Who Becomes a Father?
The Rising Importance of Non-Cognitive Ability*

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We analyze if men's fertility has become more intimately related to their non-cognitive ability during the last decades. In particular, are the men with low non-cognitive ability – who have lost the most in the labor market – also losing ground in terms of fertility? Using high-quality Swedish administrative data, we show that non-cognitive ability has become increasingly important for men's fertility, while the association of fertility with cognitive ability has moved in the opposite direction. Using sibling and twin comparisons, we show that our results are not driven by family-fixed characteristics. Further, estimates for MZ and DZ twins suggest that the impact of non-cognitive ability is driven by genetic factors. We find suggestive evidence that the increased importance of non-cognitive ability for fatherhood both goes through its increased return on the labor market and an increased demand for social skills in potential fathers.

Keywords: Men; labor market returns; fertility; non-cognitive ability; cognitive ability

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1. Introduction

At a time of surging health and economic inequality among men (Deaton 2013; Chetty et al 2016; Autor et al 2019; Pierce and Schott 2020), we know little about an essential aspect of many men's life, namely male fertility. In this paper, we analyze how the selection into fatherhood based on cognitive and non-cognitive ability has changed over time.

Recent research suggests that high-earning men are selected into fatherhood (Mari 2019; Kunze 2020). This is in line with studies, exploiting shocks to labor earnings, that show that decreases in male earnings reduce male fertility (e.g., Kearny and Wilson 2018; Anelli et al 2019; Autor et al 2019; Bratsberg et al 2021). At the same time, the individual abilities that render the highest return on the labor market have changed. Over the last decades, the increasing returns for men to non-cognitive ability, both in absolute terms and relative to cognitive ability, have been documented in countries as diverse (from a labor market organization perspective) as the US and Sweden (Autor et al 2003; Lindqvist and Vestman 2011; Deming 2017; Deming and Noray 2020; Hensvik and Nordström Skans 2020; Edin et al 2021). This raises the question of whether men with low non-cognitive ability also experience a higher risk of not becoming fathers.

Using rich high-quality Swedish administrative data, we study the change in the fertility gradient with respect to cognitive and non-cognitive ability of all Swedish men born between 1951 and 1972.[1] We use data from the mandatory military enlistment for Swedish men that includes extensive standardized test scores of cognitive ability and results from a screening of non-cognitive ability on several dimensions, performed by professional psychologists. Our data on abilities is therefore comparable both across individuals and cohorts. We can also link all men to their brothers, including twin brothers, which allows us to account for possible confounding unobservable family-fixed characteristics.

We find that men are increasingly selected into fatherhood based on their non-cognitive ability. While the importance of non-cognitive ability for childlessness has increased, changes related to the number of children among fathers are minor. In contrast, cognitive ability is increasingly associated with lower male fertility. Thus, the importance of non-cognitive ability for male fertility has not only increased in absolute terms but also relative to cognitive ability. By using brother and twin fixed-effects models, we show that our results are not driven by

[1] As in many other countries, male fertility has, albeit modestly, declined in Sweden in recent decades, from 1.82 children on average for men born at the beginning of the 1950s to 1.71 for men born in the second half of the 1960s (Jalovaara et al 2019). These authors also show that fertility has declined the most for men with only primary education. However, the share of men with only primary education is very small in Sweden in recent cohorts, making it difficult to draw any inference about characteristics of men that are falling behind in terms of fertility.

unobservable family-fixed characteristics. Access to information on twin zygosity enables us to analyze the relative importance of environmental and genetic factors and to control for endowments which may be crucial for childlessness and ability. We find that while there is no effect of non-cognitive ability on fertility for monozygotic (fraternal) twins, the effect on dizygotic (identical) twins is as large as among non-twin brothers and singletons. This suggests that childhood investments alone do not promote the development of non-cognitive ability (see e.g., Heckman 2006) but also genetics.

We conduct some explorative analysis of potential mechanisms for the increased absolute and relative importance of non-cognitive ability for male fertility. We focus on partnership status and labor income. Most men acquire a partner before having children, but partnership in itself has been shown to be linked to men's labor income (Killewald and Lundberg 2017; Ludwig and Brüdler 2018). Non-cognitive ability is likely to influence both the potential of finding a partner and also earnings. We find suggestive evidence that the increased importance of non-cognitive ability for fatherhood goes through its increased return on the labor market. Once we condition on men's labor income decile at age 45, we no longer see a stronger negative association between the probability of being childless at age 45 and non-cognitive ability for recent cohorts compared to earlier. Furthermore, the increased importance of non-cognitive ability for fatherhood does not seem to operate through an increased probability of ever having had a partner. Rather, in recent cohorts we see that higher non-cognitive ability is associated with a decreased probability of being childless at age 45 conditional on having had at least one partner before age 45. Given the recent prevalence of the dual earner model, this suggests that the increased importance of non-cognitive skills for fatherhood may also be driven by an increase in women's demand for potential fathers who have social skills (see e.g., Trimarchi and van Bavel 2017).

The two papers most related to our research question, Kramarz et al (2021) and Kolk and Barclay (2021), also use Swedish administrative data. Using twin data, Kramarz et al (2021) investigate the causal relation between fertility and human capital with cognitive and non-cognitive ability as two of several explanatory variables. They find a positive association between cognitive and non-cognitive ability and male fertility over their entire sample period, after controlling for family background. Kolk and Barclay (2021), in contrast, focus on the impact of cognitive ability on male fertility by estimating linear probability models for childlessness at age 45. They find a high probability of being childless among men with low cognitive ability in general, but also when adjusting for differences in disposable income and education, using brother-fixed effects models, and at all cumulative levels of disposable income. Kolk and Barclay (2021) suggest that there is a strong relationship between cognitive ability and ever marrying; men with higher cognitive ability are about 20 percent more likely to ever marry than men with lower cognitive ability. We take these findings further by studying how the selection into fatherhood based on cognitive and non-cognitive ability has changed over time. This is important because a focus on average patterns across cohorts may hide important changes with implications for both individual and societal welfare. Indeed, we do find sizable changes over time, which means that the men who become fathers now have a different set of abilities that men in earlier generations did not. Importantly, we find that the men who are more likely to be childless are also the men who are falling behind on the labor market.

Finally, we contribute to the literature by documenting that non-cognitive ability has a significant impact on a multitude of adult outcomes, both for men and women (e.g., Heckman et al 2006; Cunha and Heckman 2008; Carneiro and Lee 2009; Heckman et al 2019). While there is some evidence on how women's fertility varies over the cognitive and non-cognitive ability gradient (Heckman et al 2006), less is known about how men's fertility is affected. Thus, we contribute with new and causal evidence on how non-cognitive ability affects male fertility and changes in this relation over time but also speak to the question on the relative importance of nature and nurture in fostering non-cognitive ability. In contrast to previous research, we find that genetic factors, not only environmental factors, seem to be important.

In sum, we add to the previous literature on the selection of men into fatherhood by focusing on how the role of cognitive and non-cognitive ability has changed over time. To the best of our knowledge, this is the first paper to address this issue. The paper proceeds as follows. We present the empirical framework in Section 2, followed by the main results and robustness checks in Section 3. In Section 4 we present some additional results and in Section 5 we study potential mechanisms. Finally, in Section 6 we conclude.

2. Empirical framework

2.1 Data

Our main data source is population data from different Swedish registers. This is an advantage because fertility, especially fatherhood, is more accurately recorded in register than in survey data. We focus on men born from 1951 to 1972 who are still alive and resident in Sweden at age 45. By using the Multi Generation Register of Statistics Sweden we can link all men in the population to their siblings. Using this information, we create a sample including all male full siblings on the mother's side but excluding twins, who form a separate sample. We use these two sibling samples for the causal analysis using brother and twin comparisons. Finally, from the Swedish Twin Register of the Karolinska Institutet we have data on zygosity for 42 percent of the twin pairs identified through the Multi Generation Register. We use this sample to explore the relative importance of genes and environmental factors. We measure men's fertility at age 45 and link this data to information about the men in the Population Register (RTB), Education Register, and Income Register, all from Statistics Sweden.

We collect data on abilities from the Swedish Military Enlistment Data administered by the Swedish War Archives. For our cohorts, military enlistment was mandatory, and over 90 percent in each cohort enlisted. Most men, 97 percent, enlisted at age 18 or 19. We include men who enlisted between the ages of 17 and 24. For these men the military enlistment procedure involved tests of medical status, physical fitness, cognitive ability, and an interview with a psychologist. To measure cognitive and non-cognitive ability we use results from the cognitive ability and the personality tests. The test of cognitive ability consists of four parts that assess the conscript's logical, verbal, spatial, and technical skills. Each part was graded on a 9-point scale. We use a variable that measures general cognitive ability, also ranging from 1 to 9, which summarizes the results on the four subtests. The variable follows a Stanine scale that approximates a normal distribution with a mean of 5 and standard deviation of 2.

