QUANTITATIVE POLITICAL ECONOMY RESEARCH GROUP
Department of Political Economy
King's College London

**No Country for Non-Graduate Men:
The Childish Roots of Adult Job Tasks & Employment**

QPE Working Paper 2022-41

Jeevun Sandher

January 6, 2022

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Abstract

Male employment has declined across advanced economies as non-graduate men found it increasingly difficult to gain jobs in the wake of technological change and globalisation. This has led to rising earnings and, subsequently, income inequality. Female employment, by contrast, has risen in this period. Previous work has shown changing job task demands explain this pattern - with declining manual tasks penalising men and rising non-routine tasks benefiting women. In this paper, I test whether gendered differences in childhood & adolescent cognitive, social, perseverance, and emotional-health skills can help explain why men are less adept at non-routine tasks using long-term longitudinal data from the United Kingdom. I find that childhood & adolescent skills have a significant effect on adult job tasks and employment outcomes. Greater cognitive and childhood emotional-health skills lead to people performing more high-pay analytical and interactive job tasks as adults. Greater cognitive and non-cognitive skills are also associated with higher adult employment levels. Indicative calculations show that gendered differences in these childhood and adolescent skills explain an economically significant decline in the analytical and interactive job tasks performed by non-graduate men as well as their employment rates.

Keywords: Employment, Job Tasks, Gender, Cognitive Skills, Non-Cognitive Skills, Childhood, Adolescence

JEL Codes: I24, J21, J23, J24

I INTRODUCTION

Deindustrialisation has led to a dramatic fall in male non-graduate employment across the developed world that has, in turn, led to falling life expectancy, falling marriage rates, and rising populism (Autor et al. 2019; Case and Deaton 2020; Baccini and Weymouth 2021). The transition to the service economy led to falling demand for routine manual tasks that non-graduate men traditionally performed in the manufacturing sector and a rise in non-routine tasks that they have been relatively less adept at performing (Black and Spitz-Oener 2010; Olivetti and Petrongolo 2016; Cortes et al. 2018). The current literature does not, however, consider how (gendered) differences in childhood/adolescent skills can predict the full range of job tasks people perform as adults (Borghans et al. 2014; Deming 2017). Gregory (2011) notes that, “*Task based interpretations of technological change and its gender implications are highly suggesting but establishing a robust evidence base remains for future research*”.

The major contribution of this paper is to fill this gap by analysing whether gendered differences in childhood/adolescent skills can provide an explanation for gendered differences in employment probabilities and the job tasks people perform as adults. I find that childhood and adolescent skills have economically significant effects on adult job tasks and employment status. Indicative calculations show that gendered differences in these childhood and adolescent skills may explain why non-graduate men are less adept at performing analytical and interactive job tasks as well as their falling employment rates in the postindustrial economy.

Technological change and globalisation have led to deindustrialisation. This changed the type of tasks, and so the types of skills, that are now demanded in the post-industrial labour market. In the Fordist mass-production economy, non-graduate men required physical skills to undertake repetitive manual tasks in mid-pay manufacturing jobs (Frey 2019; Iversen and Soskice 2019). These mid-pay manufacturing jobs were destroyed and there was a shift in employment toward high- and low-pay service sector jobs (Autor 2015). Low-wage service sector jobs that non-graduates tend to perform are now more person-facing roles that non-

graduate men have proved less adept at performing (Nixon 2006; Black and Spitz-Oener 2010).

Early childhood experiences help determine the level of cognitive (abstract reasoning) and non-cognitive (socio-emotional) skills people possess, which in turn also determine the types of job tasks they can perform as adults (Heckman et al. 2006; Putnam 2015; Kautz et al. 2014; Bolt et al. 2021). The literature has tended to focus on how overall levels of cognitive and non-cognitive skills determine labour market outcomes (such as employment and wages), rather than the specific job tasks they help an individual perform (Lindqvist and Vestman 2011). In addition, this literature often groups together all non-cognitive skills into one non-cognitive factor (e.g. Heckman et al. (2006)). This perspective misses out important differences between non-cognitive skills - non-cognitive skills are weakly, or even negatively, related to one another (Humphries and Kosse 2017).

A growing strand of the literature that does estimate the effect of different non-cognitive skills on labour market outcomes follows the psychological literature that diagnoses behavioural problems and accordingly splits them into two factors - internalising (behaviours directed inwards) and externalising (behaviours directed outwards) (Papageorge et al. 2019; Attanasio et al. 2020a,b; Plenty et al. 2021). However, this internalising/externalising split combines both social and perseverance skills into one externalising factor. This combination can miss important effects - perseverance is a different skill than sociability and both have been shown to have strong, and separate, impact on employment outcomes (Eisenberg et al. 2014; Kautz et al. 2014; Deming 2017). In this paper, I separate out non-cognitive skills into perseverance, social, and emotional-health components (Duncan et al. 2011).

There are important gendered differences in the non-cognitive skills that children and adolescents possess. Girls possess greater social and perseverance skills as children and these differences persist into adolescence (Jacob 2002; Duncan et al. 2011; Bertrand and Pan 2013; Attanasio et al. 2020a). The current literature finds that lower levels of social and perseverance skills lead to lower employment levels as adults (Borghans et al. 2014;

Kautz et al. 2014). However, while there is little difference in the emotional-health skills boys and girls possess as children, by the time they reach adolescence, teenage girls have lower emotional-health skills (Bask 2015; Gutman and McMaster 2020). The evidence on whether emotional-health skills matter for later employment outcomes is mixed (Goodman et al. 2015; Papageorge et al. 2019; Attanasio et al. 2020a; Plenty et al. 2021). As is shown below, the least-skilled boys have much lower levels of cognitive and socio-emotional skills than the least-skilled girls. The gendered differences in skills is, then, a plausible explanation for falling employment rates for non-graduate men.

I test how gendered differences in skills effect job tasks and (relative) employment probabilities using data from the National Child Development Study that follows children born in 1958. I do so by measuring the association between childhood and adolescent measures of cognitive and non-cognitive skills and later job tasks as well as employment outcomes. These estimates are not causal - they show an association, and the specification could suffer from omitted variable bias. I progressively add childhood and adult-level controls that could also impact later employment probabilities, although these will attenuate the impact of skills. Childhood/adolescent skill levels will, for example, affect whether an individual obtains a degree, which will have a further impact on adult employment probabilities as well as job tasks.

I follow Autor et al. (2003) and split job tasks into non-routine analytical, non-routine interactive, non-routine manual, routine cognitive, and routine manual. Routine tasks are easily performed by programmable machines and non-routine tasks are not. This categorisation of tasks is widely used in the job task literature (e.g. Goos et al. (2014))

I find that cognitive skills are, as expected, positively related to non-routine analytical and interactive tasks and negatively related to manual tasks. Emotional-health skills in childhood (but not adolescence) are positively related to non-routine analytical and interactive job tasks. This may be because childhood emotional-health is important for later cognitive and non-cognitive skill development (Attanasio et al. 2020b; Donati et al. 2021). Happy kids

learn more, and children who learn more, earn more. Perseverance in adolescence but not childhood is positively related to NRA and NRI tasks, which may be due to the fact that this skills continues to develop through adolescence and into early adulthood ([Eisenberg et al. 2014](#); [Kautz et al. 2014](#)). These results hold even after controlling for adult-level conditions such as education, indicating that early conditions continue to have an enduring impact on job tasks throughout a person's life.

Surprisingly, social skills in childhood/adolescence are rarely related to any job tasks, including non-routine interactive tasks. This is in contrast to the growing literature that points to the increasing importance of social skills for adult labour market outcomes ([Borghans et al. 2014](#); [Weinberger 2014](#); [Deming 2017](#); [Deming and Kahn 2018](#)). I find that this is due to the inclusion of perseverance and emotional-health skills in this specification. When I drop measures of perseverance and emotional-health, I find social skills become significantly related to NRA and NRI tasks. This may suggest that this literature suffers from an omitted variable bias by not robustly accounting for perseverance or emotional-health skills.

There is little difference in the effect of skills on job task outcomes between genders. Where gender norms, discrimination, and childcare policies impact occupational outcomes, they do not appear to do so through gendered differences in the impact of skills on job tasks ([Cobb-Clark and Tan 2011](#); [Gregory 2011](#)).

Holding everything else constant, indicative back-of-the-envelope calculations show that the least-skilled men would perform more NRA and NRI tasks as women if they had the same non-cognitive skill levels as girls as children and adolescents. Jobs with NRA and NRI tasks are more highly paid whereas those with more manual tasks have lower pay levels ([Autor and Handel 2013](#); [Autor 2015](#)). It is therefore plausible that gendered differences in skills have made the least-skilled men less adapt at performing job tasks that are more highly demanded/have higher pay in the post-industrial economy.

I then test how cognitive and non-cognitive skills impact employment outcomes. All cognitive and non-cognitive skills are positively, and mostly significantly, related to employ-

ment outcomes in adulthood. Unsurprisingly, cognitive skills have the strongest impact on later employment outcomes ([Goodman et al. 2015](#)). Emotional-health skills have the next strongest impact followed by social and perseverance skills. There is little evidence that the impact of skills differs between genders, with weak and inconsistent results.

Using these results, back-of-the-envelope calculations show that the employment rate of the least skilled men would be about 2 to 3 percentage points higher if they had the same level of childhood/adolescent skills as the least skilled girls.

The rest of the paper proceeds as follows. The literature review sections describes the gap I fill with this paper - namely how non-graduate men may be less adept at performing the job tasks demanded in a post-industrial economy due to gendered differences in childhood/adolescent skills. I then outline the hypotheses to be tested in this paper, followed by the data, empirical results and discussion.

II EMPLOYMENT RATES AND OCCUPATIONS

Male employment and participation rates have fallen dramatically across the developed world while female employment and participation rates have risen. The decline in male employment rates have been driven by large falls in employment for non-graduate men ([Górka et al. 2017](#); [Binder and Bound 2019](#); [Sandher 2021](#)). Rising female employment and falling male employment is due to a combination of labour demand and labour supply forces. On the labour supply side, the availability of contraceptives, technological advances in home production, and the increased availability of childcare help explain why female employment rates have risen ([Olivetti and Petrongolo 2016](#)). Labour supply issues do not, however, explain why male employment rates have fallen so rapidly. Instead, technological change and globalisation have changed patterns of labour demand leading to a decline in the manufacturing sector (where men were previously employed) and a rise in service employment ([Binder and Bound 2019](#); [Abraham and Kearney 2020](#); [Wolcott 2021](#)).

Technological change and trade have led to a change in job tasks that have been demanded in the modern economy, and less-skilled men have been less adept at performing the tasks that have seen increasing demand in the post-industrial era. The routine manual tasks that were previously undertaken by semi-skilled men in the manufacturing sector are now performed by machines that are more adept at performing repeatable processes leading to large falls in employment for non-graduate men ([Cortes et al. 2017](#); [Yamaguchi 2018](#); [Frey 2019](#)). There has been a subsequent rise in the demand for non-routine job tasks that machines cannot undertake - interactive tasks that require social interaction with other human beings, analytical tasks that require creative and abstract thinking, and non-routine manual tasks that require flexible and adaptable movements to changing physical surroundings ([Autor et al. 2003](#); [Autor 2015](#)).

