response to shocks.[3] This implies that the returns to traits such as self-control, verbal ability, and positive affect may have increased as the social punishments for divorce and non-marital childbearing have decreased.[4] Certainly, 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), and this is likely to apply to social outcomes as well. 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, and there may be considerable overlap between relationship skills in the market and in the home (Kambourov, Siow, and Turner, 2013).

There is no generally-accepted set of measures for traits that contribute to relationship competence. One promising candidate among the non-cognitive skill measures identified in the existing literature 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). For example, Lahey (2009) finds that individuals high in the Big 5 trait Neuroticism are more likely to experience negative life events and find it difficult to maintain supportive social relationships, including marriages. The role of personality differences in explaining socioeconomic gaps in relationship stability and other family outcomes, however, has not been studied.

Can the skills that enhance marital quality and stability be taught? In 2005, the U.S. Congress authorized $500 million for the Healthy Marriage Initiative, a set of programs intended to promote marriage, principally among low-income groups. Mathematica Policy Research evaluated one of the first major programs for unmarried couples, Building Strong Families (BSF), using randomized treatments, and found no effect on relationship quality, relationship outcomes, or the probability of marriage (Wood et al., 2012).[5]

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[3] Gottman (1994), for example, finds that relationship quality and stability are strongly related to effective communication and conflict resolution.

[4] Cognitive ability may also be important. Blazys (2009) estimates hazard models of transitions into and out of marriage for men and women in the National Longitudinal Survey of Youth 1979, and finds that cognitive skills delay marriage (principally through increased education) but increase the probability of marriage later in life and reduce the probability of divorce.

[5] All BSF programs had three components: (1) group sessions on relationship skills, (2) individual support from family coordinators, and (3) assessment and referral to support services.

3. Data and Measures

An education gradient in several aspects of relationship history and family status 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).[6] 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. Race and ethnic differences in family outcomes are substantial, with black and Hispanic men and women less likely, conditional on education, to be married and more likely to experience single parenthood. To focus on socioeconomic differences in family behavior, the analysis in this paper uses subsamples of 3,831 non-Hispanic white women and 3,483 non-Hispanic white men for whom all key variables are non-missing.

Figures 1a and 1b show the proportions of women and men, respectively, in three education groups who are currently married or in a marital or cohabiting union as of the survey date in Wave IV, are currently in a first marriage (conditional on having married), have experienced three or more co-residential unions before that time, have ever been divorced or ended a cohabiting relationship (separation) and, for women, are currently a single or lone (neither married nor cohabiting) mother. The education groups are 4-year college degree or more, some college (including holders of 2-year Associate degrees), and high school graduate or less. Education differences in union status are very small—less educated men and women enter into marital and, particularly, cohabiting unions at an earlier age than the more-educated, but those unions tend to be less stable. There are, however, distinct education gradients in relationship instability and in single and lone motherhood, with college-graduates being much less likely to experience either status.

[6] Add Health is a program project directed by Kathleen Mullan Harris and designed by J. Richard Udry, Peter S. Bearman, and Kathleen Mullan Harris at the University of North Carolina at Chapel Hill, and funded by grant P01-HD31921 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development, with cooperative funding from 23 other federal agencies and foundations. Special acknowledgment is due Ronald R. Rindfuss and Barbara Entwisle for assistance in the original design. Information on how to obtain the Add Health data files is available on the Add Health website (http://www.cpc.unc.edu/addhealth). No direct support was received from grant P01-HD31921 for this analysis.

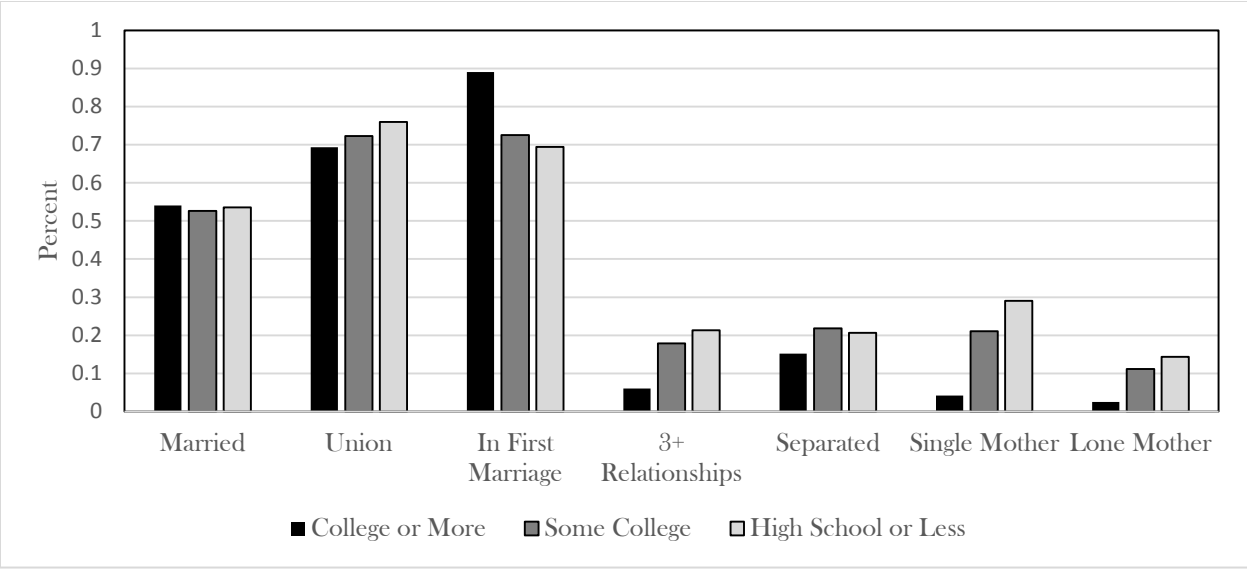

Figure 1a: Women's Family Outcomes, by Education (White, non-Hispanic, Add Health Wave IV)