As a measure of non-cognitive ability, we use the psychologist's evaluation of the conscript, which is based on a 20–25-minute interview. The psychologist had information about the conscript's test of cognitive ability, physical endurance, muscular strength, school grades, and answers to questions about friends, family, and hobbies before the interview (Lindqvist and Vestman 2011). The purpose of the interview was to evaluate the conscript's social maturity (degree of extroversion, responsibility, and independence), psychological energy (perseverance and ability to focus), intensity (activation without external pressure) and emotional stability (tolerance to stress) to predict his suitability for military leadership. Based on the psychologist's evaluation, the conscript received a score ranging from 1 to 9, following a Stanine scale. A high score indicated willingness to assume responsibility, independence, an outgoing character, persistence, emotional stability, and power of initiative, but also social skills (Lindqvist and Vestman 2011).

2.2 Empirical modeling

To study the relationship between male fertility and cognitive and non-cognitive ability, we estimate a set of OLS and linear probability models using the following equation:

$$y_i = \alpha_0 + f(CA_i, NCA_i) + \theta_b + \varepsilon_i \quad (1).$$

y_i is the outcome variable, i.e., fertility of individual i. We use three fertility outcomes, all observed at age 45: 1) total number of children, 2) a dummy variable that is equal to 1 if childless, and 0 otherwise, and 3) the number of children, if any. CA_i and NCA_i are the measures of cognitive and non-cognitive ability, respectively. In the analyses we consider both linear and non-linear specifications of $f(CA_i, NCA_i)$. In the linear specification we use standardized values (at enlistment year) with mean of 0 and standard deviation of 1. We also add an interaction between the two types of ability to explore the extent to which cognitive and non-cognitive abilities are substitutes or complements. In the non-linear specification we add dummy variables for each skill level and normalize skill level 1 to zero. θ_b is a set of dummy variables for birth year. Thus, we study cohort fertility. Finally, ε_i is the error term. Standard errors are clustered at enlistment year.

To study the causal relation, we estimate a set of sibling and twin fixed-effects models using the following equation:

$$y_{ij} = \alpha_0 + f(CA_i, NCA_i) + \theta_j + \delta X_{ij} + \varepsilon_{ij} \quad (2).$$

In this case, y_{ij} is the measure of fertility for individual *i* in sibling pair *j*. As in (1), we consider both linear and non-linear specifications of $f(CA_i, NCA_i)$. In this model X_{ij} includes dummy variables for birth year. This is superfluous in the twin fixed-effects models, because twins are born in the same year. θ_j is the sibling fixed-effect, which allows us to identify the impact of cognitive and non-cognitive ability on fertility using variation in fertility and abilities within sibling/twin pairs. In this way we control for time-constant observed and unobserved factors that are shared by brothers, such as shared genetic material and environmental factors (e.g., family background characteristics). The twin fixed-effects model controls for genetic and environmental (born in the same year and shared in utero environment) factors to a larger extent than the sibling fixed-effects model. If shared environmental and genetic factors are common causes for cognitive and non-cognitive ability, respectively, and fertility, within-twin estimates control for these factors and are unbiased. To quantify genetic and environmental influences on fertility, we estimate equation (2) separately for fraternal (DZ) and identical twins (MZ). Like the sibling fixed effects model, the DZ fixed-effect model controls for half of all genetic effects while MZ fixed-effects model control for all genetic effects. If genetic factors are important, we should, for example, see a smaller impact of cognitive and non-cognitive ability on male fertility at age 45 for MZ twins than for DZ twins.

3. Results

3.1 Main results

Table 1 presents the results using the linear specification of equation (1). Panel A shows the results for the total number of children; panel B for the probability of being childless; and panel C shows the results for the number of children, if any, at age 45.

[TABLE 1 ABOUT HERE]

We observe a positive and precisely estimated relationship between the total number of children and non-cognitive ability, both when included separately and with cognitive ability (see panel A, columns 1–3). The estimate implies that a one standard deviation increase in non-cognitive ability is related to an increase in the total number of children of 0.17 children (or 9.4 percent).[2] In contrast, the estimate for cognitive ability is positive when included separately and negative, close to zero, and statistically insignificant when both abilities are included in the regression. This indicates that non-cognitive ability affects the cognitive ability level but not vice versa. Thus, for cognitive ability the estimates in column (1) and (3) give an upper and lower bound for the true estimate, respectively, while the estimate for non-cognitive ability is consistent. Still, the results clearly indicate that non-cognitive ability is more important than cognitive ability in explaining male fertility, both in terms of the size of the relationship and variance explained.

The negative effect in column (4), although small, suggests that cognitive and non-cognitive abilities are substitutes. This implies that the positive relationship between the total number of children and non-cognitive ability is stronger among men with low cognitive ability than among men with high cognitive ability. However, adding the interaction between abilities to the regression model does not affect the variance explained.

The results in panel B and C reveal that the positive relationship between the total number of children and non-cognitive ability operates through a reduced probability of being childless

[2] The average number of children is 1.8, see Table B1 in the Online Appendix.

rather than an increased number of children among fathers.[3] More precisely, a one standard deviation increase in non-cognitive ability is associated with a 7-percentage point (or 35 percent) reduction in the probability of being childless and a reduction of the number of children, if any, of 0.16 children (or 7 percent).

[FIGURE 1 ABOUT HERE]

Figure 1 presents estimates from the non-linear specification where we represent each value of the ability measures with a dummy variable (the estimate for skill level 1 is normalized to zero). The figure confirms that the margin through which the relationship between abilities and total fertility operates is childlessness. Further, while a higher non-cognitive ability is associated with a lower probability of being childless across the entire ability distribution – although the negative relationship appears to be increasing at lower ability levels and decreasing at higher levels – we see a U-shaped relationship for cognitive ability. Thus, the zero estimate in Table 1 is a result of that a higher cognitive ability is associated with a lower probability of being childless among men with low ability levels but a higher probability among men with higher levels of cognitive ability.

Next, we turn to the question of whether the relationship between cognitive and non-cognitive ability and male fertility at age 45 has changed over time. For this purpose, we restrict the analysis to cohorts born in 1951–1955 and 1967–1972[4] and estimate the change in the relationship between fertility and abilities of the 1967–1972 cohort relative to the 1951–1955 cohort. Figure 2 presents the results.[5] While a higher cognitive ability has become increasingly associated with lower fertility in recent cohorts – both in terms of a higher probability of being childless and a lower number of children, if any – the positive relationship between non-cognitive ability and male fertility has become stronger primarily among men with higher non-cognitive ability and for the childlessness margin only. Thus, although higher non-cognitive ability reduced the probability of being childless in the 1951–1955 cohort, for recent cohorts the importance of non-cognitive ability has increased relative to cognitive ability not only over

[3] The average number of children, if any, is 2.25 and the average share of men who are childless is 20 percent. Thus, in relative terms the size of the positive relation is considerably larger at the extensive than at the intensive margin. See Table B1 in the Online Appendix for more descriptive statistics.
[4] We have chosen to include one additional birth year in the most recent cohort. This is done to increase the statistical power in the causal analysis using brother comparisons, see section 3.2 for further details.
[5] Table B2 in the Online Appendix presents the full set of estimates from this analysis.

the entire ability distribution but also in absolute terms among men with higher non-cognitive ability.

[FIGURE 2 ABOUT HERE]

To sum up, our results indicate that although a high non-cognitive ability has always been important for male fertility, and especially for fatherhood, this relationship has become stronger over time. In contrast, cognitive ability has become increasingly associated with lower male fertility.

3.2 Causal results

The relationship between abilities and fertility can be contaminated by observed or unobserved family factors. To address this, we replicate previous estimations for the sample of brothers and twins (fraternal and identical). Table 2, columns (1)–(4), presents the estimates from the different sibling and twin fixed-effects models for the three measures of fertility at age 45. To facilitate a comparison to our main results, column (5) presents estimates for all men.

[TABLE 2 ABOUT HERE]

Throughout, the estimates for non-cognitive ability for brothers and twins closely correspond to those of the entire population. For example, the estimate for twins in panel B, column (2), shows that a one standard deviation increase in non-cognitive ability reduces the probability of being childless by 6.3 percentage points, compared to 7.0 percentage points for all men. However, two notable differences emerge. First, when accounting for unobserved family-fixed characteristics, the amount of variation explained increases substantially. Thus, unobserved family characteristics clearly have an important impact on men's' fertility. Second, when accounting for family-fixed characteristics the estimate for cognitive ability turns positive, and sometimes statistically significant, as opposed to the estimates for all men. Thus, within families, a higher cognitive ability is positively correlated with men's fertility.[6]

[FIGURE 3 ABOUT HERE]

[6] This is in line previous findings on Swedish data (Kolk and Barclay 2020; Kramarz et al 2021).