The changing demand pattern in job tasks has led to a bifurcation in the labour market between high- and low-pay jobs. High-pay jobs generally require greater levels of non-routine interactive and analytical tasks while low-pay jobs tend to require more routine cognitive and (routine/non-routine) manual tasks ([Goos and Manning 2007](#); [Acemoglu and Autor 2011](#)). These job tasks have an effect on wages separate from occupation - performing non-routine analytical and interactive tasks are associated with higher wages whereas routine and manual tasks are associated with lower wages ([Autor and Handel 2013](#)).

Non-routine manual tasks include low-pay service tasks like serving food and non-routine interactive tasks are also disproportionately present in person-facing occupations such as caring ([Mihaylov and Tjidsens 2019](#)). Non-graduate men, when compared to non-graduate women, have proven less adept at performing these non-routine tasks that are more highly demanded in post-industrial economy ([Nixon 2006](#); [Black and Spitz-Oener 2010](#)).

The changing labour demand for different tasks trends has led to a large fall in non-graduate male employment in the United Kingdom as shown in Figure 1 below. Both graduate and non-graduate women saw rising employment rates over this period.

This came with a changing set of job tasks and employment types. Manufacturing jobs

Figure 1: Male and Female Graduate/Non-Graduate Employment Rates

Source: UK Labour Force Survey - Selected years 1979, 1984, 1990, 1995, 2005, 2007, 2010, 2015, 2019

made up 21.8% of jobs in 1981. This fell to 15.7 % of jobs in 1991 to 11.7% in 2002. It has since declined to 7.6% ([Rhodes 2020](#)). There has been a large, concomitant fall in routine manual tasks while non-routine analytic and interactive job tasks rose dramatically ([Autor et al. 2003](#); [Górka et al. 2017](#))

Men have a comparative disadvantage in performing job tasks that are more demanded in the postindustrial labour market, which led to falls in their employment levels. I now turn to why skills gained in childhood adolescence could explain why men are relatively less adept at job tasks that are more highly demanded in the post-industrial labour market.

III EMPLOYABLE SKILLS

Post-industrial jobs require more “brain” and less “brawn” - non-routine tasks require cognitive (abstract reasoning) and non-cognitive (socio-emotional) skills while the demand for the physical strength required to undertake routine manual tasks in the mass production industrial economy has declined (Nedelkoska and Quintini 2018). There is no single accepted breakdown of non-cognitive skills (Humphries and Kosse 2017). The literature has often grouped together all non-cognitive skills into a single factor (Heckman et al. 2006; Duncan et al. 2011; Kautz et al. 2014; Humphries and Kosse 2017; Attanasio et al. 2020a). For example, Lindqvist and Vestman (2011) show that non-cognitive skills are more important than cognitive ones for less-skilled men trying to gain employment but do not differentiate between emotional health, social, and perseverance socio-emotional skills.

Humphries and Kosse (2017) shows that the different components of non-cognitive skills are not strongly related to one another and, in some cases, are actually *negatively* related to one another. To combine all non-cognitive skills into one factor misses important differences between them. One growing strand of the literature that does differentiate between non-cognitive skills when examining labour market outcomes splits them into two components - internalising and externalising behaviour - as is common in the psychological literature (Zilanawala et al. 2019; Donati et al. 2021). They do so by combining measures of perseverance with social skills into a measure of externalising behaviour, which groups all behaviours directed away from the self, and internalising components, behaviours directed inwards. The results of these analyses are mixed (finding that none, one, or both of internalising and externalising skills predict employment outcomes) (Papageorge et al. 2019; Attanasio et al. 2020a; Plenty et al. 2021).

While splitting non-cognitive skills into two components represents an accepted categorisation of diagnosing mental health problems in children/adolescents, this grouping overlooks the separate impacts that perseverance and social skills are likely to have on employment

outcomes and job tasks. Perseverance has consistently been shown to be a strong, positive predictor of school and labour market outcomes ¹ (Duncan et al. 2011; Eisenberg et al. 2014; Kautz et al. 2014; Goodman et al. 2015). Other work has shown that higher levels of social skills predict higher employment rates (Heckman et al. 2013; Borghans et al. 2014; Goodman et al. 2015; Deming 2017).

There has been a rise in the demand for interpersonal (or non-routine interactive) job tasks that require social skills in the past two decades (Weinberger 2014; Deming 2017; Deming and Kahn 2018). Women, who have higher levels of social skills as teenagers, are more likely to have jobs that require interpersonal skills as adults, and this has contributed to their relative rise in employment rates as the demand for non-routine interactive job tasks has increased (Bertrand and Pan 2013; Borghans et al. 2014). There has been a similar rise in the demand for cognitive skills required for non-routine analytical tasks (Deming 2017; Górká et al. 2017).

The current literature does not test how cognitive and non-cognitive skills play in allowing people to perform the whole range of job tasks. The literature does, however, indicate that higher levels of these skills are positively related to non-routine interactive and analytical tasks that are increasingly present in high-skill jobs. Cognitive skills have consistently been found to be positively related to higher wages (Heckman et al. 2006; Lindqvist and Vestman 2011; Goodman et al. 2015; Deming 2017; Deming and Kahn 2018) as well as non-routine analytical and interactive job tasks (Górká et al. 2017). Weinberger (2014) with a combined measure of perseverance and emotional-health skills finds that they are positively related to non-routine analytical and interactive tasks. Similarly, Goodman et al. (2015) finds that perseverance is associated with being in a managerial and professional roles while Deming (2017) & Deming and Kahn (2018) finds that both social and cognitive skills are positively related to wages. Both managerial and professional roles contain a higher degree of non-

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¹it is the constituent part of Conscientiousness, one of the Big Five personality traits, that is most strongly related to later labour market outcomes. Conscientiousness itself is the Big Five Personality trait most closely linked to be have a strong impact on employment probability, wages and job performance (Almlund et al. 2011; Eisenberg et al. 2014)

routine analytical and interactive job tasks.

The evidence on the relationship between emotional-health and labour market outcomes is mixed. Some work finds that they are positively related to wages, while others find little impact ([Goodman et al. 2015](#); [Attanasio et al. 2020a](#)). Emotional-health in childhood may, however, have an indirect impact on later labour market outcomes. Emotional-health is important for later cognitive and social development. Children with greater levels of emotional health and social skills as children also have greater cognitive skills as adolescents ([Attanasio et al. 2020b](#); [Donati et al. 2021](#)). Happy kids learn more, and kids who learn more, earn more. Lower emotional-health in childhood and adolescence also persists into adulthood. Low levels of emotional-health in childhood, therefore, make it harder to interact successfully with others as an adult through, for example, greater levels of depression and less social personality traits ([Korhonen et al. 2018](#)). High-pay jobs now require wider and deeper intra-firm working relationships and greater co-operative capabilities to constantly innovate production processes, and this may require a minimum level of emotional-health to interact productively with colleagues ([Haskel 2018](#); [Iversen and Soskice 2019](#); [Unger 2019](#)). This in turn, could mean that childhood emotional-health skills will predict their ability to undertake non-routine analytical and non-routine interactive tasks in later life.

Cognitive, emotional-health, social, and perseverance skills appear to have an impact on labour market outcomes nor their relative importance for performing different job tasks as adults. I now turn to how these skills develop in childhood and adolescence as well as the differences between genders.

IV THE CHILDISH ROOTS OF ADULT SKILLS FOR BOYS AND GIRLS

Parental investments, neighbourhood and school quality have a strong influence on the cognitive and non-cognitive skills of children, which in turn have a strong impact on education and labour market outcomes ([Heckman et al. 2006](#); [Putnam 2015](#); [Bolt et al. 2021](#)). Skills are not immutable traits that are distributed at birth - parental and early education investments build skills in children, and a greater level of cognitive and non-cognitive skills in children makes later investments more productive ([Cunha et al. 2006](#); [Kautz et al. 2014](#); [Cooper 2017](#)). Children with greater cognitive and non-cognitive skills at early ages are able to learn more effectively at later ages.

The effect of early conditions on a child’s cognitive and socio-emotional skill development begin *before* birth. Low-income mothers are more likely to give birth to low-weight and pre-term children, which can effect their subsequent brain development ([Kramer et al. 2000](#); [Larson 2007](#); [Olsen et al. 2018](#)). We can literally see the effects of these conditions in the brains of children as young as 9 months. By the age of 14 months, low-income children are already gesturing less than their richer counterparts and are less likely to be able to communicate, move and read to an adequate standard by the time they start school ([Blair and Raver 2016](#); [Social Mobility and Child Poverty Commission 2019](#)). Early experiences help determine the cognitive and socio-emotional skills people will possess as adults, and a poor early environment cannot be fully remedied with later investments ([Cunha et al. 2006](#)). Cognitive and socio-emotional skills in early childhood help determine adult levels of these skills and are likely, therefore, to have an impact on the types of job tasks people are able to perform in adulthood.

While childhood levels of cognitive and non-cognitive skills are predictive of skill levels in later ages, they do not perfectly determine the level of skills an individual will possess as adolescents or adults - parental investments, teaching quality, and peers all impact the

acquisition of skills into early adulthood ([Duncan et al. 2011](#); [Eisenberg et al. 2014](#); [Kim and Kochanska 2019](#)). Non-cognitive skills, in particular, are more malleable in late adolescence and early adulthood than cognitive skills ([Almlund et al. 2011](#); [Kautz et al. 2014](#)).

A rich literature has analysed the link how cognitive and non-cognitive skills affect overall labour market outcomes (i.e. employment and wages) ([Heckman et al. 2006](#); [Lindqvist and Vestman 2011](#); [Goodman et al. 2015](#); [Deming and Kahn 2018](#); [Heckman et al. 2018](#)). However, this growing literature does not always consider the role of perseverance skills, does not always measure these skills in early childhood, nor does it relate the importance of these skills to the full range of job tasks (e.g. non-routine manual tasks) ([Borghans et al. 2014](#); [Deming 2017](#)).

Individuals may require higher levels of perseverance skills to adapt to a changing labour market where demand shifts have rendered their previous job tasks obsolete. Non-graduates who lose their jobs find it harder to regain employment, and this has been linked to their lower levels of overall non-cognitive skills ([Lindqvist and Vestman 2011](#); [Quintini and Venn 2013](#)). For low-skilled men in particular, non-cognitive skills have a strong impact on their ability to gain employment as adults ([Heckman et al. 2006](#); [Lindqvist and Vestman 2011](#)).

Early childhood skills are important for determining adult skill levels, and so adult labour market outcomes, but the literature often measures skill levels in late childhood or adolescence ([Heckman et al. 2006](#); [Goodman et al. 2015](#); [Papageorge et al. 2019](#)). This perspective misses the impact that the earliest childhood experiences may have on adult labour market outcomes. Studies that do estimate the impact of childhood skills on adult outcomes confirm their importance for labour market outcomes ([Heckman et al. 2013](#); [Attanasio et al. 2020a](#)).