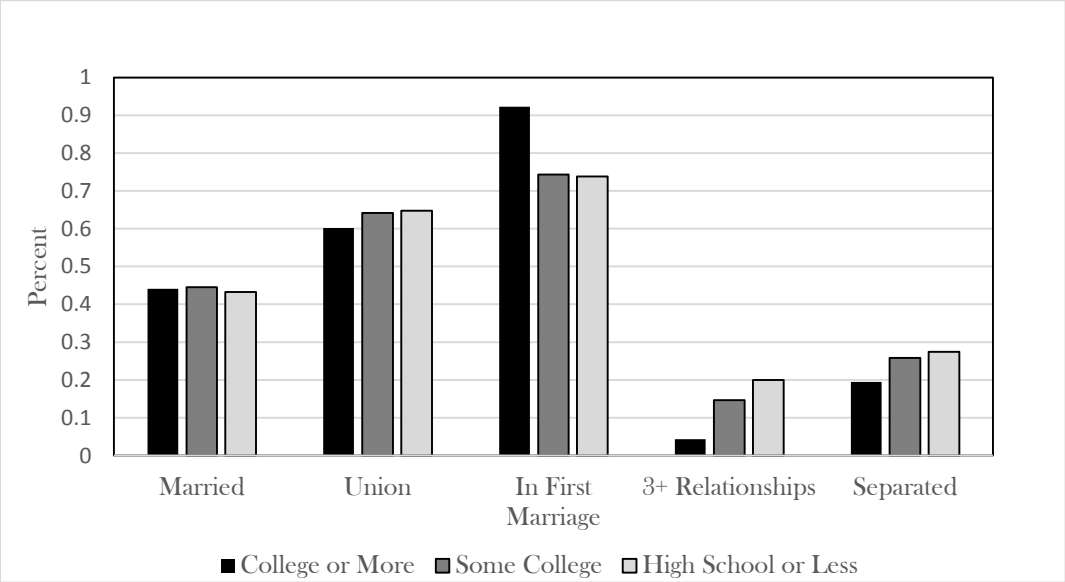

Figure 1b: Men's Family Outcomes, by Education (White, non-Hispanic, Add Health Wave IV)

Non-cognitive Skills: The Add Health study has collected an unusually rich set of psychological measures that serve in this study as indicators of non-cognitive ability, as well as several measures of cognitive ability, and a measure of risk aversion. During Wave IV, a 20-item short-form version of the 50-item International Personality Item Pool-Five-Factor Model (IPIP-FFM) known as the Mini-IPIP was fielded,[7] and it was supplemented by several other indices of personality facets and other psychological traits. 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" (Roberts, 2009).

[7] This instrument is discussed, and the specific items listed, in the Data Appendix.

Five-factor models of personality, and in particular the variant known as the "Big 5" model, are broadly accepted in psychology as a meaningful and consistent construct for describing human differences (Goldberg, 1981). 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.

Emotional Stability (vs. Neuroticism) – Predictability and consistency in emotional reactions, with absence of rapid mood changes.

Other psychological measures expected to be predictive of young adult health behaviors and outcomes were also included in the personality section of the Add Health survey in Wave IV. I have included in the set of non-cognitive skills several measures of such traits (below), but have excluded a depression scale and a perceived stress scale from the mental health section of the survey. The questions that these scales are based on refer to how the individual has been feeling during the past 7 days or the past 30 days, and so focus on current emotional states rather than persistent tendencies.

Locus of Control/Mastery – A construct that is used to categorize people's basic motivational orientations and perception of how much control they have over the conditions of their lives (APA Dictionary).

Anxiety and **Anger/Hostility**– Individual facets of Neuroticism (as identified by Costa and McCrae, 1992) that reflect tendencies to persistently experience apprehension and worry, or to respond emotionally and angrily to frustration or injury.

Optimism – A tendency to believe that things happen for the best and to anticipate positive outcomes (from APA Dictionary).

Anger/Hostility and Anxiety are individual facets of Big 5 Emotional Stability (Neuroticism) and the Add Health survey includes sets of questions that focus on these sub-traits.[8] High levels of the Anger/Hostility trait in particular might be expected to be related to difficulty in maintaining relationships. Individuals with an internal Locus of Control are more likely to behave intentionally and they "perceive their life outcomes as arising from the exercise of their own agency and abilities" (APA Dictionary). Other

[8] Studies that represent psychopathy as an extreme variant of aspects of the five-factor model of personality have included these facets among the set that characterize this disorder (Miller, Lynam, Widiger, and Leukefeld, 2001).

studies have found that an internal Locus of Control is associated with a variety of positive economic and social outcomes (Plotnick, 1992; Heckman, Stixrud, and Urzua, 2006; Cobb-Clark and Tan, 2011).

Each item in the extended personality inventory is assumed to be is a noisy measure of a single unobserved latent trait. An individual i is characterized by the set of nine non-cognitive traits T_{ij} defined above, and their responses to the K survey questions in the Wave IV survey generate:

$$t_{ijk} = \beta_{jk} T_{ij} + \varepsilon_{ijk} \qquad \text{for } k=1,\ldots,K_j \text{ and } j=1,\ldots,9$$

with measurement errors that are assumed to be independent of each other and of the trait T_j. K_j is equal to four or five for each of the traits. 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. The factor loadings and error variances from each model are then used to estimate factor scores that are unbiased estimates of each latent non-cognitive trait.

Figures 2a and 2b show the mean values of standardized non-cognitive traits for women and men in different education groups. The relationship between non-cognitive skill and education varies by trait with, among the Big 5 traits, very little socioeconomic variation in Conscientiousness and Extraversion but more significant gradients in Openness, Agreeableness, and Emotional Stability. In general, education is positively correlated with an internal locus of control and optimism and negatively correlated with anger/hostility and anxiety. For some traits, the gender gaps dominate the socioeconomic gradient—men are less agreeable and anxious and more open to experience and emotionally stable on average than women.

A possible concern with using Wave IV personality measures as non-cognitive skills that predict family outcomes is that these traits may have been directly shaped by youthful experiences. There is no standard personality inventory available in Wave I of Add Health, 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 Emotional Stability/Neuroticism, Conscientiousness, and Extraversion. Their measures have reasonable levels of internal consistency and modest but correctly-signed correlations with the corresponding Wave IV measures, and are used in some models of family outcomes for comparison.