When analyzing the non-linear estimates of the relationship between male fertility and abilities over time, the pattern for non-cognitive ability is similar to that of the total population of men, although the size of the negative effect is slightly smaller at all ability levels (Figure 3). In contrast, among brothers a higher cognitive ability only reduces the probability of being childless among men in the lower end of the ability distribution. This suggests that the positive effect of cognitive ability on total fertility observed in Table 2 is mainly because a higher cognitive ability among brothers no longer influences the probability of being childless. Still, the increasing relative importance of non-cognitive ability for fatherhood holds true also when compare brothers (Figure 4).[7]

[FIGURE 4 ABOUT HERE]

Twin studies that have information on zygosity, like ours, can compare estimates for MZ and DZ twins, which makes it possible to analyze the relative importance of environmental and genetic factors and to control for endowments which may be crucial for childlessness and ability. Amin et al (2015) maintain that if such factors are important causes, within-twin estimates that control for them are unbiased. Interestingly, the estimates for MZ and DZ twins in columns (3)–(4) in Table 2, panel A and B, are such that while abilities have no impact on the probability of being childless among identical twins, cognitive and non-cognitive ability have in principle the same impact on fraternal twins as for the total population of men.

One possible interpretation of this result is that the impact of non-cognitive ability on childlessness is driven by genetic factors, as the estimate for twins who share both environment and genes (MZ twins) is both smaller than for twins who only share environment (DZ twins) and statistically insignificant. However, this interpretation requires that the equal environment assumption holds, i.e., that twins are treated the regardless of whether they are identical or fraternal twins or that there are no interaction effects between genes and the treatment by, for instance, parents and peers (see Richardson and Norgate 2005). Therefore, an alternative interpretation might be that the difference in the impact of cognitive and non-cognitive abilities on MZ and DZ twins is driven by both differences in genes *and* in treatment by parents and

[7] Because brothers are not born in the same year, they may end up in different birth cohorts. Therefore, in this analysis we assign birth cohort using the birth year of the oldest brother in the sibling pair. We restrict the the analysis restricted to brother pairs with at most three years of age difference. In this way we ensure that both brothers are born early or late in the period under study. However, this reduces the number of sibling pairs in the last birth cohort. Therefore, we have chosen to add additional birth year, 1967, to the most recent cohort. Table B3 in the Online Appendix present the full set of results.

peers due to fraternal twins exhibiting more variation in their individual traits than identical twins. Still, our results indicate that differences in later-life outcomes associated with non-cognitive skills are not only a result of differential childhood investment but also of genetics.

3.3 Robustness

To address that unobserved family background characteristics may bias our estimates of the relation between abilities and male fertility, we use sibling and twin fixed-effects models. In this section we perform a series of sensitivity analyses to test the robustness of these comparisons.

First, external validity is a potential concern when using brother and, in particular, twin models. To evaluate the generalizability of our results, we follow the approach in the literature on fertility and compare between-family estimates of the relationship between male fertility and abilities for the brother and twin samples to those of the entire sample (see columns (1)–(3) in Table 3). In line with Kohler et al (2002) and Kramarz et al (2021) we find that between-families estimates for families with brothers and twins are similar to the associations found for the whole population.

[TABLE 3 ABOUT HERE]

Second, although sibling-fixed effect models allow us to control for all observed and unobserved factors within families that are constant over time, there may be time-varying unobservable factors – such as changes in upbringing practices, family resources, and parental career orientation – that affect siblings differently. It is reasonable to assume that factors within the family are more likely to be time-invariant if there are fewer years between siblings. Therefore, as a sensitivity check we restrict the sample to brothers with at most two years of age difference (column (4) in Table 3). The results are similar to those presented in Table 2.

Third, in the sibling fixed-effects models presented in Table 2 we include multiple sibling pairs that share a biological mother. This means that the same individual can appear several times in the data. As a robustness check, we estimate equation (2) using a sibling sample where we do not double individuals (column (5) in Table 3). In this case, the sample is restricted to families where the first- and second-born children are boys. The results are similar to our brother estimates presented in Table 2.

Fourth, to analyze patterns of heritability and control for endowments which may be crucial for fertility and ability we estimate equation (2) separately for MZ and DZ twins.

However, we have information about zygosity only for 42 percent of the twin sample identified through the Multi Generation Register. Therefore, we also present estimates for the total sample of MZ and DZ twins, see column (6) in Table 3. The results are very similar to those for the larger sample of twins (see Table 2).

Finally, a potential problem with the analysis using twin comparisons is that birthweight differs more among twins than among siblings in general. Because birthweight is positively related to adult outcomes such as income (Bharadwaj et al 2018), twin estimates that do not include controls for birthweight may be biased. We have access to information on birthweight for some of the twins in the sample of MZ and DZ twins. As a robustness check we have therefore estimated twin models controlling for birthweight (see Table B4 in the Online Appendix). Columns (1)–(2) and (7)–(8) show the MZ and DZ twin estimates from Table 4. The estimates using the smaller sample of individuals for whom we have access to information on birthweight (see columns (3)–(4) and (9)–(10)) differs slightly from the estimates produced using the main sample. Importantly, however, the estimates for cognitive and non-cognitive ability produced using the smaller sample are robust to controlling for birthweight.

4. Additional results

4.1 Complementarity and substitutability between cognitive and non-cognitive ability

Our findings show that the importance of non-cognitive ability for fatherhood has increased in absolute terms and relative to cognitive ability. To speak more to the question of what characterizes the men who are increasingly falling behind in terms of fatherhood, in this section we focus on the interaction between cognitive and non-cognitive ability and how it has changed over time. The results using the linear specification of equation (1) presented in Table 1 suggests that cognitive and non-cognitive ability are complements. However, the interaction effect may very well vary across the ability distribution (and across cohorts). We therefore focus on the non-linear case and estimate the probability of being childless separately for men with low (stanine 1–3), medium (stanine 4–6), and high (stanine 7–9) cognitive and non-cognitive ability, respectively. Because the main results shows that the impact of abilities mainly go through the childlessness margin, we present estimates for this margin only. Figure 5 present the results. Panel A presents estimates by cognitive ability level and Panel B by non-cognitive ability.

[FIGURE 4 ABOUT HERE]

Panel A indicates that cognitive and non-cognitive ability were substitutes across the entire ability distribution in the 1951–55 cohort; the negative relationship between the probability of being childless at age 45 and non-cognitive ability is stronger for men with low cognitive ability than for men with high or medium cognitive ability. Interestingly, the estimates of the change of the relation of the 1967–72 cohort relative to the 1951–55 cohort indicates that degree of substitutability has decreased over time. This implies among men in the lower half of the non-cognitive ability distribution, the relationship between childlessness and non-cognitive ability no longer varies by cognitive ability level (or at least to a smaller degree). Among men in the upper half of the non-cognitive ability distribution, the negative relationship has become stronger primarily among men with high cognitive ability and, if anything, weaker among men with low cognitive ability. This suggests that cognitive and non-cognitive ability are complements for these men. Although the estimates by non-cognitive ability in Panel B for the 1951–55 cohort are less clear, the estimated change of the interaction effect between abilities points in the same direction as that in Panel A.

What do these results imply for what characterizes the men who are increasingly falling behind in terms of fatherhood? Evidently, having a low non-cognitive ability was associated with a higher probability of being childless also in the earliest cohorts. However, in these cohorts having a high cognitive ability compensated for a low non-cognitive ability. The reduced substitutability among men with low abilities suggests that, in recent cohorts, men with low non-cognitive ability are more likely to be childless at age 45 irrespective of cognitive ability. In contrast, among men with high abilities the increased complementary between abilities indicates that nowadays a higher non-cognitive ability reduces the probability of being childless especially among men with high cognitive ability.

4.2 Generalizability

To assess if the importance of non-cognitive ability for fertility outcomes is unique for Sweden, we use the NLSY79 to study the US case. We focus on the US because most studies on the impact of non-cognitive ability on adult outcomes use US data. Following Deming (2017), we measure cognitive skills using the respondent's score on the Armed Forces Qualifying Test (AFQT) and social skills using a standardized composite of four variables: sociability in childhood, sociability in adulthood, participation in high school clubs, and participation in team sports. Approximately 2000 men in NLSY79 reached the age of 45; they are born between 1957 and 1965. Preliminary evidence, reported in Table 4, suggests that social skills are important in explaining men's fertility in the US. This is particularly interesting given the striking difference in general fertility patterns between the US and Sweden.

[TABLE 4 ABOUT HERE]

Unfortunately, the NLSY79 cohort is not large enough to allow for an analysis of the change in the association over time. Given that Deming (2017) finds that the labor market return to social skills was much higher in the first decade of the 2000s than in the mid-1980s and 1990s and that other research suggests that poor economic and health trends for less-educated American men (Autor and Dorn 2013; Deaton 2013; Autor et al 2019), it would not be surprising if the likelihood of fathering a child has decreased for the American men with limited social skills.

5. Potential mechanisms

Having established that non-cognitive ability has become increasingly negatively correlated with male childlessness both in absolute terms and in relation to cognitive ability, the question is what mechanisms are at work. In this section, we explore the plausibility of two potential explanations: partnership formation and labor income. Given the potential endogeneity among fertility, partnership, and labor income, understanding the importance of these two channels is no small matter. Still, we conduct some explorative analyses.