There are important gendered differences between the level of emotional-health, perseverance, and social skills that may have an impact on later employment outcomes. As children, boys have lower levels of social and perseverance skills than girls, and these differences persist into adolescence ([Duncan et al. 2011](#); [Bertrand and Pan 2013](#); [Attanasio et al. 2020a](#)). This has an impact on their later outcomes including college attendance and their ability to gain

employment as adults ([Jacob 2002](#)).

As children, there is little difference in the emotional-health skills between genders. However, by the time they reach adolescence, girls have lower levels of emotional-health skills than boys ([Bask 2015](#); [Gutman and McMaster 2020](#)). Emotional-health skills have mixed impacts in the literature on employment outcomes ([Goodman et al. 2015](#); [Attanasio et al. 2020a](#); [Plenty et al. 2021](#)).

While there are clear gendered differences in the levels of cognitive, emotional-health, perseverance, and social skills, it is unclear whether the impacts of these skills differ by gender. The literature has mixed findings on whether boys and girls with the same level of cognitive, perseverance, emotional-health and social skills have different labour market outcomes ([Goodman et al. 2015](#); [Papageorge et al. 2019](#); [Plenty et al. 2021](#)).

However, while (gendered differences in) skill levels may be important determinants of both the probability of employment and the types of jobs adults do, it is clear that they are not the only the determinant. Men and women with the same levels of non-cognitive skills, education, and experience levels enter the same occupations at different rates with women having generally lower occupational attainment than would be expected on the basis of their skill levels alone ([Cobb-Clark and Tan 2011](#)). Gender norms, discrimination, childcare availability, as well as preferences all determine the employment and occupational choices of women ([Gregory 2011](#)).

This paper fills a gap in the literature by testing how the level of emotional-health, social, perseverance, and cognitive skills in both childhood and adolescence effect the job tasks people perform as adults as well as their probability of employment. By doing so, I analyse whether gendered differences in childhood and adolescent skills can help explain falling employment rates for non-graduate men.

V HYPOTHESES

I test the following hypotheses in this paper:

Hypothesis 1: Cognitive, emotional-health and perseverance skills will be positively related to Non-Routine Analytical and Interactive Job Tasks while being negatively related to manual tasks. Social skills will be positively related to Non-Routine Interactive tasks.

Non-routine analytical tasks require abstract reasoning, creative thinking, and problem solving so I expect that higher levels of cognitive and perseverance skills to be associated with them. Emotional-health skills are important for later cognitive development and social interaction, and so I expect these to also be positively associated with non-routine analytical and interactive tasks. Social skills are expected to be positively related to interaction. Manual tasks require fewer abstract thinking and problem solving skills and so will require fewer cognitive, emotional-health, and social skills.

Hypothesis 2: Childhood and adolescent measures of cognitive, social, perseverance, and emotional skills will be positively related to adult employment probabilities

In line with the previous literature, I expect that higher levels of cognitive and non-cognitive skills in childhood/adolescence will lead to higher adult employment rates

VI DATA

I use the National Child Development Study (NCDS) that tracked the lives of 17,415 people born in the same week in 1958. I use this data because of the rich information it has on both childhood experiences and adult outcomes.

VI.1 Measuring Skills

There is no perfect way to measure personality traits. I here use measures of perseverance, emotional-health, and social skills as in [Duncan et al. \(2011\)](#). Unlike the commonly used Big 5 measures, the categories of skills used here are mutually exclusive, although not exhaustive, measures of personality ([Almlund et al. 2011](#)).

For cognitive, social, emotional, and perseverance measures of skills, I use exploratory factor analysis to extract one factor from a set of questions that measure each skill as is common in the literature (e.g. [Attanasio et al. \(2020a\)](#)). The questions used to construct each factor are shown in table 1 below ([Shepherd 2013](#); [Betthäuser et al. 2016](#)). The relative loadings of each factor are shown in Appendix A.

Tables 2 and 3 below shows the average skill level for girls and boys as children and adolescents in the NCDS data. T-tests indicate that the differences in means are all significant with a p-value of less than or equal to 0.0001. As children, girls have higher levels of perseverance, social, and emotional-health skills. As adolescents, however, girls have, on average, lower emotional-health skills but still possess higher social and perseverance skills. Consistent with other findings in the literature, differences tend to larger for non-cognitive skills than cognitive skills ([Jacob 2002](#)). However, one large and noticeable difference is that within this sample, boys have a much higher level of cognitive skills than girls in adolescence.

This is a surprising reversal from the differences in childhood, where girls had a slightly higher cognitive score. Analysing this further, I find that this is due to boys seeing both a general increase in cognitive skills as well as a greater increase at the top of the distribution

Table 1: Questions Used to Construct Skill Measures in NCDS

	NCDS - Age 7	NCDS - Age 16
Cognitive Skills	Southgate Group Reading Test Score Problem Arithmetic Test Score Copying Designs Test Human Figure Drawing Test	Reading Comprehension Test Mathematics Test
Emotional Skills	Depression Withdrawal Unforthcomingness	Worried Fearful Solitary Miserable Twitches Sucks Thumb Bites Nails Fussy Irritable
Social Skills	Hostility Towards Children Hostility Towards Adults Anxiety for Acceptance by Children Anxiety	Bullies Others Disobedient Destroys Objects Fights Lies Disliked
Perserverance Skills	Restlessness Difficulty Concentrating Squirmy, Fidgety Writing off Adults and Standards Inconsequential Behaviour	Lazy/Hardworking Gets on with Classwork Takes Work Seriously Difficult to Keep Mind on Work Fidgety Restless

(the median cognitive score increases by .12 points compared to .22 points for the mean). For emotional-health skills, girls experienced a large general fall in skills between childhood and adolescence while the top of the distribution remains relatively unchanged (a median fall of 0.4 compared to a fall in the mean of .22).

Table 2: Average Skill Level for Boys and Girls Age 7

	Cognitive	Emotional-Health	Social	Perseverance
Female	-.042	.159	.154	.167
Male	-.110	-.008	.003	-.151
Difference (Female - Male)	.068	.167	.151	.318

Table 3: Average Skill Level for Boys and Girls Age 16

	Cognitive	Emotional-Health	Social	Perseverance
Female	.010	-.074	.066	.131
Male	.119	.112	.027	-.065
Difference (Female - Male)	-.109	-.186	.039	.195

The distributions of these scores are shown in Figures 1 and 2 below (as well as tables 6 and 7 in Section 9 of this paper). They show that gendered differences in child/adolescent skills are largely driven by boys at the bottom of the skill distribution falling far behind girls at the bottom of the skill distribution. Crucially, boys in adolescence have a wider distribution of cognitive skills than girls with a higher average *and* a lower minimum level than their female counterparts. In the middle and at the top of the skill distribution, by contrast, there is less difference between boys and girls in terms of skill levels.

Figure 2: Cognitive, Emotional-Health, Social, and Perseverance Skills at Age 7 in the NCDS by Sex

Figure 3: Cognitive, Emotional-Health, Social, and Perseverance Skills at Age 16 in the NCDS by Sex

VI.2 Measuring Tasks

I measure tasks using the classification from [Mihaylov and Tijdens \(2019\)](#), which breaks down job tasks within ISCO-08 occupation codes into the schema used in [Autor et al. \(2003\)](#): routine manual, routine cognitive, non-routine interactive, non-routine analytical, and non-routine manual. Each score gives the proportion of job tasks that falls within that category. For example, a score of 0.3 on the non-routine analytical measure, indicates that 30% of the job tasks are non-routine analytical tasks. I translate the ISCO-08 codes to SOC2000 codes and match this to the NCDS data using the classification developed by [Morris \(2012\)](#).

In common with other classifications (e.g. [Acemoglu and Autor \(2011\)](#)), non-routine interactive and analytical tasks are most common in high-pay jobs whereas low-pay jobs have a greater number of routine and non-routine manual tasks. This is also shown in Figure 4 below for the NCDS data, where I summarize occupational task intensities by one-digit SOC2000 codes.

Non-routine analytical and non-routine interactive indicate complex tasks that require complex cognitive abilities ([Autor et al. 2003](#)). Examples of non-routine analytical tasks include researching, analysing, and forecasting. Non-routine interactive tasks include advising, teaching, and negotiating.

By contrast, routine cognitive and manual tasks require fewer cognitive abilities. Routine cognitive tasks include inputting data and filing; routine manual operating machinery and making standardised products; while non-routine manual include cleaning, barwork, and caring ([Mihaylov and Tijdens 2019](#)).

High-pay jobs have a higher proportion of Non-Routine Interactive job tasks than low-pay service jobs, which tend to have a higher proportion of Non-Routine Manual job tasks. This usually holds even when these low-pay service jobs are customer facing. For example, waiters have an Non-Routine Interactive Job Task score of 0.14 and Non-Routine Manual score of 0.71. This is in contrast to Accountants that have an Non-Routine Interactive score

Figure 4: Job Tasks by One-Digit SOC2000 Occupations

of 0.27 with an Non-Routine Manual score of 0 (and Non-Routine Analytical score of 0.55).

Job tasks also tend to come in bundles - where analytical and interactive tasks are positively correlated with each other within occupations as shown in Table 4 below. This is as expected - high-wage occupations tend to require both analytical skills and the ability to work with others in flexible teams to solve complex problems (Weinberger 2014; Haskel 2018). By contrast, low-pay jobs tend to require specific commands and instructions to be followed rather than higher-level problem-solving or complex co-operation (Bloom et al. 2014; Garicano and Rossi-Hansberg 2015).

Table 4: Cross-correlation table

Variables	NRAscore	NRIscore	RCscore	RMscore	NRMscore
NRAscore	1.000				
NRIscore	0.382	1.000			
RCscore	-0.320	-0.233	1.000		
RMscore	-0.317	-0.389	-0.124	1.000	
NRMscore	-0.558	-0.462	-0.362	-0.001	1.000

VII HOW DO COGNITIVE AND NON-COGNITIVE SKILLS AFFECT ADULT JOB TASKS?

I estimate the below equation to estimate the association between childhood/adolescent skills and adult job tasks:

$$\begin{aligned} \text{Job-Task}_i = & a_i + \text{Male Dummy}_i + \text{Cognitive Skills}_i + \text{Social Skills}_i + \\ & \text{Emotional-Health Skills}_i + \text{Perserverance}_i + (\text{Childhood Controls}_i) + \\ & (\text{Adult Controls}_i) + \epsilon_{i,t} \end{aligned} \quad (1)$$

Where separate models are estimated for each job task: Non-Routine Analytical, Non-Routine Interactive, Routine Cognitive, and Routine Manual, and Non-Routine Manual

For all specifications in this paper, I iteratively control for ethnicity, childhood conditions, and then adult conditions. I first estimate a parsimonious specification with only ethnicity controls. This specification would suffer from omitted variable bias - there will be other childhood factors that are likely to impact employment probabilities and job tasks. In the second specification, I control for childhood conditions that could also impact future employment probabilities and job tasks. This is the preferred specification. It is important to note that these variables are measured at birth. They will influence the acquisition of cognitive and other skills but will not be influenced by them in return. In the last specification, I include adult controls as well. This specification is likely to reduce the impact of cognitive and other skills as they are impacted by them. For example, greater perseverance skills in childhood/adolescence will lead to a greater probability of gaining a university degree ([Jacob 2002](#); [Heckman et al. 2006](#)).