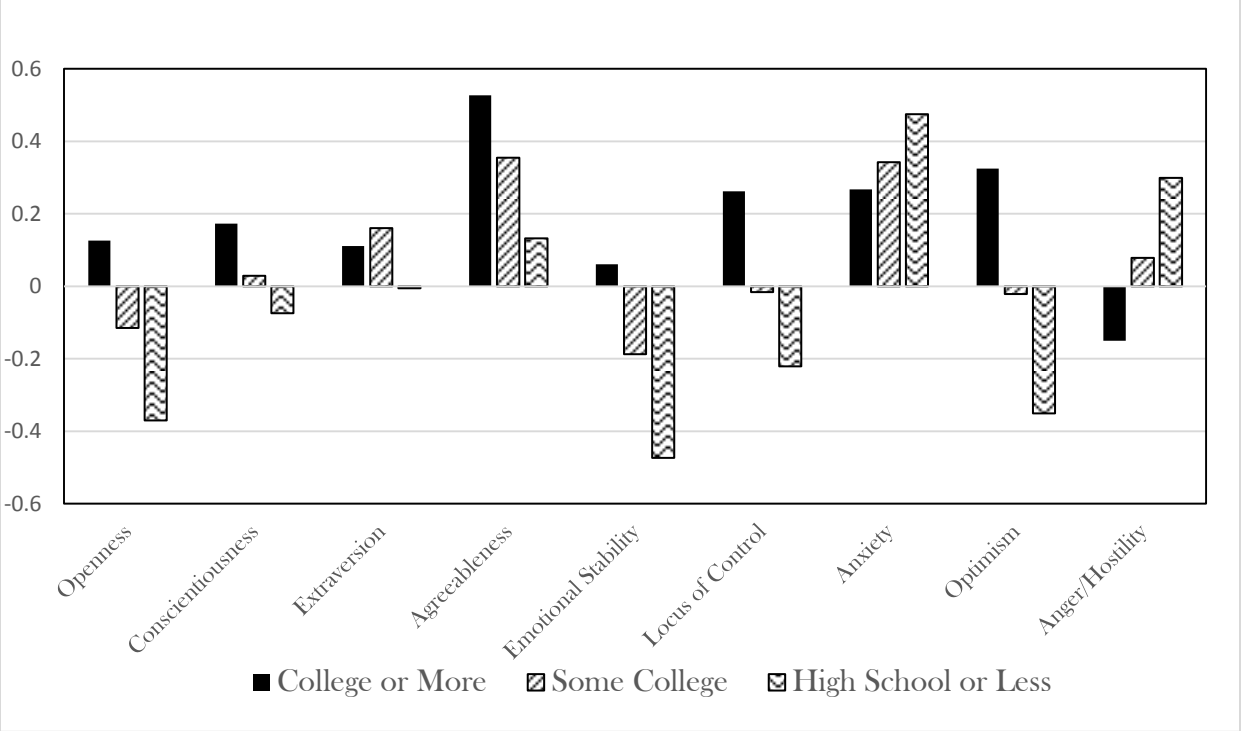

Figure 2a: Non-cognitive Skills by Education Group, Women

White, non-Hispanic women, Add Health Wave IV

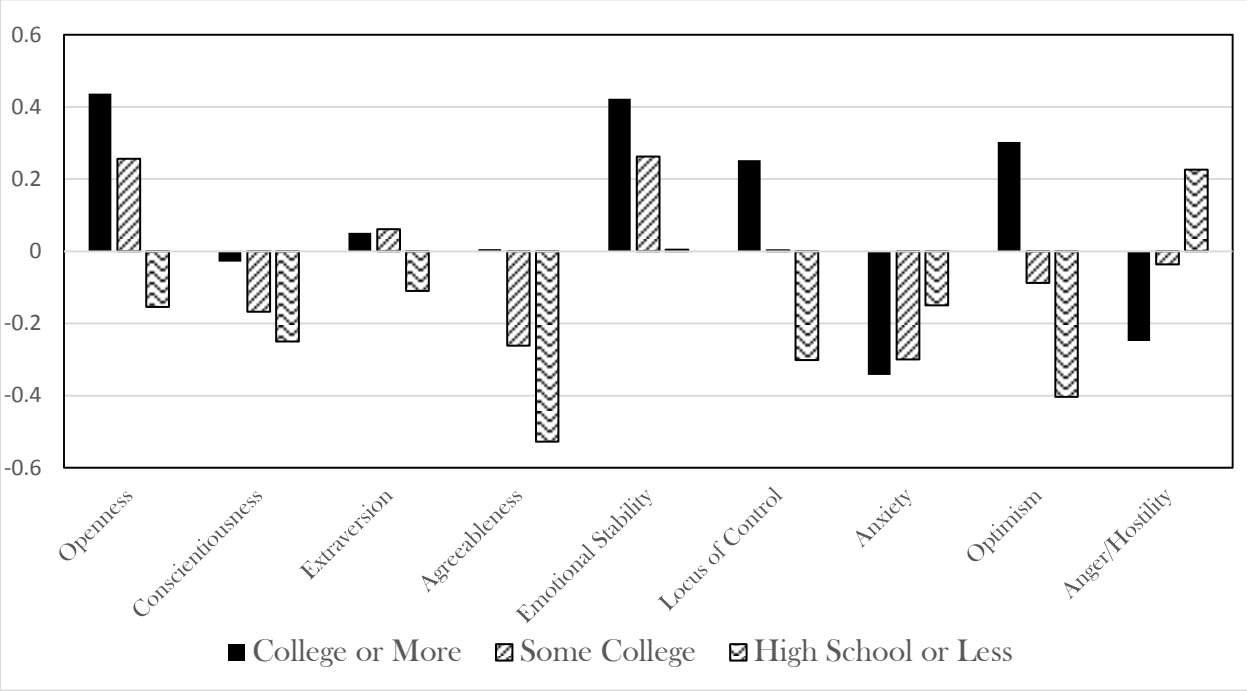

Figure 2b: Non-cognitive Skills by Education Group, Men

White, non-Hispanic men, Add Health Wave IV

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 mean of this standardized variable is about .7 standard deviations greater in the highest education group for both men and women (college graduate or more) than in the lowest education group (high school graduate or less).

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. There is no significant association between this measure of risk aversion and education in these samples.

4. Family Status, Education, and Skills

Tables 1a and 1b report the coefficients from linear probability models for four discrete indicators of family status history as of Wave IV—currently in a marital or cohabiting union, still in a first marriage (conditional on having married), having had three or more marital or cohabiting relationships and, for women, single motherhood. The independent variables are educational attainment, standardized measures of cognitive and non-cognitive skills, and risk aversion. For each outcome, the second column reports the results from a model that uses Wave IV skill measures and the third column a model based on measures of personality and cognitive ability from Wave I, when the respondents were in Grades 7 through 12.