5.1 Partnership formation and fatherhood

Because fatherhood, for most men, entails entering a romantic relationship, it is possible that some or all impact of non-cognitive ability on the probability of being childless goes through its influence on the probability of finding a partner. Further, while it is likely that more intelligent and more socially skilled men always have been more attractive partners, the increase in women's economic independence might have accentuated the importance of social skills in a male partner. Over the past decades, women have become more similar to men in terms of labor market outcomes in most high-income countries. Women are now at least as well educated as men, are working full-time, and the gender wage gap is narrower than ever (Blau and Kahn 2017). In this respect, Sweden is an outlier given that female labor force participation exceeded 70 percent for both married women and mothers born from 1950 to the mid-1970s, due to the availability of generous parental leave for both fathers and mothers since 1974 (Statistics Sweden 2020). The prevalence of the dual-earner model combined with parental leave for both fathers and mothers is likely to have increased the expectation of fathers having a more active role in raising their children (see e.g., Carlson et al 2016; Duvander and Johansson 2019).

Therefore, it is reasonable that women, more than ever, appreciate and search for partners and potential fathers with high non-cognitive abilities (see e.g., Trimarchi and Van Bavel 2017).

A first indication of the presence of a partnership channel would be if men who have had at least one partner before the age of 45 have a higher non-cognitive ability in recent cohorts than in earlier cohorts. We investigate this by estimating the change in the relationship between abilities and the probability of ever having had a partner at age 45.[8] Panel A in Figure 6 presents the results. The figure reveals that a higher non-cognitive ability increased the probability of men born from 1951 to 1955 to have had a partner over the entire ability distribution. In contrast, for cognitive ability we see a positive relationship only in the lower end of the ability distribution; for men in the upper half a higher cognitive ability made little difference. However, a comparison of the estimates for ever having had a partner in the early cohorts to those in the late cohorts reveals that, in more recent cohorts, having a high cognitive ability is associated with a falling probability for men of ever having had a partner, while the importance of non-cognitive ability for partnership has not changed. In other words, having a high non-cognitive ability has increased in importance only relative to cognitive ability. This is fascinating and in line with evidence from social psychology showing that women assign a lot of weight to social skills in a prospective partner (e.g., Botwin et al 1997; Figueredo et al 2006; Erevik et al 2020). However, the results are not in line with that men who have had at least one partner before the age of 45 have a higher non-cognitive ability in recent cohorts than in earlier cohorts.

We further explore the plausibility of a partnership mechanism by estimating the change in the relationship between abilities and the probability of being childless conditional on ever having had a partner at age 45 (entered as a dummy variable and interacted with the 1967–1972 indicator to allow for changes in the association over time). Interestingly, Panel B in Figure 6 shows that the negative relationship between non-cognitive ability and childlessness observed for the 1951–1955 cohort in Figure 2 becomes considerably weaker once we condition on ever having had a partner.[9] This indicates that for early cohorts much of the relationship between

[8] In this case, the outcome variable equals one if the individual has ever had a partner at age 45 and zero otherwise. We define a man as ever partnered at age 45 if he has been married or in a partnership at any time between the ages 20 and 45. We can identify all men in our cohorts who have ever been married. As regards partnership, we have data on cohabitation in every five years between 1970 and 1990 and from 2011 and onwards. From 1991 to 2010 we can only identify partners if they are cohabiting *and* have common children. This means that the definition of ever having a partner is comprehensive only for early and late cohorts, i.e., the cohorts of men who we include in the analysis.

[9] We have tested whether the estimated coefficients of the change of the relationship between abilities and the probability of being childless presented in Figure 5 statistically significantly differ from those presented in Figure 2 using the *suest* command in Stata. For cognitive ability we find that the coefficients are statistically significantly smaller at all ability levels when we condition on ever having had a partner while they are not statistically significantly different for non-cognitive ability.

non-cognitive ability and childlessness went through an increased probability of finding a partner. However, in recent cohorts, higher non-cognitive ability reduces the probability of being childless at age 45 also conditional on ever having had a partner. In contrast, once conditioning on partnership cognitive ability has approximately the same impact in both cohorts. This is not surprising given that higher cognitive ability has become associated with a falling probability of ever having had a partner.[10]

Taken together, this suggests that although non-cognitive ability has become more strongly associated with the probability of men ever having had a partner, at least in relative terms, this cannot explain the increased importance of non-cognitive ability for fatherhood. Hence, it is not men who never have had a partner who drive the increased importance of high non-cognitive ability for childlessness, but an increased probability of becoming a father among ever-partnered men with high non-cognitive ability. That non-cognitive ability appears to have a direct effect on fatherhood in recent cohorts instead suggests that women may become more interested in the social (fathering) skills in potential fathers.

[FIGURE 6 ABOUT HERE]

5.2 Labor income and fatherhood

Previous research shows that high-earning men are more likely to father a child than low-earning men (Mari 2019; Jalovaara and Fasang 2020; Kunze 2020).[11] In light of the evidence on the increased returns to non-cognitive on the labor market (see e.g., Deming 2017; Edin et al 2021), a question that arises is whether the increased importance of non-cognitive ability for fatherhood goes through an income effect.

We begin by estimating the change in the relationship between abilities and earnings to assess whether the return to non-cognitive ability has increased also for our population of men.

[10] We have also used a semi-parametric approach to try to address that union formation and male fertility are endogenous processes (see e.g., Trimarchi and van Bavel 2017). In the first stage we estimate the probability of ever having had a partner at age 45 and include the abilities, entered as dummy variables, and add a standardized variable for height. Research shows that height has a direct effect on the probability of having ever been partnered but an indirect effect on childlessness (see e.g., Sohn 2015; Barclay and Kolk 2019). We predict the probability of ever partnering for all men using the estimates of from this regression. The predicted probability is then entered in the regression used to estimate the change in the relationship between abilities and the probability of being childless at age 45. The results, presented in Figure A1 in the Online Appendix, are similar to those presented in panel B in Figure 5.

[11] From a theoretical perspective, we should expect men who are high-income earners to become fathers (and fathers of more children) than men who are low-income earners (Becker 1991; Oppenheimer 2003), because high-income men are more attractive on the partner market and as fathers given their capacity as family providers.

For this purpose, we use ranked annual earnings at age 45 as dependent variable.[12] Panel A in Figure 6 presents the results.[13] In the early cohorts the return to non-cognitive ability was higher than the return to cognitive ability for all except for those in the top deciles of the earnings distribution. Over time, the return to non-cognitive ability has increased primarily among men with high non-cognitive ability, both in absolute terms and relative to cognitive ability. This is in line with previous findings for the US and Sweden (see e.g., Deming 2017; Edin et al. 2021).

Next, we estimate the change in the relationship between abilities and the probability of being childless conditional on labor income decile at age 45, see Panel B in Figure 7. We have entered the earnings deciles as dummy variables and interacted with an indicator of cohorts born in 1967–72. Although the estimates for early cohorts are somewhat smaller than in the corresponding estimation without controls for earnings rank at age 45 (see Panel B in Figure 2), the general pattern is the same.

[FIGURE 7 ABOUT HERE]

However, once conditioning on earnings at age 45, we no longer see an increased negative association between non-cognitive ability and the probability of being childless in recent cohorts.[14] This suggests that most of the increased importance of non-cognitive ability for childlessness goes through labor income and possibly its increased return on the labor market. Notably, men with low non-cognitive ability within a certain labor income decile at age 45 even have a higher probability of childlessness compared to earlier cohorts. In contrast, conditioning on labor income does not affect the finding that cognitive ability has become increasingly associated with childlessness over time.

Finally, to try to speak to the relative importance of these candidate mechanisms, we condition childlessness on both labor income rank and ever having had a partner at age 45. In this case, we still see a stronger association between non-cognitive ability and childlessness in

[12] We have assigned men to earnings deciles based on their annual earnings at age 45 and by birth year.

[13] The endogeneity between earnings and fertility makes it difficult to know when to measure earnings. Ideally one would like to measure earnings before a man becomes a father, but a problem is that age at first birth varies both across cohorts and by educational level. Further, it is not obvious when to measure the earnings of the men who are childless at 45.

[14] We have tested whether the estimated coefficients of the change of the relationship between abilities and the probability of being childless presented in Figure 6 statistically significantly differ from those presented in Figure 2 using the *suest* command in Stata. For cognitive ability we find that the coefficients are statistically significantly larger at all ability levels when we condition on labor income rank at age 45. For non-cognitive ability the estimates are statistically significantly different at all ability levels but level 2.

more recent cohorts, at least among men in the upper end of the ability distribution.[15] This suggests that even though an increased labor market return to non-cognitive ability has made men with high non-cognitive ability more attractive as fathers, the increased importance of non-cognitive ability for fatherhood is also driven by an increased demand among women for socials skills in potential fathers. For cognitive ability, the estimates are similar to those obtained when conditioning only on ever having had a partner. This indicates that the reduced importance of cognitive ability for fatherhood is a result of the reduced probability of finding a partner.