The childhood controls are: maternal education, maternal employment, father's occupation, maternal background (height at pregnancy, age, and marital status), pregnancy charac-

teristics (mother smoked in pregnancy, and birthweight), and region of childhood ([Lindqvist and Vestman 2011](#); [Attanasio et al. 2020a](#)). The adult-level controls are: region of residence, marital status, a graduate dummy, and general health status.

The results are shown in Tables 5 to 10 below. Figures 5 and 6 show the coefficients for skills with childhood controls.

There is mixed support for Hypothesis 1. Cognitive skills in childhood & adolescence are, as expected, strongly and positively related to NRA and NRI tasks while being negatively related to manual tasks at both age 33 and 42. A greater level of cognitive skills is necessary both to carry out more complex NRA and NRI tasks, which require creative thinking and complex communication skills ([Autor et al. 2003](#); [Acemoglu and Autor 2011](#); [Weinberger 2014](#))

Emotional-health skills in childhood, but not adolescence, are positively related to NRA and NRI tasks at ages 33 and 42. Lower levels of emotional-health in childhood leads children down a negative trajectory with severe adult repercussions - these children have higher levels of depression, lower adult sociability, and lower cognitive skills making them less suited to NRA and NRI tasks that require sustained application, creative thinking, and interaction with others ([Korhonen et al. 2018](#); [Attanasio et al. 2020b](#); [Donati et al. 2021](#)). That these effects do not persist into adolescence may indicate that the effect of emotional-health skills in childhood on adult job tasks operates through their impact on the acquisition of cognitive and other socio-emotional skills. For example, lower emotional-health skills in childhood reduces the level of cognitive and other non-cognitive skills in adolescence ([Attanasio et al. 2020b](#); [Donati et al. 2021](#)). Therefore, the impact of emotional-health skills in adolescence may be operating through other skills.

Perseverance in adolescence, but not childhood, is positively related to NRA skills and negatively related to manual skills at ages 33 and 42. Perseverance continues to develop into adolescence and young adulthood and so later skill levels may more closely resemble adulthood levels of perseverance ([Eisenberg et al. 2014](#); [Kautz et al. 2014](#)). The fact that

it is still significant even after controlling for cognition and later education status suggests that it continues to have an independent effect on NRA job tasks despite it contributing to educational attainment.

Surprisingly, social skills are not significantly related to NRI or NRA tasks. This is surprising because, firstly, NRA and NRI tasks are associated with higher wages and current findings indicate that higher social skills lead to higher wages ([Autor and Handel 2013](#); [Deming 2017](#); [Deming and Kahn 2018](#)). In addition, other findings in the literature do find a strong impact of social skills on interpersonal interaction tasks as adults ([Borghans et al. 2014](#); [Weinberger 2014](#)). This may be because [Borghans et al. \(2014\)](#) does not include measures of perseverance and emotional health in their specification, leading to an omitted variable bias in their specification. Similarly, it is unclear *prima facie* whether [Weinberger \(2014\)](#) social skill measure, namely the participation in sports or extra-curricular activities, does actually measure sociability as opposed to perseverance. One does not have to be sociable to play sports or be on the chess team. One may, however, need a certain amount of perseverance to pursue extra-curricular activities. Noticeably, when I drop measures of perseverance and emotional-health skills, I do find a positive impact of social skills on NRA and NRI tasks (Appendix C). The current literature may, therefore, suffer from an omitted variable bias.

Childhood/adolescent skills make workers more adept at performing a bundle of job tasks. Workers cannot, of course, simply perform a set of job tasks at random. Instead, these job tasks are embedded in occupations, and occupations with higher NRA and NRI tasks tend to have lower levels of manual tasks ([Autor and Handel 2013](#)). Generally, these results show that skills that have a positive impact on NRA tasks also have a positive impact on NRI tasks and a negative impact on manual tasks.

Finally, childhood/adolescent skills that are significant with childhood controls are usually also significantly related to job tasks even after controlling for adult conditions including graduate status, marital status, and region, although with somewhat weaker effects. This is

similar to other findings in the literature (Borghans et al. 2014). This indicates that childhood/adolescent skills have an enduring impact on adult job tasks even after controlling for a rich set of covariates such as childhood background and adult education levels. In short, early experiences matter above and beyond the adult conditions they help foster such as a degree and marriage.

Figure 5: Effect of Child Skills on Job Tasks with childhood controls

Figure 6: Effect of Adolescent Skills on Job Tasks with childhood controls

Table 5: Impact of Skills Measured at Ages 7/16 on Job Tasks at Age 33

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	NRA	NRA	NRA	NRA	NRA	NRA	NRI	NRI	NRI	NRI	NRI	NRI
	Age 7	Age 7	Age 7	Age 16	Age 16	Age 16	Age 7	Age 7	Age 7	Age 16	Age 16	Age 16
Male Dummy	0.078*** (0.004)	0.080*** (0.005)	0.071*** (0.004)	0.063*** (0.005)	0.070*** (0.006)	0.067*** (0.006)	-0.027*** (0.003)	-0.029*** (0.004)	-0.033*** (0.003)	-0.044*** (0.004)	-0.041*** (0.005)	-0.043*** (0.004)
Cognitive	0.044*** (0.002)	0.036*** (0.003)	0.019*** (0.003)	0.106*** (0.004)	0.092*** (0.005)	0.055*** (0.005)	0.022*** (0.002)	0.015*** (0.002)	0.006*** (0.002)	0.059*** (0.003)	0.050*** (0.004)	0.026*** (0.004)
Emotional	0.026*** (0.003)	0.022*** (0.003)	0.014*** (0.003)	0.000 (0.004)	0.000 (0.004)	0.000 (0.004)	0.019*** (0.002)	0.017*** (0.002)	0.013*** (0.002)	0.008*** (0.003)	0.008** (0.003)	0.009*** (0.003)
Social	0.013*** (0.003)	0.010*** (0.004)	0.003 (0.003)	0.002 (0.004)	0.005 (0.005)	0.004 (0.005)	0.002 (0.003)	0.000 (0.003)	-0.004 (0.003)	0.000 (0.003)	-0.001 (0.004)	-0.002 (0.004)
Perseverance	0.005 (0.003)	0.005 (0.004)	0.004 (0.003)	0.025*** (0.004)	0.029*** (0.004)	0.018*** (0.004)	0.009*** (0.003)	0.009*** (0.003)	0.009*** (0.003)	0.010*** (0.003)	0.012*** (0.003)	0.005 (0.003)
Constant	0.191*** (0.003)	0.016 (0.062)	0.082 (0.058)	0.191*** (0.004)	0.181** (0.077)	0.189** (0.075)	0.237*** (0.002)	0.115** (0.047)	0.152*** (0.046)	0.242*** (0.003)	0.283*** (0.061)	0.292*** (0.060)
Ethnicity Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Childhood Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Adult Control	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
N	9756	8345	8113	6074	4917	4799	9756	8345	8113	6074	4917	4799
r2	0.081	0.136	0.278	0.197	0.218	0.302	0.050	0.078	0.159	0.107	0.117	0.180

Standard errors in parentheses

Ethnicity controls: ethnicity of child

Childhood controls: maternal education, maternal employment, father's occupation, maternal background (height at pregnancy, age, and marital status), pregnancy characteristics (mother smoked in pregnancy, and birthweight), region of childhood

Adult Controls: region of residence, marital status, a graduate dummy, and general health status

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Impact of Skills Measured at Ages 7/16 on Job Tasks at Age 42

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	NRA	NRA	NRA	NRA	NRA	NRA	NRI	NRI	NRI	NRI	NRI	NRI
	Age 7	Age 7	Age 7	Age 16	Age 16	Age 16	Age 7	Age 7	Age 7	Age 16	Age 16	Age 16
Male Dummy	0.044*** (0.005)	0.042*** (0.005)	0.037*** (0.005)	0.030*** (0.006)	0.032*** (0.007)	0.030*** (0.007)	-0.033*** (0.004)	-0.035*** (0.004)	-0.039*** (0.004)	-0.038*** (0.004)	-0.041*** (0.005)	-0.044*** (0.005)
Cognitive	0.031*** (0.003)	0.027*** (0.003)	0.018*** (0.003)	0.076*** (0.004)	0.068*** (0.005)	0.044*** (0.006)	0.019*** (0.002)	0.016*** (0.003)	0.009*** (0.002)	0.043*** (0.003)	0.041*** (0.004)	0.025*** (0.004)
Emotional	0.025*** (0.003)	0.024*** (0.003)	0.020*** (0.004)	-0.004 (0.004)	-0.004 (0.005)	-0.002 (0.005)	0.015*** (0.002)	0.014*** (0.003)	0.010*** (0.003)	-0.001 (0.003)	0.000 (0.004)	0.000 (0.004)
Social	0.005 (0.004)	0.005 (0.004)	0.002 (0.004)	0.004 (0.005)	0.004 (0.005)	0.000 (0.006)	0.002 (0.003)	0.002 (0.003)	0.001 (0.003)	0.006 (0.004)	0.008* (0.004)	0.005 (0.005)
Perseverance	0.006* (0.004)	0.004 (0.004)	0.00 (0.004)	0.014*** (0.004)	0.017*** (0.005)	0.009* (0.005)	0.004 (0.003)	0.002 (0.003)	0.002 (0.003)	0.002 (0.003)	0.000 (0.003)	-0.005 (0.004)
Constant	0.229*** (0.003)	0.101 (0.070)	0.209*** (0.073)	0.231*** (0.004)	0.0627 (0.088)	0.106 (0.094)	0.266*** (0.003)	0.191*** (0.052)	0.238*** (0.056)	0.265*** (0.003)	0.235*** (0.067)	0.249*** (0.071)
Ethnicity Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Childhood Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Adult Control	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
N	8639	7396	6371	5425	4404	3881	8639	7396	6371	5425	4404	3881
r2	0.040	0.061	0.121	0.089	0.099	0.134	0.037	0.047	0.082	0.057	0.063	0.087

Standard errors in parentheses

Ethnicity controls: ethnicity of child

Childhood controls: maternal education, maternal employment, father's occupation, maternal background (height at pregnancy, age, and marital status), pregnancy characteristics (mother smoked in pregnancy, and birthweight), region of childhood

Adult Controls: region of residence, marital status, a graduate dummy, and general health status

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Impact of Skills Measured at age 7/16 on RC Tasks Aged 33