In general, marital stability, the probability of multiple relationships and the probability of single motherhood are decreasing in education, with college graduation having a substantial association with all three outcomes. The effects of education moderate only slightly when skills and preferences are added to the model.[9] The pattern of education effects on current union status is somewhat different—the earlier entry of the less-educated, particularly into cohabiting unions, outweighs the greater stability of relationships for the more-educated, and the probability of being in union is higher for the less-educated groups in this young cohort. The R-squares are low, particularly for union status, and educational attainment accounts for most of the explained variance in the relationship instability and single motherhood models.

[9] One possible source of the education differences in first marriage persistence at this stage of the life-cycle is the later age at marriage (and thus shorter elapsed duration) for the more educated. A hazard model is a more appropriate tool for examining first marriage persistence and will be implemented in the next version of the paper.

There are, however, several non-cognitive traits that are significantly associated with family outcomes. Consistent with earlier results using German data, Openness decreases the probability of being in a union and increases relationship instability, especially for men (Lundberg, 2012). Optimism also has strong and consistent effects on family status: high levels of Optimism increase the probability of being in a union and decrease relationship instability and single motherhood. Emotional Stability, as expected, reduces relationship instability and a more internal Locus of Control increases the probability that both men and women are in a marital or cohabiting union. Other effects are gender specific. Union status for men is increasing in Extraversion and, oddly, Anger/Hostility and decreasing in Agreeableness. For women, Agreeableness reduces both relationship instability and single motherhood, while Extraversion increases the probability of single motherhood.

The short battery of personality traits extracted from Wave I also has some significant effects on family status, particularly for women. Wave I Conscientiousness is positively associated with being in a union and negatively associated with relationship instability and single motherhood, while Extraversion is positively associated with being in a union, remaining in a first marriage, and negatively associated with the probability of three or more relationships.

Cognitive ability has small significant effects on relationship stability for women and single motherhood when education is not controlled for (not reported), but these disappear in the models that include educational attainment. A positive effect remains only on the probability that men remain in a first marriage. Risk aversion has robust positive effects on union status and first marriage and negative effects on relationship instability for both men and women. These results are consistent with previous studies showing that risk aversion is positively associated with marriage (Schmidt, 2008; Spivey, 2010) and negatively associated with divorce (Light and Ahn, 2010; Lundberg, 2012).

In general, these models confirm that there are large disparities in family outcomes between young college-educated Americans and those with lower levels of education. Less-educated men and women are less likely to remain in a first marriage and more likely to experience multiple cohabiting relationships by their late twenties and early thirties, and less-educated women are more likely to become single mothers. These education gaps are reduced only slightly when a large set of cognitive and non-cognitive skill measures are included in the model and, though there are a number of significant skill-family relationships that are intuitively plausible and consistent with the findings of previous studies, these traits have little explanatory power relative to education.

5. Decomposing the Socioeconomic Gap in Family Outcomes

The regression models in the previous section do not allow for the possibility that the returns to skills in generating relationship stability and other family outcomes may vary across socioeconomic groups. In this section, the mean differences in family outcomes across education and family background groups are decomposed into components that can be "explained" by group differences in skills and preferences and residuals that are due to group differences in the model parameters, including the constant term. Dividing the sample by mother's education as an indicator of family background allows the effect of skills on family background to be both direct and indirect via own education. A Blinder-Oaxaca decomposition is implemented with linear probability models for each of the outcomes—union status, remaining in a first marriage, relationship instability, and single motherhood. Basing the decomposition on a pooled model (that includes a separate intercept for each education group, as suggested by Fortin (2008)) allows a two-fold decomposition of the family gaps into explained and unexplained portions without an addition interaction term.[10]

By Own Education: Table 2 shows the decomposition of the college-graduate vs. some college gaps in union status, relationship history, and (for women) the probability of single parenthood, while Table 3 reports the college-graduate vs. high school and below decomposition. Since skills and preferences affect educational attainment, group membership in this application is not exogenous and this decomposition should be regarded as a descriptive exercise. For a discussion of identification issues in decomposition analyses, with particular reference to the analogous problem of decomposing union-nonunion wage differentials, see Fortin, Lemieux, and Firpo (2011).

As we have seen, the mean differences between educational groups in the probability of being in a marital or cohabiting union are small: less-educated men and women are more likely to enter into such a union at an early age, but more likely to experience the dissolution of these unions than more-educated individuals. On average, men and women with a high school diploma or less are 7 percentage points more likely to be in a union than college graduates (Table 3). Men and women with some college are also more likely than graduates to be in a union, but these differences are smaller and, for women, not significant (Table 2). In all cases, these group differences can be attributed entirely to differences in the coefficients and in particular to differences in the constant terms of the union equations. Differences in non-cognitive skills and risk aversion between the education groups, rather than contributing to relationship gaps, work in the opposite direction and these effects are significant for women's non-cognitive skills and for risk aversion

[10] This is implemented in Stata with the "pooled" option of the *oaxaca* command. This command and its variants is described in Jann (2008), who also derives the variance estimators for the decomposition. Sinning, Hahn, and Bauer (2008) derive and implement a Blinder-Oaxaca decomposition for nonlinear models but, since bootstrapping the standard errors is required, their *nldecompose* command is not used for these preliminary analyses.

in the college/some college comparison. On average, the non-cognitive skills of the more educated women predict a higher union rate, rather than the lower rate that we observe.

For the other three outcomes, the differences between education groups are substantial and significant. Conditional on having ever married, college graduate men and women are close to 20 percent points more likely than the less-educated to still be in a first marriage as of Wave IV. For women, differences across groups in skills and preference make no significant contribution to that gap, and 95 percent is "explained" by differences in coefficients. In both cases, differences in the constant term more than explain the group differences in first marriage persistence. Results are slightly different for men; differences in cognitive and non-cognitive skills and risk aversion across education groups add up to a small significant contribution of about 14 percent of the high-medium education gap and an (insignificant) 9 percent of the high-low gap in first marriage persistence.

The education gaps in our measure of relationship instability are also substantial: men in the lowest educational group are 17 percentage points more likely to have experienced three or more marital or cohabiting unions by Wave IV, and women with a high-school diploma or less are 15 percentage points more likely to have had three relationships than female college graduates. Once again, differences in the constant term are equal to or greater than the mean differences between groups, and the proportion of the gap attributable to coefficient differences exceeds 90 percent in each case. There is a significant impact of non-cognitive skill levels only in the female college-high school comparison, and it is small.