6. Concluding remarks

In this paper we have analyzed if men's fertility has become more closely related to their non-cognitive ability. In particular, we ask whether the men with low non-cognitive ability – the men who have lost the most in the labor market – are also losing ground in terms of fertility.

The short answer is yes. Although high non-cognitive ability has always been important for fatherhood, we show that its importance has increased over time. At the same time, cognitive ability has become increasingly associated with lower fertility. Our findings show that brothers and fraternal twins have experienced the same increased association between fertility and non-cognitive ability as have men from different families, despite family-fixed effects being important in explaining male fertility. Interestingly, non-cognitive ability has a role in explaining fertility for fraternal but not for identical twins. Previous literature argues that non-cognitive abilities are shaped early in the life cycle and has thus suggested early childhood interventions to promote the development of non-cognitive skills (e.g., Heckman 2006). However, our findings suggest that differences in later life outcomes associated with non-cognitive skills may not only be a result of differential childhood investment but also of genetics.

We present suggestive evidence that the increased importance of non-cognitive ability for fatherhood is a result of the increased labor market return to non-cognitive ability and an increased demand for social skills in potential fathers. Having or having had a partner does not protect men with low non-cognitive ability from childlessness. Instead, the likelihood of becoming a father for an ever-partnered man with high non-cognitive ability has increased.

[15] See Figure A2 in the Online Appendix. We have tested whether the estimated coefficients of the change of the relationship between abilities and the probability of being childless presented in Figure A2 statistically significantly differ from those presented in Figure 2 using the *suest* command in Stata. For cognitive ability we find that the coefficients are statistically significantly different at all ability levels when we condition on both ever having had a partner and labor income rank at age 45. For non-cognitive ability the estimates are statistically significantly different at ability levels 5 to 10.

Although the increased labor market return to non-cognitive ability appears to have made men with high non-cognitive ability more attractive as fathers, the increased importance of non-cognitive ability for childlessness is also visible when conditioning on ever having had a partner *and* labor income at age 45. This suggests some other factor, possibly that women place more weight on social skills in potential fathers, which contributes to the increased importance of high non-cognitive ability for fatherhood.

Our results have implications not only for the welfare of men with low non-cognitive ability but also for societal welfare. If the trend that men with low non-cognitive ability both face worse labor market outcomes *and* are more likely to be childless continues, the polarization between the men "who have it all" and the men who are both poor and less likely to have a family will continue to increase. Whether this surge in inequality in access to fertility implies significantly increased levels of male violence and criminality is hotly debated (see e.g., Filser et al 2021). But increased inequality among men in, for many, a central aspect of life may also turn out to have negative consequences for societal welfare. Thus, both for the welfare of men with low non-cognitive ability and on a more societal level, policy needs to address this development.

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Figures

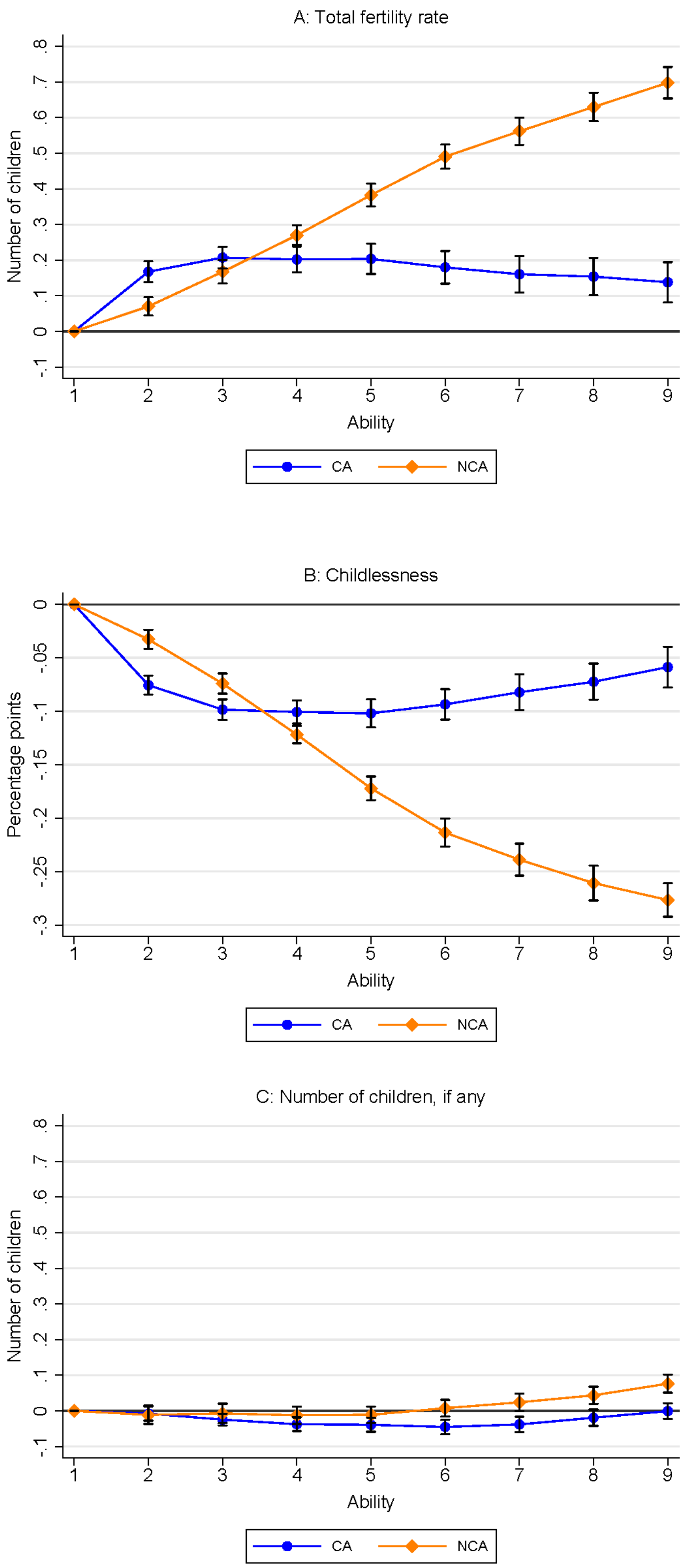


Figure 1: Non-linear estimates of the relationship between abilities and male fertility at age 45
Note: The figure shows estimates of the relationship between cognitive (CA) and non-cognitive ability (NCA), and male fertility at age 45. We use dummy variables for each value of cognitive and non-cognitive ability. Skill level 1 is normalized to zero. The regressions include birth year fixed effects. Robust standard errors are clustered at enlistment year.