	(1)	(2)	(3)	(4)	(5)	(6)
	RC	RC	RC	RC	RC	(RC
	Age 7	Age 7	Age 7	Age 16	Age16	Age16
Male Dummy	-0.102*** (0.005)	-0.103*** (0.005)	-0.0984*** (0.005)	-0.100*** (0.006)	-0.104*** (0.007)	-0.102*** (0.007)
Cognitive	0.007** (0.003)	0.009*** (0.003)	0.018*** (0.003)	0.004 (0.004)	0.015*** (0.005)	0.048*** (0.005)
Emotional- Health	0.000 (0.003)	0.002 (0.003)	0.006* (0.003)	-0.006 (0.004)	-0.004 (0.005)	-0.007 (0.005)
Social	-0.001 (0.004)	0.000 (0.004)	0.004 (0.004)	0.005 (0.005)	0.003 (0.005)	0.005 (0.005)
Perseverance	0.006* (0.004)	0.008** (0.004)	0.008** (0.004)	0.007 (0.004)	0.007 (0.005)	0.017*** (0.005)
Constant	0.272*** (0.003)	0.294*** (0.067)	0.258*** (0.067)	0.274*** (0.004)	0.293*** (0.089)	0.270*** (0.088)
Ethnicity Control	Yes	Yes	Yes	Yes	Yes	Yes
Childhood Controls	No	Yes	Yes	No	Yes	Yes
Adult Control	No	No	Yes	No	No	Yes
N	9756	8345	8113	6074	4917	4799
r2	0.055	0.070	0.113	0.052	0.067	0.132

Standard errors in parentheses

Ethnicity controls: ethnicity of child

Childhood controls: maternal education, maternal employment, father's occupation, maternal background (height at pregnancy, age, and marital status),

pregnancy characteristics (mother in pregnancy, and birthweight), region of childhood

Adult Controls: region of residence, marital status, a graduate dummy, and general health status

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Impact of Skills Measured at age 7/16 on RC Tasks Aged 42

	(1)	(2)	(3)	(4)	(5)	(6)
	RC	RC	RC	RC	RC	(RC
	Age 7	Age 7	Age 7	Age 16	Age16	Age16
Male Dummy	-0.049*** (0.005)	-0.048*** (0.005)	-0.045*** (0.006)	-0.043*** (0.006)	-0.043*** (0.007)	-0.038*** (0.007)
Cognitive	-0.001 (0.003)	0.000 (0.003)	0.004 (0.003)	-0.002 (0.004)	0.000 (0.005)	0.018*** (0.006)
Emotional- Health	-0.002 (0.003)	-0.002 (0.004)	-0.001 (0.004)	-0.006 (0.004)	-0.007 (0.005)	-0.010* (0.005)
Social	-0.003 (0.004)	-0.005 (0.004)	-0.002 (0.005)	0.005 (0.005)	0.006 (0.006)	0.006 (0.006)
Perseverance	0.005 (0.004)	0.006 (0.004)	0.009* (0.005)	-0.003 (0.004)	-0.003 (0.005)	0.005 (0.005)
Constant	0.225*** (0.003)	0.294*** (0.070)	0.276*** (0.076)	0.225*** (0.0044)	0.336*** (0.0930)	0.316*** (0.099)
Ethnicity Control	Yes	Yes	Yes	Yes	Yes	Yes
Childhood Controls	No	Yes	Yes	No	Yes	Yes
Adult Control	No	No	Yes	No	No	Yes
N	8639	7396	6371	5425	4404	3881
r2	0.015	0.021	0.038	0.013	0.021	0.045

Standard errors in parentheses

Ethnicity controls: ethnicity of child

Childhood controls: maternal education, maternal employment, father's occupation,

maternal background (height at pregnancy, age, and marital status),

pregnancy characteristics (mother in pregnancy, and birthweight), region of childhood

Adult Controls: region of residence, marital status, a graduate dummy, and general health status

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Impact of Skills Measured at Ages 7/16 on Job Tasks at Age 33

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	RM	RM	RM	RM	RM	RM	RM	NRM	NRM	NRM	NRM	NRM
	Age 7	Age 7	Age 7	Age 16	Age 16	Age 16	Age 7	Age 7	Age 7	Age 16	Age 16	Age 16
Male Dummy	0.006*	0.007*	0.009**	0.017***	0.015***	0.014***	0.046***	0.044***	0.052***	0.065***	0.060***	0.063***
	(0.003)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
Cognitive	-0.018***	-0.015***	-0.010***	-0.044***	-0.039***	-0.029***	-0.054***	-0.045***	-0.033***	-0.125***	-0.117***	-0.100***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)	(0.005)	(0.006)	(0.006)
Emotional-Health	-0.014***	-0.012***	-0.010***	-0.001	-0.002	-0.002	-0.032***	-0.028***	-0.023***	0.000	0.000	-0.001
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)
Social	0.000	0.000	0.003	-0.002	-0.002	-0.002	-0.014***	-0.012**	-0.007	-0.005	-0.005	-0.005
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)
Perseverance	-0.004*	-0.005*	-0.006**	-0.012***	-0.016***	-0.014***	-0.016***	-0.017***	-0.016***	-0.029***	-0.031***	-0.026***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Constant	0.063***	0.119**	0.102**	0.062***	0.010	-0.007	0.238***	0.455***	0.406***	0.231***	0.234**	0.255**
	(0.002)	(0.048)	(0.048)	(0.003)	(0.062)	(0.063)	(0.004)	(0.080)	(0.080)	(0.005)	(0.099)	(0.100)
Ethnicity Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Childhood Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Adult Control	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
N	9756	8345	8113	6074	4917	4799	9756	8345	8113	6074	4917	4799
r2	0.022	0.042	0.066	0.061	0.074	0.087	0.074	0.109	0.157	0.163	0.180	0.196

Standard errors in parentheses

Ethnicity controls: ethnicity of child

Childhood controls: maternal education, maternal employment, father's occupation, maternal background (height at pregnancy, age, and marital status), pregnancy characteristics (mother smoked in pregnancy, and birthweight), region of childhood

Adult Controls: region of residence, marital status, a graduate dummy, and general health status

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10: Impact of Skills Measured at Ages 7/16 on Job Tasks at Age 42

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	RM	RM	RM	RM	RM	RM	RM	NRM	NRM	NRM	NRM	NRM
	Age 7	Age 7	Age 7	Age 16	Age 16	Age 16	Age 7	Age 7	Age 7	Age 16	Age 16	Age 16
Male Dummy	0.008*** (0.003)	0.009*** (0.003)	0.012*** (0.004)	0.009** (0.004)	0.010** (0.004)	0.012*** (0.005)	0.031*** (0.006)	0.032*** (0.006)	0.035*** (0.007)	0.042*** (0.007)	0.041*** (0.008)	0.040*** (0.008)
Cognitive	-0.007*** (0.002)	-0.007*** (0.002)	-0.004** (0.002)	-0.024*** (0.003)	-0.021*** (0.003)	-0.016*** (0.004)	-0.041*** (0.003)	-0.035*** (0.004)	-0.027*** (0.004)	-0.093*** (0.005)	-0.088*** (0.006)	-0.071*** (0.007)
Emotional-Health	-0.006*** (0.002)	-0.006*** (0.002)	-0.005** (0.002)	0.004 (0.003)	0.004 (0.003)	0.003 (0.003)	-0.032*** (0.004)	-0.030*** (0.004)	-0.023*** (0.005)	0.007 (0.005)	0.008 (0.006)	0.007 (0.006)
Social	-0.001 (0.002)	-0.001 (0.003)	0.001 (0.003)	-0.002 (0.003)	-0.004 (0.003)	-0.002 (0.004)	-0.004 (0.005)	-0.001 (0.005)	-0.002 (0.005)	-0.013** (0.006)	-0.014** (0.006)	-0.008 (0.007)
Perseverance	-0.004* (0.002)	-0.003 (0.003)	-0.003 (0.003)	-0.003 (0.003)	-0.002 (0.003)	-0.001 (0.003)	-0.012** (0.005)	-0.010* (0.005)	-0.009 (0.005)	-0.010* (0.005)	-0.013** (0.005)	-0.008 (0.006)
Constant	0.0459*** (0.002)	0.0948** (0.043)	0.0444 (0.047)	0.0476*** (0.003)	0.0300 (0.066)	0.00548 (0.061)	0.234*** (0.004)	0.319*** (0.086)	0.233** (0.091)	0.231*** (0.005)	0.336*** (0.110)	0.323*** (0.115)
Ethnicity Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Childhood Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Adult Control	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
N	8639	7396	6371	5425	4404	3881	8639	7396	6371	5425	4404	3881
r2	0.010	0.019	0.030	0.023	0.028	0.035	0.045	0.059	0.090	0.083	0.093	0.098

Standard errors in parentheses

Ethnicity controls: ethnicity of child

Childhood controls: maternal education, maternal employment, father's occupation, maternal background (height at pregnancy, age, and marital status), pregnancy characteristics (mother smoked in pregnancy, and birthweight), region of childhood

Adult Controls: region of residence, marital status, a graduate dummy, and general health status

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

VIII ARE THERE GENDERED DIFFERENCES IN THE EFFECT OF COGNITIVE AND NON-COGNITIVE SKILLS ON ADULT JOB TASKS?

I estimate the below regression to measure whether there are gender-specific differences in the effect of childhood/adolescent skills on adult job tasks. Specifically, I interact a male dummy with each skill to analyse whether there is a gendered impact in the effect of skills on job tasks. A positive coefficient on the interaction terms would indicate that men gain an extra benefit for a given level of skills while a negative one indicates that women gain an extra effect.

The interaction coefficients for the specification with childhood controls are shown in Figures 7 and 8 below. The full regression tables are in Appendix B.

$$\begin{aligned}
 \text{Job-Task}_i = & a_i + \text{Male Dummy}_i + \text{Cognitive Skills}_i + \text{Social Skills}_i + \\
 & \text{Emotional-Health Skills}_i + \text{Perseverance}_i + \\
 & \text{Cognitive Skills}_i \times \text{Male Dummy}_i + \\
 & \text{Emotional-Health Skills}_i \times \text{Male Dummy}_i + \\
 & \text{Social Skills}_i \times \text{Male Dummy}_i + \\
 & \text{Perseverance}_i \times \text{Male Dummy}_i + \\
 & (\text{Childhood Controls}_i) + (\text{Adult Controls}_i) + \epsilon_{i,t}
 \end{aligned} \tag{2}$$

The results show there is little in the way of gender specific differences in the effect of childhood and adolescent skills to adult job tasks. Neither men nor women tend to gain an extra benefit for a given level of skills in childhood or adolescence.

The only consistent effect is that, for a given level of cognitive skills in adolescence, men are more likely to undertake more highly paid NRA and NRI tasks while being less likely

to undertake lower paid NRM tasks. This could indicate discrimination, childcare policies and/or gender norms lead to men with the same level of cognitive skills as women being more likely to enter occupations with greater levels of these tasks (Gregory 2011).

There is little evidence of any other gendered specific skill effects on job tasks. Cobb-Clark and Tan (2011) finds that men and women with the same level of cognitive and non-cognitive skills enter occupations at different rates. The findings here indicate that this is not due to cognitive and non-cognitive skills being more or less valued in men/women. Instead, it indicates that differential skill levels, occupational choices and/or discrimination is what leads to occupational segregation. In addition, it could indicate that men and women with similar skills choose different occupations with similar task profiles. Examining these issues in further detail is beyond the scope of this paper.

Figure 7: Gender Specific Effects of Child Skills on Job Tasks with Childhood controls

Figure 8: Gender Specific Effects of Adolescent Skills on Job Tasks with childhood controls

IX HOW DO GENDERED DIFFERENCES IN CHILDHOOD AND ADOLESCENT SKILLS AFFECT JOB TASKS COMPLETED AS ADULTS?