The decomposition of the substantial education gaps in the probability of being a single mother in Wave IV yields very similar results. Differences in non-cognitive skill levels are significant contributors to this gap, but characteristics can account for only about 8 percent of the mean group differences in both the high-medium and high-low comparisons.

Alternative specifications of the model demonstrate that these results are robust. Allowing for non-linearities in the effects of non-cognitive skills by including dummy variables for values greater than or less than one standard deviation from the mean for each trait increases the explanatory power of characteristics only slightly. Using Wave I measures of personality and cognitive ability reduces the fraction of the gaps attributable to differences in characteristics. In the case of Wave I personality, these measures are both makeshift and partial indicators of non-cognitive skills, though they are also less likely to be endogenous with respect to young adult outcomes. Decompositions of the socioeconomic gaps in other family outcomes, such as having experienced a divorce or separation, having a history 2 or more cohabiting or marital relationships, and being a lone (non-cohabiting) mother, yield very similar patterns of results.

Differences across education groups in cognitive and non-cognitive skills fail to account for a substantive fraction of gaps in family outcomes between college-educated and other men and women and in

most cases they make no significant contribution. Overall, these results provide little support for the hypothesis that non-cognitive skills play an important role in explaining socioeconomic differences in important family outcomes. In each of these decompositions, almost all of the action is in the constant terms—education itself, rather than skills and preferences that are correlated with education appears to be the source of differences in the stability of relationships and in single motherhood.

By Family Background: Both cognitive and non-cognitive skills have substantial effects on educational attainment in the Add Health sample (Lundberg, 2013ab), and so it is possible that these skills are important drivers of family status through this channel. By redefining groups on the basis of the mother's educational attainment and estimating decomposition models that are both conditional and unconditional on own education, we can investigate how skills and own education mediate the relationship between family background and family outcomes. Since the gaps in union status by maternal education are extremely small, this outcome is not included in this analysis.

Table 4a and 4b report the decompositions of family outcomes across family background groups for women and Table 5a and 5b do the same for men. The average education level of mothers is lower than that of the Add Health respondents, and so the education groups are adjusted to some college or more, high school, and less than high school to maintain adequate sample sizes. The first column in each table decomposes the differences in educational attainment (in years completed) across family background groups. Then two variants of each family outcome model are estimated: one includes just skills and risk aversion as explanatory variables, and the other includes own educational attainment as well.

The disparity in educational attainment between the high and medium mother's education groups is about 1.4 years for both men and women, and the gap between the high and low mother's education groups is 2.8 years for women and 2.6 years for men. Between 19 and 27 percent of these gaps can be explained by disparities in non-cognitive skills and cognitive ability across these groups, with the impact of non-cognitive skills somewhat larger in each case. This provides a sharp contrast with the previous analysis, in which individual traits appeared to be relatively unimportant in explaining family outcome discrepancies across own education groups.

Individual characteristics also play an important role in explaining differences in family outcomes by family background. In the models that do not include education, the fraction of the gap explained by characteristics varies between 18 and 43 percent, with most in the 20 to 25 percent range. The one exception is the high-low gap in the persistence of first marriage for men, in which differences in characteristics (and particularly cognitive ability) more than explain the group difference. The roles of non-cognitive skills in explaining gaps in first marriage and relationship instability are very different for men and women. For men, non-cognitive skill gaps make no significant contribution to the explanation of family outcome gaps, though cognitive ability does matter.

When own educational attainment is included in the model, however, it becomes clear that the increased significance of cognitive and non-cognitive skills in the prediction of family outcomes across family background groups is an indirect effect through their impact on education. Education increases the "explained" proportion of the gap to at least 60 percent while nearly eliminating the independent contribution of skills. The two exceptions are the gap between the two higher family background groups for women, where non-cognitive skills remain important factors explaining mean differences (due primarily to the impact of differences in optimism and emotional stability), and the impact of cognitive ability on first marriage for men.

The pattern is similar for single motherhood. Differences in characteristics explain about 25 percent of the gap unconditional on education, but more than 80 percent when education is included in the model. The impact of non-cognitive skill levels is reduced substantially (from about 20 percent to 10-12 percent) by the addition of educational attainment in the decomposition but remains significant. The principal contributor to the skill component of the family background gap in single motherhood is differences in optimism.

The relative unimportance of non-cognitive skills in explaining socioeconomic gaps in important family outcomes such as marital stability and single motherhood is made even more surprising by the possibility that traits measured in adulthood may have been influenced by the relationship history of the individual. There is considerable evidence that Big 5 personality traits are remarkably stable over the adult lifecycle,[11] but some malleability in adolescence cannot be ruled out, and the stability of other measures included here, such as optimism, are relatively unexplored. When the decomposition analyses are repeated using only Wave I measures of non-cognitive and cognitive skills, the pattern of results is very similar. Early measures of non-cognitive traits have some modest explanatory power in models of family outcomes that do not include education, but this disappears when education is included.

[11] A survey of this literature is included in Lundberg (2013b).

6. Conclusions

Federal programs that attempt to foster relationship skills among the poor are responding to concerns that falling marriage rates and rising non-marital childbearing in low-income communities may be exacerbated by a deficit in non-cognitive abilities such as self-control and communications skills. A growing literature in economics and psychology that documents the importance of non-cognitive skills and personality traits for a broad set of economic and social outcomes also motivates this investigation of the sources of socioeconomic gaps in family history and family status for a recent cohort of young adults. The findings from the Add Health data show that even though individual non-cognitive traits, such as personality, locus of control, and optimism are correlated with family outcomes such as relationship instability and single motherhood, differences in these traits across education and family background groups fail to explain any portion of most of these gaps. The major exception is single motherhood, for which a small fraction of the differences across education groups can be attributed to differences in emotional stability and optimism.

Instead, much of the correlation between non-cognitive skills and family outcomes arises because these skills are strong predictors of educational attainment. Education itself appears to be playing a central role in socioeconomic differences in family behavior—the results here are consistent with the conclusion that economic advantages have a causal impact on family stability.