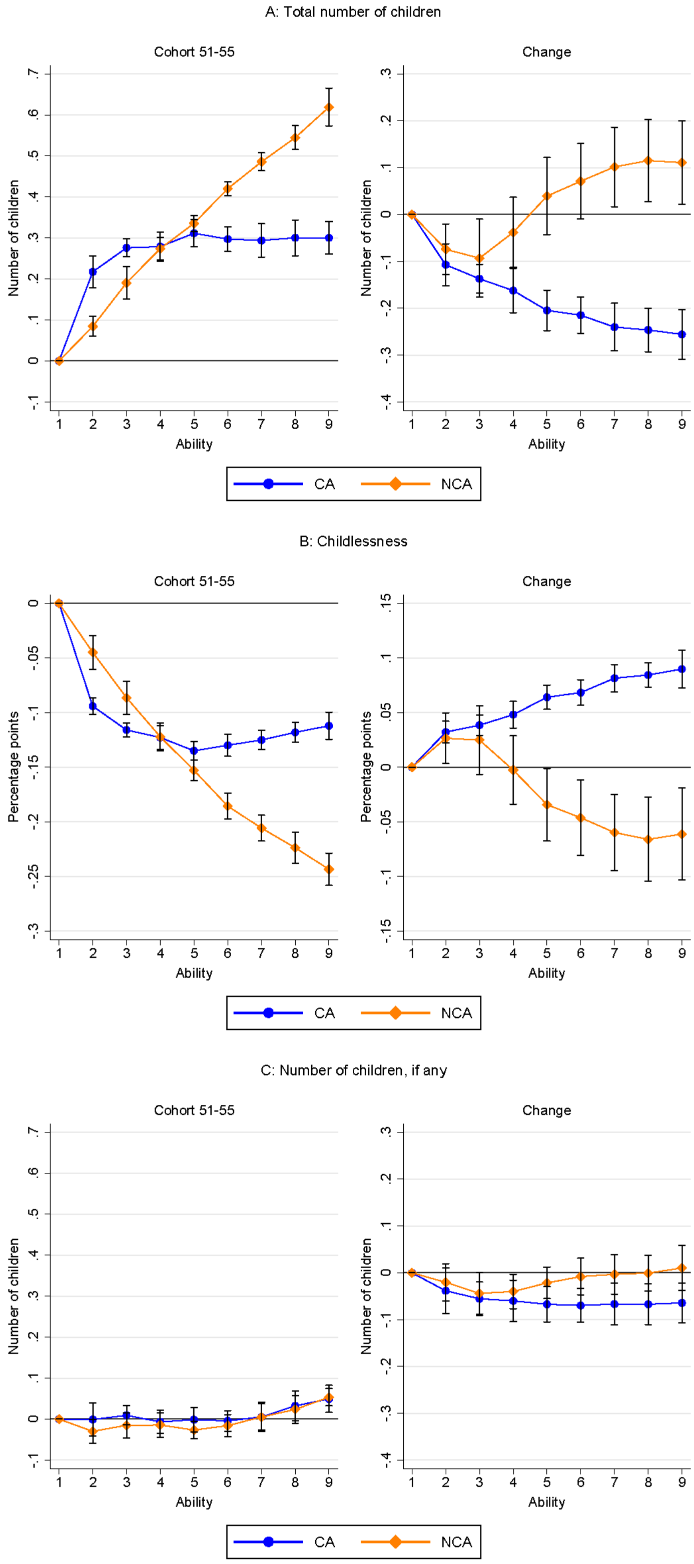


Figure 2: Change in the relationship between abilities and male fertility at age 45
Note: The figure shows estimates of the change in the relationship between cognitive (CA) and non-cognitive ability (NCA), and male fertility from the 1951–55 to 1967–1972 cohort. We use dummy variables for each value of cognitive and non-cognitive ability. Skill level 1 is normalized to zero. The regressions include birth year fixed effects. Robust standard errors are clustered at enlistment year.

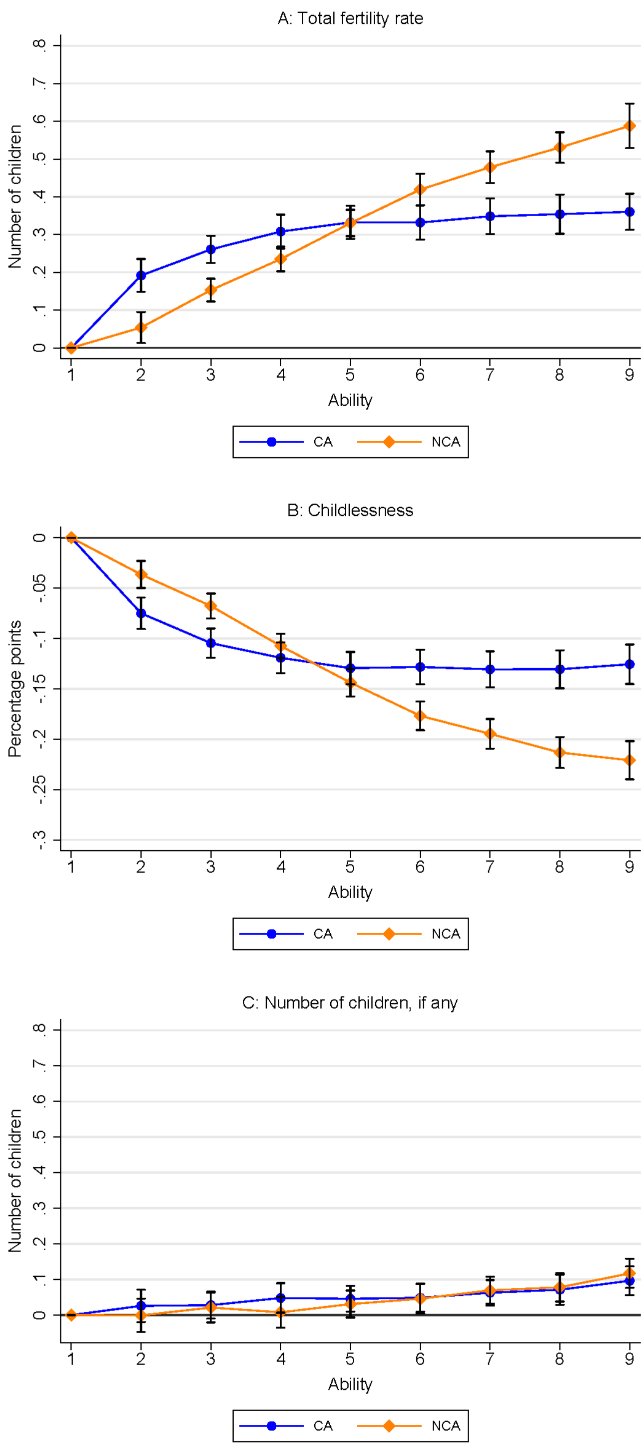


Figure 3: Non-linear estimates of the relationship between abilities and male fertility at age 45 among brothers

Notes: The figure shows the relationship between cognitive (CA) and non-cognitive ability (NCA), and male fertility at age 45. The line with cap shows 95% CI. We use dummy variables for each value of cognitive and non-cognitive ability. Skill level 1 is normalized to zero. The regressions include birth year fixed effects. Robust standard errors are clustered at enlistment year. The line with cap shows 95% CI.

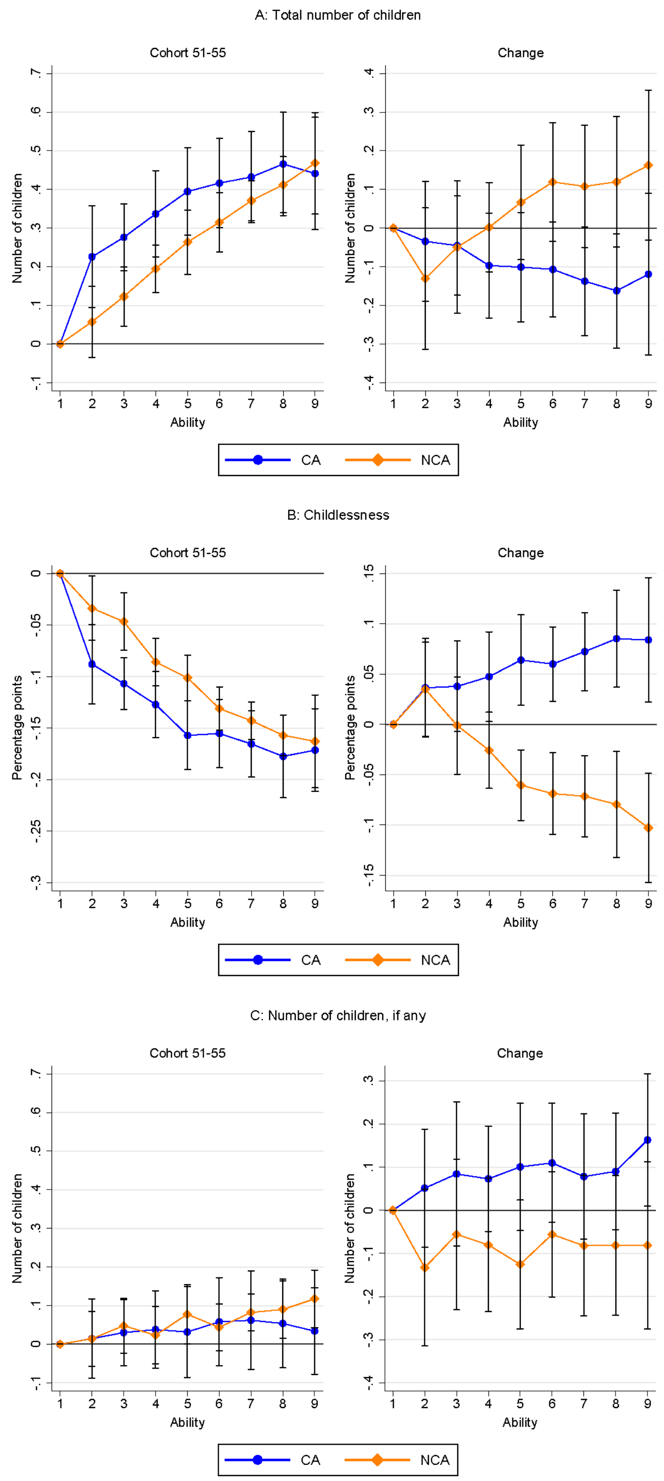
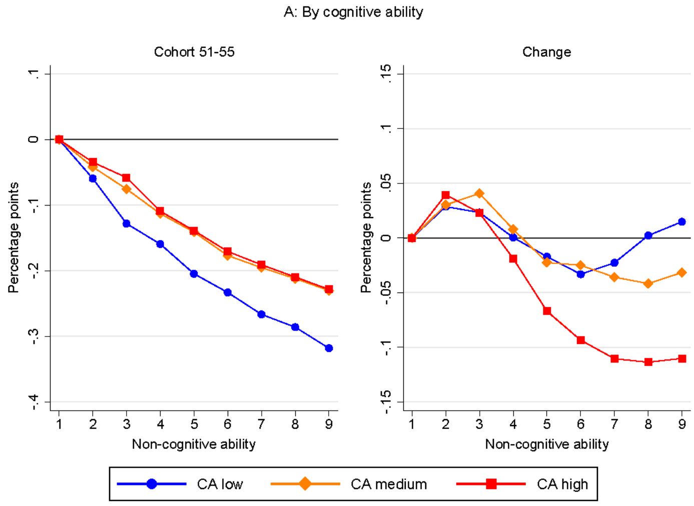


Figure 4: Change in the relationship between abilities and male fertility at age 45 among brothers
Notes: The figure shows the change in the relationship between cognitive (CA) and non-cognitive ability (NCA), and male fertility from the 1951–55 to 1967–1972 cohort among brothers. The analysis is restricted to brother pairs with at most three years of age difference and in which the oldest brother is born 1951–55 and 1967–72. Birth cohort is assigned to each brother pair using the birth year of the oldest brother. We use dummy variables for each value of cognitive and non-cognitive ability. Skill level 1 is normalized to zero. The regressions include birth year fixed effects. Robust standard errors are clustered at enlistment year. The line with cap shows 95% CI.