I conduct an indicative, back-of-the envelope exercise to estimate how job tasks of men would differ if they had the same level of cognitive and non-cognitive skills as women while holding everything else constant. This is a static, partial-equilibrium calculation that does not consider, for example, whether the demand for occupations with the constituent job tasks is high enough to accommodate a higher supply of men who have the same skill profile as women. The calculation here gives an approximate estimate of how men's job tasks could change if they had the same skills as women.

I estimate the difference in job tasks by multiplying the difference in average cognitive and non-cognitive skills between girls and boys in childhood/adolescence from Tables 2 and 3 with the coefficients from equations 1 and 2 with childhood controls. To make this concrete, I use an example of how NRA tasks for men would differ if they had the same level of emotional-health skills as girls at age 7.

At age 7 the difference in emotional-health skills between boys and girls is 0.167. I then multiply this difference, 0.167, by the Emotional-health coefficient from table 5 with childhood controls in column 2 (0.022). This then gives a partial-equilibrium estimate of how NRA tasks for men would differ if they had the same amount of emotional-health skills as girls at age 7, 0.3%. I then repeat this for each cognitive and non-cognitive skills for every type of job task. The results are shown in Figure 9 below.

I repeat this exercise using the gender-specific coefficients from equation 2. Here I add the coefficients from each cognitive/non-cognitive skill and the gender specific interaction. For example to estimate effect of emotional-health skills on NRA tasks at age 7 including gender-specific effects, I add together the Emotional-health (.017) and Emotional-Health x

Figure 9: Gender Specific Effects of Child Skills on Job Tasks with Childhood controls

Male dummy (.008) coefficients from column 2 of Table A.9. I then multiply this by the average difference in emotional-health skills at age 7 as before (0.167) giving an increase in NRA tasks of 0.4 % in childhood. The results are shown in Figure 10 below.

Figure 10: Relative Change in Male Job Tasks From Gendered Differences in Childhood/Adolescent Skills with Gender-Specific Impacts)

As can be seen from Figures 9 and 10 above, this indicative calculation suggests that if boys had the same average cognitive and non-cognitive skill levels as girls at aged 7 then they would undertake more NRA and NRI tasks while undertaking fewer manual tasks when

working as adults.

By contrast, in adolescence, boys would be *less* likely to undertake NRA and NRI tasks and more likely to undertake low-paid manual tasks. This result is being driven almost entirely by differences in the cognitive score in adolescence. Boys have higher average cognitive skills in adolescence within this sample. Non-cognitive skill differences in adolescence still lead to men performing fewer NRA and NRI tasks than women. The overall effect of gendered differences in skill on task outcomes is, therefore, smaller in adolescence than in childhood as cognitive and non-cognitive skill differences have offsetting effects.

While boys have, on average, higher cognitive skills than girls in adolescence, these differences only open up in the middle and top of the skill distribution. At the bottom of the skill distribution, boys have lower cognitive skills than girls. Re-calculating the effect of skills for boys at the bottom of the skill distribution ² shows that these boys would perform more NRA and NRI tasks if they had the same level of skills as girls in both childhood *and* adolescence (Figure 11).

Figure 11: Relative Change in Male Job Tasks From Gendered Differences in Childhood/Adolescent Skills at the Bottom of the Skill Distribution

The evidence presented here shows that it is plausible that differences in non-cognitive

²Calculating the difference in skills between boys and girls at the 1st percentile in Table 13 & 14 and then multiplying it by the coefficients from Tables 5 to 10

skills have led to the men undertaking fewer NRA and NRI tasks that are more highly demanded in modern labour markets ([Autor and Handel 2013](#)). Gendered differences in cognitive skills that arise in adolescence do, however, appear to be ensuring that men who do enter the labour market are, on average, undertaking more highly paid NRA and NRI tasks than girls. For boys at the bottom of the skill distribution, however, these results unambiguously indicate they would be performing more highly paid NRA and NRI tasks if they had the same level of cognitive and non-cognitive skills as girls in childhood/adolescence.

There is a selection effect present in the analysis of job tasks thus far - only those men who are able to gain employment in the first place are able to undertake job tasks. Cognitive and non-cognitive skills do effect whether individuals are able to gain jobs in the first place. It is to this which I now turn.

X DO CHILDHOOD AND ADOLESCENT COGNITIVE AND NON-COGNITIVE SKILLS AFFECT EMPLOYMENT PROBABILITY AS ADULTS?

I use a linear probability model to estimate how the cognitive and non-cognitive skills of children are related to adult probability of employment at age 33 and age 42. Linear probability models are common in the skill literature. This estimator is preferred as the parameters are easier to interpret and it is possible to estimate the impact where an entire group³ is employed in the sample as is the case here (Caudill et al. 1988; Lindqvist and Vestman 2011; Attanasio et al. 2020a). Logit models are shown in Appendix E and give the same substantive results.

All models below exclude women whose youngest child is under 5, when mothers may be unable to work due to the lack of full-time public pre-school provision at the time (Stewart 2013). Employment rates for new mothers does drop sharply in the first year after the birth of a child before steadily rising in each year after that (Stewart 2014; Roantree and Vira 2018). Specifications including mothers with children under 5 are shown in Appendix D. Their exclusion makes minor difference to the results, with the point estimates for some skills dropping to insignificance (although still remaining positive).

I estimate equation (3) below for the impact of childhood/adolescent skills on adult employment outcomes.

$$\begin{aligned} \text{Employment}_i = & a_i + \text{Sex}_i + \text{Ethnicity}_i + \text{Cognitive Skills}_i + \text{Social Skills}_i + \\ & \text{Emotional-Health Skills}_i + \text{Perseverance}_i + (\text{Childhood Controls}_i) + \\ & (\text{Adult Controls}_i) + \epsilon_i \end{aligned} \quad (3)$$

---

³Specifically, an entire ethnic group

Where Employment is a dummy that takes a value of 1 if the individual is employed. Models are measured with employment probabilities at age 33 (in 1991) and age 42 (in 2000). While the employment rates were relatively similar in each year, this masks a change in employment type over this time. Male non-graduate employment had fallen as shown in Figure 1, with a concomitant decline in manufacturing jobs and routine manual tasks ([Autor et al. 2003](#); [Goos and Manning 2007](#); [Górka et al. 2017](#); [Sandher 2021](#)).

The results of equation (3) are shown in Tables 11 & 12 and Figures 12 and 13 below. There is support for Hypothesis 2 from this specification. In the preferred specification with childhood controls, all cognitive and emotional-health skills in both childhood and adolescence are positively, and mostly significantly, related to employment outcomes at age 33 and 42. These effects are reduced when controlling for adult level conditions that will subsume some of the effects as cognitive and non-cognitive skills that help further educational attainment. These results are consistent with the literature ([Heckman et al. 2006](#); [Goodman et al. 2015](#)).

The strongest relationship is between cognitive skills and employment outcomes. This is unsurprising given the strong relationship in the literature between cognitive skills and employment ([Almlund et al. 2011](#); [Goodman et al. 2015](#); [Attanasio et al. 2020a](#)). In the literature, non-cognitive skills have an effect on employment outcomes that are as strong as cognitive skills, but this is when they are combined into one non-cognitive factor and not separated out as we do here ([Heckman et al. 2006](#); [Lindqvist and Vestman 2011](#)). While it is beyond the scope of this paper, it is probable that separating out the measure of cognitive skills in to its constituent parts would reveal a similar weaker relationship.

After cognitive skills, emotional-health skills have the next strongest relationship with employment outcomes and these effects are somewhat stronger at age 7 than age 16. Emotional-health problems at early ages both damage later cognitive development *and* lead to later emotional-health problems, making it more difficult to gain employment ([Donati et al. 2021](#)). These effects remain in adolescence although are somewhat weaker. The results here do dif-

fer from other findings that use British Cohort Data (of children born in 1970 and outcomes measured in 2012), which find little impact of emotional-health skills on employment outcomes (Goodman et al. 2015; Attanasio et al. 2020a). It is possible that wider changes in unemployment explain the differences between British cohorts. The 1980s were a time of economic upheaval with a large decline of the manufacturing sector and unemployment remaining elevated for an extended period of time - it was above 10% between 1981 and 1986 (Vaitilingam 2009). Many workers who could not find a job simply left the labour market altogether (McVicar 2008; Beatty and Fothergill 2017). A certain level of emotional resilience could have been required to get through this period as well as to be able to look for a job once it had ended.

Perseverance has a relatively weaker (although still strong), relationship with employment. In contrast to job tasks, effects here on employment are somewhat weaker in adolescence than in childhood. This is consistent with the literature that tends to find positive impacts of perseverance on employment outcomes (Eisenberg et al. 2014; Goodman et al. 2015).

In contrast to findings on job tasks, social skills have a relatively strong impact on later employment probability. The effects of social skills are somewhat stronger at age 42, and this may reflect growing service sector employment at this time requiring more person-facing interaction and/or the (re-)entry of mothers who were not working at age 33 due to childbirth (Olivetti and Petrongolo 2016; Deming 2017).

Finally, the impact of non-cognitive skills does fall significantly when controlling for adult level conditions but often remain significant. Non-cognitive skills have been shown to have a strong impact on education status, and so their impact is attenuated when including educational status (Jacob 2002). Their continued significance, however, indicates a child/adolescent with greater non-cognitive skills will, generally, be more likely to be employed than an otherwise similar child with the same level of education.