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Table 1a: Effects of Education and Skills on Women's Family Status, Linear Probability Model

	Union	Union	Union Wave I measures	First Marriage	First Marriage	First Marriage Wave I measures	3+ Relation-ships	3+ Relation-ships	3+ Relation-ships Wave I measures	Single Mom	Single Mom	Single Mom Wave I measures
Some College	-0.05*	-0.05**	-0.05*	0.01	0.01	-0.001	-0.03	-0.02	-0.03	-0.07***	-0.06**	-0.02
	(0.024)	(0.024)	(0.028)	(0.029)	(0.030)	(0.035)	(0.021)	(0.022)	(0.024)	(0.023)	(0.024)	(0.027)
College Graduate	-0.07***	-0.09***	-0.10***	0.20***	0.19***	0.19***	-0.15***	-0.13***	-0.13***	-0.24***	-0.22***	-0.17***
	(0.023)	(0.025)	(0.029)	(0.025)	(0.028)	(0.032)	(0.018)	(0.019)	(0.022)	(0.019)	(0.020)	(0.023)
Openness		-0.02**			-0.01			0.02**			0.00	
		(0.010)			(0.012)			(0.007)			(0.008)	
Conscientiousness		0.02	0.031**		-0.01	0.01		-0.00	-0.02*		0.00	-0.02**
		(0.010)	(0.012)		(0.011)	(0.013)		(0.007)	(0.008)		(0.007)	(0.009)
Extraversion		-0.01	0.021*		-0.01	0.03**		0.01	-0.02*		0.02***	-0.01
		(0.010)	(0.012)		(0.011)	(0.014)		(0.007)	(0.009)		(0.008)	(0.009)
Agreeableness		0.00			0.01			-0.02**			-0.02**	
		(0.012)			(0.014)			(0.009)			(0.009)	
Emotional Stability		0.00	0.020		0.01	0.01		-0.02*	-0.000		-0.01	0.003
		(0.015)	(0.013)		(0.017)	(0.014)		(0.011)	(0.009)		(0.012)	(0.010)
Locus of Control		0.03**			0.01			0.02*			0.00	
		(0.013)			(0.016)			(0.010)			(0.011)	
Anxiety		-0.01			0.01			0.00			-0.01	
		(0.013)			(0.014)			(0.009)			(0.010)	
Optimism		0.03**			0.02			-0.03***			-0.03***	
		(0.013)			(0.015)			(0.010)			(0.010)	
Anger/Hostility		0.01			-0.001			-0.01			0.02	
		(0.014)			(0.016)			(0.010)			(0.011)	
Risk Aversion		0.03***			0.03**			-0.02***			-0.00	
		(0.010)			(0.012)			(0.008)			(0.008)	
Cognitive Ability		-0.01	-0.001		-0.01	-0.002		-0.002	0.001*		0.01	-0.001
		(0.011)	(0.001)		(0.012)	(0.001)		(0.008)	(0.001)		(0.008)	(0.001)
Observations	3831	3831	2751	2344	2344	1722	3831	3831	2751	3831	3831	2751
Adjusted R^2	0.003	0.015	0.019	0.049	0.054	0.058	0.038	0.053	0.036	0.078	0.087	0.056

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Sample is white, non-Hispanic men in Wave IV.

Table 1b: Effects of Education and Skills on Men's Family Status, Linear Probability Model

	Union	Union	Union Wave I measures	First Marriage	First Marriage	First Marriage Wave I measures	3+ Relation-ships	3+ Relation-ships	3+ Relation-ships Wave I measures
Some College	-0.02	-0.02	-0.01	-0.004	-0.02	-0.03	-0.07***	-0.07***	-0.07***
	(0.025)	(0.026)	(0.032)	(0.031)	(0.032)	(0.040)	(0.019)	(0.020)	(0.024)
College Graduate	-0.07***	-0.08***	-0.07**	0.18***	0.14***	0.17***	-0.17***	-0.17***	-0.17***
	(0.026)	(0.028)	(0.035)	(0.026)	(0.029)	(0.035)	(0.016)	(0.018)	(0.022)
Openness		-0.06***			-0.01			0.02***	
		(0.011)			(0.013)			(0.007)	
Conscientiousness		-0.01	0.01		-0.03**	-0.02		-0.00	0.01
		(0.011)	(0.013)		(0.013)	(0.017)		(0.008)	(0.010)
Extraversion		0.02*	0.01		-0.01	0.05***		0.01*	-0.02
		(0.012)	(0.014)		(0.014)	(0.017)		(0.008)	(0.010)
Agreeableness		-0.03**			0.03*			-0.00	
		(0.012)			(0.015)			(0.009)	
Emotional Stability		0.00	0.002		0.02	0.01		-0.04***	-0.01
		(0.018)	(0.015)		(0.022)	(0.019)		(0.013)	(0.011)
Locus of Control		0.04**			0.01			0.01	
		(0.014)			(0.016)			(0.009)	
Anxiety		-0.02			-0.002			-0.01	
		(0.014)			(0.017)			(0.009)	
Optimism		0.04***			0.02			-0.01	
		(0.013)			(0.017)			(0.010)	
Anger/Hostility		0.04**			0.02			-0.01	
		(0.015)			(0.017)			(0.010)	
Risk Aversion		0.04***			0.04***			-0.02**	
		(0.011)			(0.013)			(0.008)	
Cognitive Ability		0.02*	-0.002		0.03*	-0.001		-0.00	0.002***
		(0.012)	(0.001)		(0.014)	(0.001)		(0.007)	(0.001)
Observations	3483	3483	2370	1773	1773	1228	3483	3483	2370
Adjusted R^2	0.003	0.038	0.006	0.037	0.051	0.066	0.042	0.056	0.046

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Sample is white, non-Hispanic men in Wave IV.