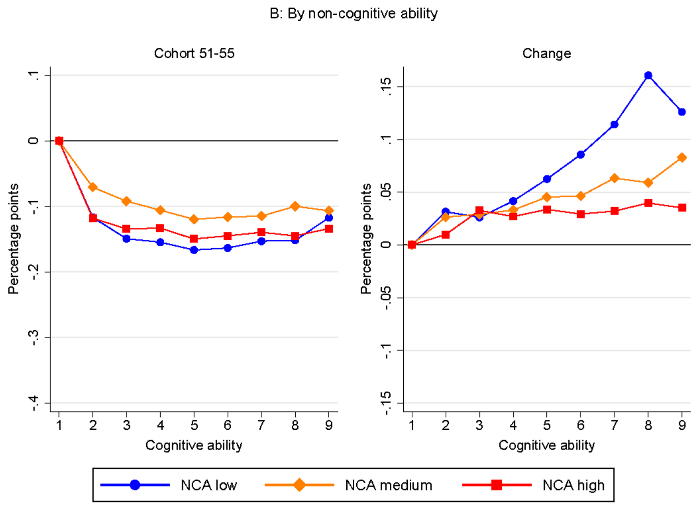


Figure 5: Change in the degree of complementary or substitutability between cognitive and non-cognitive ability

Note: The figure shows the change in the relationship between cognitive ability (CA) or non-cognitive (NCA) and male fertility from the 1951–55 to 1967–1972 cohort for men with low (stanine 1–3), medium (stanine 4–6), and high (stanine 7–9) cognitive (panel A) and non-cognitive (panel B) ability, respectively. We estimate separate regression for each skill group. We enter the ability measure as dummy variables. Skill level 1 is normalized to zero. The regressions include birth year fixed effects. Robust standard errors are clustered at enlistment year.

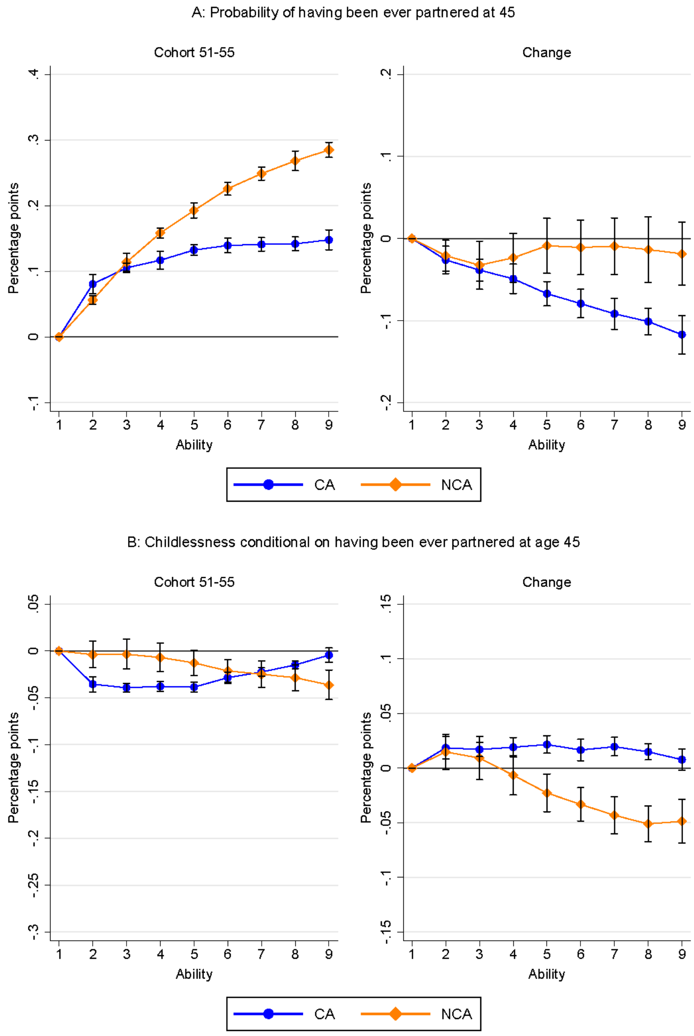


Figure 6: Change in the relationship between abilities, partnership and male childlessness at age 45
Note: The figure shows estimates of the change in the relationship between cognitive (CA) and non-cognitive ability (NCA), and the probability of ever having had a partner at 45 and male fertility respectively from the 1951–55 to 1967–1972 cohort. We use dummy variables for each value of cognitive and non-cognitive ability. Skill level 1 is normalized to zero. The regressions include birth year fixed effects. Robust standard errors are clustered at enlistment year.

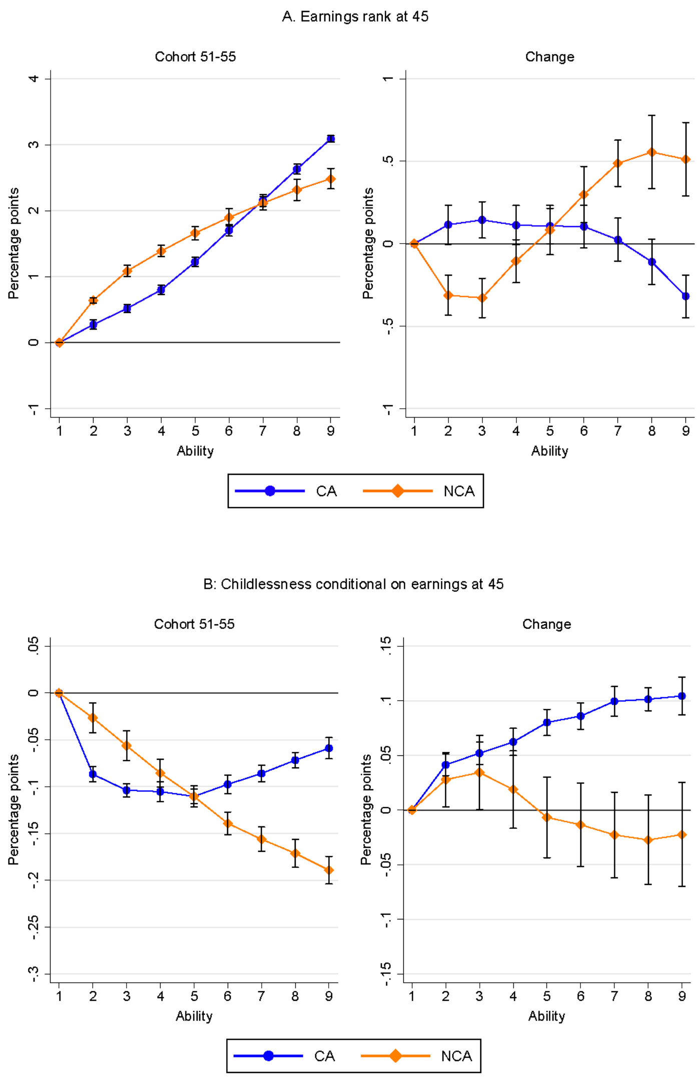


Figure 7: Change in the relationship between abilities, earnings rank, and male childlessness at age 45
Note: The figure shows the change in the relationship between cognitive (CA) and non-cognitive ability (NCA), and the earnings rank at 45 and male fertility respectively from the 1951–55 to 1967–1972 cohort. We use dummy variables for each value of cognitive and non-cognitive ability. Skill level 1 is normalized to zero. The regressions include birth year fixed effects. Robust standard errors are clustered at enlistment year.