Table 11: Impact of Skills Measured at age 7/16 on Employment aged 33

	(1)	(2)	(3)	(4)	(5)	(6)
	Age 7	Age 7	Age 7	Age 16	Age16	Age16
Male Dummy	0.127*** (0.008)	0.124*** (0.008)	0.118*** (0.008)	0.111*** (0.010)	0.106*** (0.011)	0.111*** (0.011)
Cognitive	0.039*** (0.004)	0.029*** (0.005)	0.018*** (0.005)	0.052*** (0.007)	0.051*** (0.008)	0.034*** (0.008)
Emotional-Health	0.024*** (0.005)	0.020*** (0.005)	0.014*** (0.005)	0.012* (0.007)	0.014* (0.007)	0.014* (0.007)
Social	0.007 (0.006)	0.004 (0.006)	0.003 (0.006)	0.029*** (0.007)	0.035*** (0.008)	0.018** (0.008)
Perserverance	0.016*** (0.006)	0.020*** (0.006)	0.014** (0.006)	0.019*** (0.006)	0.017** (0.007)	0.008 (0.007)
Constant	0.785*** (0.006)	0.569*** (0.109)	0.507*** (0.109)	0.799*** (0.007)	0.750*** (0.138)	0.693*** (0.139)
Ethnicity Control	Yes	Yes	Yes	Yes	Yes	Yes
Childhood Controls	No	Yes	Yes	No	Yes	Yes
Adult Control	No	No	Yes	No	No	Yes
N	8242	7055	6764	5078	4105	3957
r2	0.052	0.062	0.112	0.065	0.074	0.109

Standard errors in parentheses

Ethnicity controls: ethnicity of child

Childhood controls: maternal education, maternal employment, father's occupation, maternal background (height at pregnancy, age, and marital status),

pregnancy characteristics (mother in pregnancy, and birthweight), region of childhood

Adult Controls: region of residence, marital status, a graduate dummy, and general health status

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 12: Impact of Skills Measured at age 7/16 on Employment aged 42

	(1)	(2)	(3)	(4)	(5)	(6)
	Age 7	Age 7	Age 7	Age 16	Age16	Age16
Male Dummy	0.104*** (0.007)	0.101*** (0.008)	0.095*** (0.008)	0.073*** (0.008)	0.076*** (0.010)	0.076*** (0.010)
Cognitive	0.034*** (0.004)	0.029*** (0.004)	0.019*** (0.004)	0.044*** (0.006)	0.042*** (0.007)	0.042*** (0.007)
Emotional- Health	0.023*** (0.005)	0.022*** (0.005)	0.008 (0.005)	0.018*** (0.006)	0.017** (0.007)	0.017** (0.007)
Social	0.014** (0.005)	0.013** (0.006)	0.014** (0.006)	0.019*** (0.007)	0.018** (0.008)	0.018** (0.008)
Perserverance	0.020*** (0.005)	0.017*** (0.006)	0.011* (0.006)	0.012** (0.006)	0.009 (0.007)	0.009 (0.007)
Constant	0.806*** (0.005)	0.648*** (0.101)	0.748*** (0.101)	0.834*** (0.006)	0.940*** (0.128)	0.926*** (0.128)
Ethnicity Control	Yes	Yes	Yes	Yes	Yes	Yes
Childhood Controls	No	Yes	Yes	No	Yes	Yes
Adult Control	No	No	Yes	No	No	Yes
N	9549	8129	6892	5893	4762	4762
r2	0.044	0.052	0.161	0.041	0.054	0.057

Standard errors in parentheses

Ethnicity controls: ethnicity of child

Childhood controls: maternal education, maternal employment, father's occupation, maternal background (height at pregnancy, age, and marital status),

pregnancy characteristics (mother in pregnancy, and birthweight), region of childhood

Adult Controls: region of residence, marital status, a graduate dummy, and general health status

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure 12: Effect of Childhood Skills on Adult Employment

(a) Effect of Skills on Employment Age 33

(b) Effect of Skills on Employment Age 42

Figure 13: Effect of Adolescent Skills on Adult Employment

(a) Effect of Skills on Employment Age 33

(b) Effect of Skills on Employment Age 42

XI DO COGNITIVE AND NON-COGNITIVE SKILLS HAVE DIFFERENT EFFECTS ON EMPLOYMENT FOR MEN AND WOMEN?

I estimate equation 4 below to analyse whether the effects of cognitive and non-cognitive skills differ for men and women in the labour market. The key coefficients are on whether the interactions of these skills with the Male Dummy has an impact on employment probabilities as adults. Positive interactions indicate that men are more likely to be employed for a given level of skills, while a negative coefficient indicates that women gain a greater employment bonus from a given level of skills. The key coefficients are shown in Figures 14 and 15 below. Full regression tables are shown in Appendix F .

$$\begin{aligned}
 \text{Employment}_i = & a_i + \text{Male Dummy}_i + \text{Cognitive Skills}_i \times \text{Male Dummy}_i + \\
 & \text{Social Skills}_i \times \text{Male Dummy}_i + \text{Emotional-Health Skills}_i \times \text{Male Dummy}_i + \\
 & \text{Perseverance}_i \times \text{Male Dummy}_i (+\text{Childhood Controls}_i) \\
 & (+\text{Adult Controls}_i) + \epsilon_i
 \end{aligned}
 \tag{4}$$

As with job tasks, I find almost no evidence, again, that the effect of cognitive and non-cognitive skills differs between genders. There is very little difference in the impact of cognitive, emotional-health, perseverance and social skills. The effects that are found are generally weak and inconsistent. For example, boys appear to gain from social skills at age 33 in childhood but then girls get an extra bonus as adolescents. These effects are somewhat consistent with the literature. The literature finds little difference in the impact of emotional-health skills on employment outcomes between genders, with mixed findings on the whether the effect of cognitive skills and externalising skills differs between genders

(Papageorge et al. 2019; Attanasio et al. 2020a). The results here are broadly in line with findings that differences in education levels (that are correlated with employment outcomes) are due to differences in cognitive and non-cognitive skill levels rather than differences in their effects (Jacob 2002).

The results here indicate that the differential employment outcomes between men and women is not due to their skills being differentially rewarded between genders. Instead, differences in their employment probabilities may reflect their overall skill levels as well as differences in gender norms, discrimination, and childcare policies (Gregory 2011).

Figure 14: Gender-Specific Effect of Childhood Skills on Adult Employment

Figure 15: Gender-Specific Effect of Adolescent Skills on Adult Employment

XII HOW DID COGNITIVE AND NON-COGNITIVE SKILLS DIFFERENCES BETWEEN BOYS AND GIRLS AFFECT EMPLOYMENT RATES?

Here I provide an illustrative calculation of how gendered differences in childhood/adolescent skills could affect adult employment. I do this by estimating how the employment rates for men would change if they had the same level of skills as girls in childhood and adolescence using the results from equations 3 and 4 while holding everything else constant. This is a static, back-of-the-envelope calculation that does not consider dynamic responses to changes in skill levels. I use the results at age 33 with childhood controls and show differences across the skill distribution. Non-graduates have far lower skill levels than graduates. Across skill categories, an average of 85% of those in the bottom quartile are non-graduates (ranging from 75 to 95% across skill categories).

I calculate the illustrative skill-based difference in employment rates by first measuring the difference in cognitive, internalising, perseverance, and social skills between boys and girls at the 1st, 25th, 50th, 75th, and 99th percentiles as shown in Tables 13 and 14 below. I then multiply these differences by the coefficients from columns 2 and 4 in Table 11 (that include education controls).

Table 13: Differences in Skill levels for Girls and Boys at age 7 at Skill Percentiles

Girl - Boy Difference	p1	p25	p50	p75	p99
Cognitive	0.000	0.130	0.075	0.027	-0.024
Emotional-health	0.309	0.258	0.220	0.000	0.000
Social	0.616	0.211	0.000	0.000	0.000
Perseverance	0.580	0.582	0.177	0.085	0.000

For example, at age 7 boys in the 1st percentile of the skill distribution have perseverance skills of -3.22 compared to -2.64 for girls at the same age leading to a difference in 0.58

Table 14: Differences in Skill levels for Girls and Boys at age 16

Girl - Boy Difference	p1	p25	p50	p75	p99
Cognitive	0.130	-0.066	-0.189	-0.193	-0.128
Emotional-health	-0.240	-0.295	-0.277	-0.110	0.000
Social	0.537	0.000	0.000	0.000	0.000
Perseverance	0.399	0.229	0.191	0.183	0.000

(Table 13). I then multiply this difference, 0.58, by the perseverance coefficient from table 11, column 2 (0.020) to measure how much employment probabilities would change if boys had the amount of Perseverance skills at this percentile (1.16%).

In childhood, girls have higher cognitive and non-cognitive skill levels than boys in every skill across almost the entire distribution (with the sole exception of cognitive skills at the 99th percentile). In adolescence, girls have generally lower cognitive (except at the 1st percentile) and emotional-health skills across the skill distribution. They still have higher social and perseverance skill levels across the distribution.

The results of this illustrative, static employment calculation are shown in Figures 16a and 16b below. Noticeably, the impact of childhood/adolescent has a significant impact at the bottom of the skill distribution reducing relative employment for men by around 2 points in childhood and 3 percentage points in adolescence. Similar to findings in [Heckman et al. \(2006\)](#) and [Lindqvist and Vestman \(2011\)](#), I find that non-cognitive skills make a much larger impact at the bottom than at the top of the distribution.

In the middle and top of the skill distribution, gendered differences in childhood skills have less of an impact on employment outcomes. In adolescence, however, differences in skills would drive down employment rates for men relative to women by around 0.5 %. This is not only driven by differences in cognitive skills. Emotional-health skill differences have a positive and strong impact on employment outcomes for men.

It is worth comparing these results with the job task results in section There we found that differences in adolescent skills led to an *average* increase in NRA job and NRI job tasks

for men. At the bottom of the skill distribution, we saw that opposite is true. Similarly here, we find that it is boys at the bottom of the skill distribution that gain the most if they had the same skill levels as girls in childhood and adolescence.

Figure 16: Relative Fall in Male Employment Rates due to Skill Differences (with no Gender Specific Impacts)

I conduct the same calculations using the gender-specific results. Here I sum together the results for both cognitive and male dummy interaction measures to get the total impact for men. So, for example, from Appendix F, I use the coefficients from “Emotional-Health” and “Male Dummy x Emotional”, add these together, and multiply this by the difference between Boy and Girl Emotional-Health Skills at age 7 and 16. As can be seen in Figures 17 below, the impact is still largest at the bottom of the skill distribution, and again reduces employment for the least skilled men by around 2 to 3 percentage points.

In summation, these results indicate that cognitive, social, emotional-health and perseverance skills in childhood/adolescence are important predictors of adult employment outcomes. In childhood, these differences unambiguously reduce employment for men across the skill distribution. In adolescence, it is the least-skilled men who lose out due to gender differences in skills. As the least-skilled boys possess lower levels of skills than the least-skilled girls, the gendered differences in cognitive and non-cognitive skills could provide an important ex-

Figure 17: Relative Fall in Male Employment Rates due to Skill Differences with Gender Specific Effects

planation of the falling employment rates non-graduate men have seen in the postindustrial economy. It is likely that the least-skilled boys have lost out on employment opportunities in the post-industrial economy due to their lower skill levels relative to girls.

XIII DISCUSSION AND CONCLUSION

In this paper, I provided evidence that gendered differences in childhood and adolescent skills are an important explanation for why less-skilled men are less likely to undertake highly paid non-routine analytical and interactive tasks that are more highly demanded in the post-industrial economy. The least-skilled men, in particular, would benefit from having the same cognitive and non-cognitive skills as girls in children and adolescence. Indicative calculations indicate that these least skilled men would perform more highly paid analytical (NRA) and interactive (NRI) tasks as well as be see their employment rates rise by 2 to 3 percentage points.

The most important contribution to the literature that this paper makes is to test the effect of a wide range of cognitive and non-cognitive skills on the full range of job tasks. When combined with the evidence that boys have generally lower cognitive and non-cognitive

skills than girls, this gives an explanation of why non-graduate men have been less adept at performing the tasks demanded in the post-industrial economy. I believe this is the first piece of work to show this.

Using regressions that iteratively controlled for childhood and then adult level conditions, I found that these cognitive and non-cognitive skills had existing effects even after controlling for education status. Early childhood and adolescent experiences matter for labour market outcomes over and above their impact on educational attainment.

When it came to analysing job tasks, cognitive tasks had the strongest effect on job tasks with a positive effect on analytical and interactive tasks and negative effect on manual tasks. Emotional-health in childhood was also strongly related to NRA and NRI tasks, which may be due to its importance for later cognitive development ([Donati et al. 2021](#)). Perseverance skills in adolescence, but not childhood, were positively related to later NRA tasks, which may be due to them developing throughout adolescence.