Table 2: Decomposition of the Education Gap in Family Status: High vs. Medium

	Women				Men		
	Union	First Marriage	3+ Relationships	Single Mom	Union	First Marriage	3+ Relationships
Means by Own Education							
College or More	0.6813	0.8660	0.0538	0.0380	0.5759	0.9221	0.0394
Some College	0.7063	0.7075	0.1783	0.2165	0.6263	0.7414	0.1378
Raw Difference	-0.0251	0.1885***	-0.1244***	-0.1786***	-0.0505*	0.1807***	-0.0984***
Differences in Characteristics	0.0185**	0.0091	-0.0083	-0.0133**	0.0124	0.0254**	-0.0022
	[-0.737]	[0.048]	[0.067]	[0.075]	[-0.258]	[0.141]	[0.022]
Non-Cognitive Skills	0.0165**	0.0101	-0.0024	-0.0156***	0.0017	0.0164	-0.0002
Cognitive Ability	-0.0025	-0.0024	-0.0033	0.0017	0.0053	0.0053	-0.0011
Risk Aversion	0.0046*	0.0014	-0.0026*	0.0006	0.0055*	0.0037	-0.0009
Differences in Coefficients	-0.0436*	0.1794***	-0.1161***	-0.1652***	-0.0629**	0.1553	-0.0962***
	[1.737]	[0.952]	[0.933]	[0.925]	[1.258]	[0.859]	[0.978]
Constant	-0.0418	0.1922***	-0.1480***	-0.1876***	-0.0775**	0.1829	-0.1074***

Note: p-values in parentheses. Percentage of raw difference explained in brackets.

*** p<0.01, ** p<0.05, * p<0.1

Samples are white, non-Hispanic women and men in Wave IV.

Table 3: Decomposition of the Education Gap in Family Status: High vs. Low

	Women				Men		
	Union	First Marriage	3+ Relationships	Single Mom	Union	First Marriage	3+ Relationships
Means by Own Education							
College or More	0.6813	0.8960	0.0538	0.0380	0.5759	0.9221	0.0394
High School or Less	0.7526	0.6936	0.2080	0.2818	0.6448*	0.7458	0.2110
Raw Difference	-0.0713***	0.2024***	-0.1542***	-0.2438***	-0.0690***	0.1763***	-0.1716***
Differences in Characteristics	0.0161	0.0111	-0.0119	-0.0130	0.0042	0.0162	-0.0079
	[-0.226]	[0.055]	[0.077]	[0.075]	[-0.061]	[0.092]	[0.046]
Non-Cognitive Skills	0.0234**	0.0167	-0.0190**	-0.0191**	-0.0053	0.0124	-0.0043
Cognitive Ability	-0.0093	-0.0096	0.0091	0.0062	0.0058	0.0035	-0.0016
Risk Aversion	0.0020	0.0040	-0.0019	-0.0001	0.0037	0.0003	-0.0020
Differences in Coefficients	-0.0874***	0.1913***	-0.1423***	-0.2309***	-0.0732**	0.1601***	-0.1638***
	[1.226]	[0.945]	[0.923]	[0.925]	[1.061]	[0.908]	[0.954]
Constant	-0.0909***	0.2083***	-0.1545***	-0.2530***	-0.0892***	0.1193***	-0.1724***

Note: p-values in parentheses. Percentage of raw difference explained in brackets.

*** p<0.01, ** p<0.05, * p<0.1

Samples are white, non-Hispanic women and men in Wave IV.

Table 4a: Decomposition of Family Background Gap in Education and Family Status: High vs. Medium

	Women						
	Years of Education	First Marriage	First Marriage (incl. education)	3+ Relationships	3+ Relationships (incl. education)	Single Mom	Single Mom (incl. education)
Means by Mother's Education							
Some College or More	15.26	0.8057		0.1026***	-	0.1141***	-
High School	13.83	0.7592		0.1468***	-	0.1823***	-
Raw Difference	1.44***	0.0465**		-0.0442***	-	-0.0682***	-
Differences in Characteristics	0.27***	0.0097*	0.0541***	-0.0101***	-0.0379***	-0.0164***	-0.0605***
	[0.188]	[0.209]	[1.163]	[0.229]	[0.858]	[0.240]	[0.887]
Non-Cognitive Skills	0.17***	0.0092*	0.0033	-0.0108***	-0.0069**	-0.0140***	-0.0075**
Cognitive Ability	0.11***	0.0017	-0.0015	-0.0007	0.0019	-0.0026	0.0017
Risk Aversion	-0.01	-0.0012	-0.0010	0.0013	0.0011	0.0002	-0.0001
Own Education			0.0533***		-0.0341***		-0.0547***
Differences in Coefficients	1.17***	0.0369	-0.0075	-0.0341**	-0.0063	-0.0518***	-0.0077
	[0.813]	[0.791]	[-0.163]	[0.771]	[0.142]	[0.760]	[0.113]
Constant	1.05***	0.0084	-0.0962***	-0.0498***	-0.0113	-0.0441**	0.0210

Note: p-values in parentheses. Percentage of raw difference explained in brackets.
*** p<0.01, ** p<0.05, * p<0.1
Samples are white, non-Hispanic women and men in Wave IV.

Table 4b: Decomposition of Family Background Gap in Education and Family Status: High vs. Low

	Women						
	Years of Education	First Marriage	First Marriage (incl. education)	3+ Relationships	3+ Relationships (incl. education)	Single Mom	Single Mom (incl. education)
Means by Mother's Education							
Some College or More	15.26	0.8057		0.1026***	-	0.1141***	-
Less than High School	12.44	0.7061		0.2316***	-	0.2736***	-
Raw Difference	2.82***	0.0996***		-0.1290***	-	-0.1595***	-
Differences in Characteristics	0.64***	0.0429***	0.1226***	-0.0225**	-0.0812***	-0.0404***	-0.1317***
	[0.227]	[0.431]	[1.231]	[0.175]	[0.629]	[0.254]	[0.826]
Non-Cognitive Skills	0.37***	0.0294**	0.0162	-0.0171**	-0.0081	-0.0328***	-0.0192**
Cognitive Ability	0.28***	0.0172**	0.0067	-0.0081*	-0.0010	-0.0079*	0.0025
Risk Aversion	-0.01	-0.0037	-0.0031	0.0026	0.0024	0.0003	0.0000
Own Education			0.1028***		-0.0744***		-0.1149***
Differences in Coefficients	2.18***	0.0568	-0.0229	-0.1065***	-0.0479	-0.1191***	-0.0278
	[0.773]	[0.569]	[-0.231]	[0.825]	[0.371]	[0.746]	[0.174]
Constant	2.10***	0.0437	-0.0337	-0.1459***	-0.0607*	-0.1224***	-0.0418

Note: p-values in parentheses. Percentage of raw difference explained in brackets.
*** p<0.01, ** p<0.05, * p<0.1
Samples are white, non-Hispanic women and men in Wave IV.