Tables

Table 1: Abilities and male fertility at age 45

VARIABLES	(1) All	(2) All	(3) All	(4) All
Panel A. Total fertility rate				
Cognitive ability (std)	0.061***		-0.004	-0.005
	(0.004)		(0.006)	(0.006)
Non-cognitive ability (std)		0.169***	0.171***	0.171***
		(0.002)	(0.004)	(0.004)
Cognitive x Non-cognitive ability				-0.007***
				(0.002)
Observations	1,004,448	1,004,448	1,004,448	1,004,448
R-squared	0.005	0.022	0.022	0.022
Panel B. Childlessness				
Cognitive ability (std)	-0.025***		0.001	0.003
	(0.001)		(0.002)	(0.002)
Non-cognitive ability (std)		-0.070***	-0.070***	-0.070***
		(0.001)	(0.002)	(0.002)
Cognitive x Non-cognitive ability				0.010***
				(0.001)
Observations	1,004,448	1,004,448	1,004,448	1,004,448
R-squared	0.004	0.031	0.031	0.031
Panel C. Number of children, if any				
Cognitive ability (std)	0.004*		-0.002	-0.001
	(0.002)		(0.002)	(0.002)
Non-cognitive ability (std)		0.016***	0.016***	0.016***
		(0.001)	(0.001)	(0.002)
Cognitive x Non-cognitive ability				0.020***
				(0.001)
Observations	804,195	804,195	804,195	804,195
R-squared	0.005	0.006	0.006	0.006
Birth year fixed effects	Yes	Yes	Yes	Yes

Note: The table shows estimates of the relationship between cognitive and non-cognitive ability, and male fertility at age 45. We use standardized values (at enlistment year) for cognitive and non-cognitive ability with mean zero and standard deviation one. Robust standard errors, clustered at enlistment year, in parentheses. ***p<0.01 **p<0.05 *p<0.1.

Table 2: Abilities and male fertility at age 45 among brothers and twins

VARIABLES	(1) Brothers	(2) Twins	(3) MZ twins	(4) DZ twins	(5) All
Panel A: Total cohort fertility					
Cognitive ability (std)	0.053***	0.073*	0.141*	0.016	-0.003
	(0.004)	(0.042)	(0.071)	(0.086)	(0.006)
Non-cognitive ability (std)	0.144***	0.135***	-0.019	0.170**	0.171***
	(0.004)	(0.002)	(0.101)	(0.067)	(0.004)
Cognitive x Non-cognitive ability	-0.018***	-0.060**	-0.070	-0.037	-0.007**
	(0.003)	(0.025)	(0.080)	(0.048)	(0.002)
Observations	494,302	9,896	1,962	2,160	1,004,401
R-squared	0.564	0.617	0.653	0.581	0.022
Panel B: Childlessness					
Cognitive ability (std)	-0.017***	-0.013	-0.025	0.003	0.002
	(0.002)	(0.018)	(0.032)	(0.027)	(0.002)
Non-cognitive ability (std)	-0.054***	-0.063***	-0.013	-0.073***	-0.070***
	(0.002)	(0.012)	(0.034)	(0.015)	(0.002)
Cognitive x Non-cognitive ability	0.010***	0.022**	0.035	0.014	0.010***
	(0.001)	(0.009)	(0.028)	(0.019)	(0.001)
Observations	494,302	9,896	1,962	2,160	1,004,401
R-squared	0.556	0.631	0.661	0.584	0.032
Panel C: Number of children, if any					
Cognitive ability (std)	0.016***	0.037	0.124	0.044	-0.001
	(0.003)	(0.034)	(0.100)	(0.076)	(0.002)
Non-cognitive ability (std)	0.026***	0.005	-0.059	0.008	0.016***
	(0.004)	(0.036)	(0.084)	(0.074)	(0.002)
Cognitive x Non-cognitive ability	0.006*	0.003	0.037	0.001	0.019**
	(0.003)	(0.033)	(0.082)	(0.036)	(0.014)
Observations	400,231	6,374	1,442	1,530	805,152
R-squared	0.624	0.568	0.583	0.583	0.006
Birth year fixed effects	Yes	No	No	No	Yes
Sibling fixed effects	Yes	Yes	Yes	Yes	No

Note: The table shows estimates of the relationship between cognitive and non-cognitive ability, and male fertility at age 45 using sibling- and twin-fixed effects models. To facilitate comparison, we include the estimates for the total population in column (5). We use standardized values (at enlistment year) for cognitive and non-cognitive ability with mean zero and standard deviation one. Robust standard errors, clustered at enlistment year, in parentheses. ***p<0.01 **p<0.05 *p<0.1.

Table 3: Robustness checks

VARIABLES	(1) All	(2) Brothers	(3) Twins	(4) Age difference in brother pair <=2 years	(5) First- and second born brothers	(6) MZ and DZ twins
Panel A: Total number of children						
Cognitive ability (std)	-0.003	-0.007	-0.012	0.063***	0.056***	0.058
	(0.006)	(0.005)	(0.018)	(0.010)	(0.007)	(0.065)
Non-cognitive ability (std)	0.171***	0.161***	0.178***	0.129***	0.154***	0.098
	(0.004)	(0.004)	(0.017)	(0.007)	(0.005)	(0.060)
Cognitive x Non-cognitive ability	-0.007**	-0.005*	-0.011	-0.013**	-0.018***	-0.051
	(0.002)	(0.003)	(0.013)	(0.005)	(0.005)	(0.037)
Observations	1,004,401	494,968	9,860	129,786	127,692	4,122
R-squared	0.022	0.020	0.019	0.569	0.559	0.613
Panel B: Extensive margin						
Cognitive ability (std)	0.002	0.002	0.007	-0.020***	-0.019***	-0.007
	(0.002)	(0.002)	(0.005)	(0.003)	(0.003)	(0.023)
Non-cognitive ability (std)	-0.070***	-0.065***	-0.079***	-0.050***	-0.061***	-0.050***
	(0.002)	(0.002)	(0.005)	(0.003)	(0.002)	(0.014)
Cognitive x Non-cognitive ability	0.010***	0.009***	0.016***	0.008***	0.011***	0.022
	(0.001)	(0.001)	(0.004)	(0.001)	(0.001)	(0.014)
Observations	1,004,401	494,968	9,860	129,786	127,692	4,122
R-squared	0.032	0.030	0.038	0.558	0.557	0.619
Panel C: Intensive margin						
Cognitive ability (std)	-0.001	-0.006*	0.001	0.021***	0.019***	0.069
	(0.002)	(0.003)	(0.013)	(0.007)	(0.006)	(0.064)
Non-cognitive ability (std)	0.016***	0.009***	-0.005	0.017***	0.025***	-0.015
	(0.002)	(0.002)	(0.015)	(0.005)	(0.007)	(0.054)
Cognitive x Non-cognitive ability	0.019***	0.022***	0.036***	0.008	0.008	0.013
	(0.001)	(0.002)	(0.012)	(0.007)	(0.006)	(0.025)
Observations	805,152	332,236	6,372	104,947	102,215	2,972
R-squared	0.006	0.007	0.002	0.626	0.617	0.582
Birth year fixed effects	Yes	Yes	No	Yes	Yes	No
Sibling fixed effects	No	No	No	Yes	Yes	Yes

Note: The table shows estimates of the relationship between cognitive and non-cognitive ability, and male fertility at age 45 using different samples. Estimates in columns (2)–(3) present estimates for the brother and twin samples excluding sibling fixed effects, columns (4)–(5) present estimates for alternative brother samples, and column (6) present estimates for MZ *and* DZ twins. See section 3.3 for further details. We use standardized values (at enlistment year) for cognitive and non-cognitive ability with mean zero and standard deviation one. ***p<0.01 **p<0.05 *p<0.1.

Table 4: Abilities and male fertility at age 45 in the US by birth cohort, using NLSY79 data

VARIABLES	(1)	(2)
Panel A: Total number of children		
Cognitive ability (std)	-0.029	-0.026
	(0.031)	(0.030)
Social ability (std)	0.115***	0.115***
	(0.026)	(0.026)
Cognitive x Social ability		-0.060***
		(0.017)
Observations	2,346	2,346
R-squared	0.008	0.010
Panel B: Childlessness		
Cognitive ability (std)	0.003	0.002
	(0.010)	(0.009)
Social ability (std)	-0.035***	-0.035***
	(0.006)	(0.006)
Cognitive x Social ability		0.007
		(0.009)
Observations	2,346	2,346
R-squared	0.010	0.011
Panel C: Number of children, if any		
Cognitive ability (std)	-0.029	-0.023
	(0.024)	(0.022)
Social ability (std)	0.041*	0.041*
	(0.021)	(0.021)
Cognitive x Social ability		-0.054**
		(0.022)
Observations	1,813	1,813
R-squared	0.005	0.007
Birth year fixed effects	Yes	Yes

Note: The table shows estimates of the relationship between cognitive and social ability, their interaction, and the three measures of male fertility at age 45 for US men. The regressions are based on data from the National Longitudinal Survey of Youth 1979 cohort (NLSY79). Following Deming (2017), we measure cognitive skills using the respondents score on the Armed Forces Qualifying Test (AFQT) and social skills using a standardized composite of four variables: (i) sociability in childhood, (ii) sociability in adulthood, (iii) participation in high school clubs, and (iv) participation in team sports. We use standardized values for cognitive ability and social skills with mean zero and standard deviation one. Robust standard errors, clustered at birthyear, in parentheses. ***p<0.01 **p<0.05 *p<0.1.