Table 5a: Decomposition of Family Background Gap in Education and Family Status: High vs. Medium

	Men				
	Years of Education	First Marriage	First Marriage (incl. education)	3+ Relationships	3+ Relationships (incl. education)
Means by Mother's Education					
Some College or More	14.61	0.8224		0.0958***	-
High School	13.26	0.7617		0.1505***	-
Raw Difference	1.35***	0.0607**		-0.0547***	-
Differences in Characteristics	0.36***	0.0133*	0.0348***	-0.0082**	-0.0365***
	[0.267]	[0.219]	[0.573]	[0.149]	[0.667]
Non-Cognitive Skills	0.23***	0.0096	0.0008	-0.0041	0.0025
Cognitive Ability	0.13***	0.0062*	0.0035	-0.0048*	-0.0007
Risk Aversion	-0.01	-0.0025	-0.0023	0.0008	0.0006
Own Education			0.0328***		-0.0390***
Differences in Coefficients	1.00***	0.0474*	0.0259	-0.0466***	-0.0182
	[0.733]	[0.781]	[0.427]	[0.851]	[0.333]
Constant	1.11***	0.0274	-0.0170	-0.0592***	-0.0368*

Note: p-values in parentheses. Percentage of raw difference explained in brackets.

*** p<0.01, ** p<0.05, * p<0.1

Samples are white, non-Hispanic women and men in Wave IV.

Table 5b: Decomposition of Family Background Gap in Education and Family Status: High vs. Low

	Men				
	Years of Education	First Marriage	First Marriage (incl. education)	3+ Relationships	3+ Relationships (incl. education)
Means by Mother's Education					
Some College or More	14.61	0.8224		0.0958***	-
Less than High School	12.03	0.7833		0.1968***	-
Raw Difference	2.58***	0.0392		-0.1010***	-
Differences in Characteristics	0.70***	0.0504***	0.0741***	-0.0198**	-0.0781***
	[0.271]	[1.286]	[1.890]	[0.196]	[0.774]
Non-Cognitive Skills	0.39***	0.0193	0.0076	-0.0098	0.0016
Cognitive Ability	0.30***	0.0347***	0.0309***	-0.0094	-0.0024
Risk Aversion	0.003	-0.0037	-0.0037	-0.0006	-0.0005
Own Education			0.0393**		-0.0769***
Differences in Coefficients	1.39***	-0.0112	-0.0349	-0.0812***	-0.0228
	[0.729]	[-0.286]	[-0.890]	[0.804]	[0.226]
Constant	2.11***	-0.0479	-0.1041**	-0.0854**	-0.0290

Note: p-values in parentheses. Percentage of raw difference explained in brackets.

*** p<0.01, ** p<0.05, * p<0.1

Samples are white, non-Hispanic women and men in Wave IV.

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. The mean age of respondents was 29 at the time of the Wave IV survey (2008Wave IV sampling weights are used in all analyses.

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.

Construction of Cognitive Ability Index

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

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). Also included are the two facets of Emotional Stability—Anger/Hostility and Anxiety—and the indices for the traits Optimism and Locus of Control.

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. [12]

Wave I personality measures (Young and Beaujean, 2011) are based on Likert scale responses (from strongly agree to strongly disagree) to the following statements:

Emotional Stability	You have a lot of good qualities. You have a lot to be proud of. You like yourself just the way you are. You feel like you are doing everything about right. You feel socially accepted. You feel wanted and loved.
Extraversion*	I feel close to people at school. I feel like I am a part of this school. I feel socially accepted.
Conscientiousness	When you have a problem to solve, one of the first things you do is get as many facts about the problem as possible. When you are attempting to find a solution to a problem, you usually try to think of as many different ways to approach the problem as possible. When making decisions, you generally use a systematic method for judging and comparing alternatives. After carrying out a solution to a problem, you usually try to analyze what went wrong.

* Extraversion items are taken from the In-School questionnaire rather than the In-Home questionnaire.

[12] 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 Non-Cognitive Skill 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	0.4270
I often forget to put things back in their proper place (reversed)	0.5956	0.6452	0.5462
I like order	0.4715	0.7777	0.3586
I make a mess of things (reversed)	0.5681	0.6772	0.4963
Extraversion (α=.72)			
I am the life of the party	0.5375	0.7110	0.3030
I don't talk a lot (reversed)	0.5746	0.6699	0.3438
I talk to a lot of different people at parties	0.6422	0.5875	0.4381
I keep in the background (reversed)	0.6870	0.5281	0.5214
Agreeableness (α=.71)			
I sympathize with others' feelings	0.5658	0.6799	0.3615
I am not interested in other people's problems (reversed)	0.6441	0.5851	0.4783
I feel others' emotions	0.5736	0.6710	0.3714
I am not really interested in others (reversed)	0.6221	0.6130	0.4409
Neuroticism (α=.62)			
I have frequent mood swings	0.6332	0.5991	0.6182
I am relaxed most of the time (reversed)	0.4550	0.7930	0.3356
I get upset easily	0.6195	0.6162	0.5880
I seldom feel blue (reversed)	0.3680	0.8646	0.2489
Internal Locus of Control/Mastery			
There is little I can do to change the important things in my life	0.6212	0.6142	0.2854
Other people determine most of what I can and cannot do	0.6499	0.5777	0.3175
There are many things that interfere with what I want to do	0.4818	0.7679	0.1771
I have little control over the things that happen to me	0.6976	0.5134	0.3835
There is really no way I can solve the problems I have	0.6949	0.5171	0.3793
Anxiety			
I worry about things	0.6208	0.6147	0.4427
I am not easily bothered by things (reversed)	0.5909	0.6509	0.3980
I get stressed out easily	0.6583	0.5667	0.5093
I don't worry about things that have already happened	0.5108	0.7390	0.3030
Optimism			
I'm always optimistic about my future	0.4170	0.8261	0.2589
I hardly ever expect things to go my way (reversed)	0.5956	0.6453	0.4735

Overall, I expect more good things to happen to me than bad	0.5784	0.6655	0.4459
I rarely count on good things happening to me (reversed)	0.6380	0.5929	0.5520
Anger/Hostility			
I get angry easily	0.7541	0.4314	0.4856
I rarely get irritated (reversed)	0.5193	0.7304	0.1975
I lose my temper	0.7497	0.4379	0.4756
I keep my cool (reversed)	0.6213	0.6140	0.2811