This paper also makes an important contribution by showing that previous findings of the importance of social skills for person tasks may suffer from an omitted variable bias. Surprisingly, and in contrast to the rest of the literature, social skills had little effect on NRI tasks as expected - and the results here indicate that this could be due to me including measures of emotional-health and perseverance that are often missing from other work in this area ([Borghans et al. 2014](#)). There was little effect of gender-specific effects of skills.

Illustrative back-of-the-envelope calculations indicate that the least-skilled men would have undertaken more NRA and NRI job tasks as well as fewer manual tasks if they had the same level of cognitive and non-cognitive skills as girls in childhood/adolescence. Men in general would have performed more NRA and NRI tasks as adults if, as children, they had the same skill levels as women. As adolescents, however, boys have greater cognitive skills than girls in the middle and top of the skill distribution. Equalising their skill levels to girls would have then led to an overall decrease in the NRA and NRI tasks they perform.

The results for the effect of childhood/adolescent skills on employment outcomes were

subtly different than that of job tasks. Cognitive skills were, again, the most important for predicting employment outcomes. Social skills had a strong effect on employment outcomes, and this was stronger at age 42 than 33, which may indicate the changing job tasks demand at this time and/or the re-entry of mothers into the labour market. Emotional-health and perseverance skills were also positively related to employment outcomes.

The clear policy implication from this paper is that measures to improve early childhood and adolescent experiences are crucial for later labour market outcomes. While the previous literature has convincingly pointed to the importance of childhood cognitive skills and general non-cognitive skills for labour market outcomes, this paper also provides clear evidence of the importance of emotional-health skills for both employment outcomes and high-skill tasks. A warm, nurturing environment for children is as important as stimulating activities ([Putnam 2015](#)). As the non-cognitive skills of boys are more sensitive to home environments than girls, more nurturing environments are likely to lead to a relative rise in male employment rates ([Bertrand and Pan 2013](#)).

Improving these skills in childhood and adolescence is, therefore, crucial for improving labour market outcomes in general and for boys in particular. As [Cooper and Stewart \(2021\)](#) show, a lack of money itself damages cognitive and non-cognitive skills in children. The effects of parental income on childhood cognitive and socio-emotional development begin before children are born ([Blair and Raver 2016](#)). Parents with more money have more material *and* psychological resources to invest in their children and this, in turn, leads to greater cognitive, emotional-health, perseverance, and social skills ([Mullainathan 2013](#); [Cooper 2017](#); [Reeves et al. 2021](#)). Measures that increase incomes for the most deprived will, by providing parents with greater resources to invest in their children, lead to these children growing up to undertake jobs with higher-paying tasks and better employment programs ([Almlund et al. 2011](#); [Autor and Handel 2013](#)).

As well as more money, pre-school programs that aim to improve the early experiences for children can also improve cognitive and non-cognitive skills. Only programs that start

before the age of 3 have, however, consistently improve IQ outcomes ([Kautz et al. 2014](#)). Other pre-school programs that improve parenting practices, such as Sure Start in the UK, and other early education programs can improve non-cognitive skills in young children and so improve both the quality of their jobs as well as the likelihood of them having a job when they become adults ([Heckman et al. 2013](#); [Stewart 2013](#); [Kautz et al. 2014](#)).

There are a number of limitations in this paper that could be addressed with future work. Firstly, these estimates cannot be considered “causal” and instead measure associations between skills in childhood/adolescence and later labour market outcomes. It is possible that other childhood experiences account for employment and skill outcomes that are not covered here. However, the wide range of covariates, including adult-level controls that would attenuate the impacts of childhood skills (such as graduate education), do make these estimates more robust. Many of the effects remain even when controlling for adult-level conditions, indicating they have an important and enduring effect on outcomes, separate from childhood conditions and educational attainment.

Secondly, the measures of emotional-health, social, and perseverance skills tend to measure the presence or absence of problems rather than a child excelling in a particular area. When it comes to social skills, for example, the factor includes measures such as hostility toward others and fighting rather than whether they are liked by other children. While this adequately captures differences at the bottom of the skill distribution, this work may be less suited to analysing differences between boys and girls with greater levels of these skills.

Thirdly, measures of non-cognitive skills differ and there is no perfect way to measure them ([Almlund et al. 2011](#)). Here I use a single taxonomy where I split non-cognitive skills into emotional-health, perseverance, and social skills. There are other taxonomies such as the Big Five and I look forward to future work that uses these measures instead to analyse whether they are consistent with the findings here.

Fourthly, tasks vary within jobs as well and these measures here cannot account for that ([Autor and Handel 2013](#)). Tasks within jobs can also change over time, whereas the measure

used here effectively fixes the task content of occupations when they are measured. Methods that could account for these intra-occupation task differences could give more precise estimates.

Finally, the work completed here shows impacts from one particular country, the United Kingdom, and one cohort of people born in 1958 and measuring their outcomes in 1991 and 2000. The labour market has changed in the past 20 years, with a continuing rise in job tasks requiring analytical and interactive tasks demanded ([Deming 2017](#); [Górka et al. 2017](#)). Future work could consider whether the impact of skills has changed for younger generations as well as in other countries.

XIV APPENDIX A: CONSTRUCTION OF COGNITIVE, EMOTIONAL-HEALTH, SOCIAL AND PERSEVERANCE SKILLS

XIV.1 Childhood Skills

Table A1: Loadings for Cognitive Skills

Item	Title	Factor Loading
1	Reading Test Score	0.655
2	Problem Arithmetic Score	0.637
3	Drawing-a-Man Test	0.533
4	Copying Designs Test	0.505

Table A2: Loadings for Emotional-Health Skills

Item	Title	Factor Loading
1	Depression	0.652
2	Withdrawal	0.648
3	Unforthcomingness	0.624

Table A3: Loadings for Social Skills

Item	Title	Factor Loading
1	Hostility Toward Other Children	0.694
2	Hostility Toward Adults	0.637
3	Anxiety for Acceptance by Children	0.628
4	Anxiety	0.388

Table A4: Loadings for Perseverance Skills

Item	Title	Factor Loading
1	Inconsequential Behaviour	0.820
2	Restlessness	0.666
3	Squirmy, Fidgety	0.665
4	Writing off Adults and Standards	0.500
5	Difficulty Concentrating	0.207

XIV.2 Adolescent Skills

Table A5: Loadings for Cognitive Skills

Item	Title	Factor Loading
1	Reading Test	0.727
2	Mathematics Test	0.727

Table A6: Loadings for Emotional-Health Skills

Item	Title	Factor Loading
1	Worried	0.541
2	Miserable	0.518
3	Fearful	0.443
4	Irritable	0.436
5	Solitary	0.313
6	Fussy	0.305
7	Twitches	0.187
8	Bites Nails	0.171
Sucks Thumb	0.131	9

Table A7: Loadings for Social Skills

Item	Title	Factor Loading
1	Disobedient	0.576
2	Lies	0.563
3	Fights	0.562
4	Bullies	0.524
5	Destroys Objects	0.438
6	Disliked	0.300

Table A8: Loadings for Perseverance Skills

Item	Title	Factor Loading
1	Takes Work Seriously	0.554
2	Difficult to Keep Mind on Work	0.535
3	Lazy/Hardworking	0.505
4	Gets on with Classwork	0.466
5	Restless	0.426
6	Fidgety	0.384

XV APPENDIX B: GENDER SPECIFIC SKILL IM- PACTS ON TASKS

Table A9: Impact of Skills Measured at Ages 7/16 on Job Tasks at Age 32

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	NRA	NRA	NRA	NRA	NRA	NRA	NRI	NRI	NRI	NRI	NRI	NRI
	Age 7	Age 7	Age 7	Age 16	Age 16	Age 16	Age 7	Age 7	Age 7	Age 16	Age 16	Age 16
Male Dummy	0.079*** (0.004)	0.080*** (0.005)	0.072*** (0.004)	0.062*** (0.005)	0.067*** (0.006)	0.064*** (0.006)	-0.027*** (0.003)	-0.030*** (0.004)	-0.034*** (0.004)	-0.046*** (0.004)	-0.044*** (0.005)	-0.045*** (0.005)
Cognitive	0.038*** (0.004)	0.028*** (0.004)	0.012*** (0.004)	0.096*** (0.005)	0.076*** (0.006)	0.042*** (0.006)	0.022*** (0.003)	0.013*** (0.003)	0.004 (0.003)	0.049*** (0.004)	0.038*** (0.005)	0.016*** (0.005)
Cognitive x Male	0.011** (0.005)	0.014*** (0.005)	0.013*** (0.005)	0.020*** (0.007)	0.029*** (0.008)	0.024*** (0.008)	0.0000 (0.004)	0.005 (0.004)	0.003 (0.004)	0.018*** (0.006)	0.021*** (0.006)	0.019*** (0.006)
Emotional-Health	0.024*** (0.005)	0.017*** (0.005)	0.011** (0.004)	0.004 (0.005)	0.002 (0.005)	0.002 (0.005)	0.015*** (0.003)	0.013*** (0.004)	0.010*** (0.004)	0.007* (0.004)	0.006 (0.004)	0.005 (0.004)
Emotional-Health x Male	0.003 (0.006)	0.008 (0.006)	0.005 (0.006)	-0.009 (0.007)	-0.007 (0.008)	-0.003 (0.008)	0.006 (0.004)	0.007 (0.005)	0.006 (0.005)	0.001 (0.006)	0.005 (0.006)	0.008 (0.006)
Social	0.018*** (0.005)	0.013** (0.006)	0.008 (0.005)	0.004 (0.006)	0.005 (0.007)	0.004 (0.007)	0.008** (0.004)	0.004 (0.004)	0.002 (0.004)	0.000 (0.005)	0.002 (0.006)	0.002 (0.005)
Social x Male	-0.008 (0.006)	-0.005 (0.007)	-0.008 (0.007)	-0.003 (0.008)	0.000 (0.010)	0.000 (0.009)	-0.011** (0.005)	-0.007 (0.006)	-0.010* (0.005)	-0.003 (0.007)	-0.006 (0.007)	-0.007 (0.007)
Perseverance	0.003 (0.005)	0.005 (0.006)	0.005 (0.005)	0.029*** (0.005)	0.033*** (0.006)	0.023*** (0.006)	0.030 (0.004)	0.004 (0.005)	0.003 (0.004)	0.012*** (0.004)	0.015*** (0.005)	0.008* (0.005)
Perseverance x Male	0.003 (0.007)	0.000 (0.007)	-0.002 (0.007)	-0.007 (0.007)	-0.008 (0.008)	-0.008 (0.008)	0.010* (0.005)	0.009 (0.006)	0.009 (0.006)	-0.003 (0.006)	-0.005 (0.006)	-0.006 (0.006)
Constant	0.191*** (0.003)	0.0158 (0.062)	0.0809 (0.058)	0.191*** (0.004)	0.179** (0.077)	0.188** (0.075)	0.238*** (0.002)	0.116** (0.047)	0.153*** (0.046)	0.242*** (0.003)	0.280*** (0.061)	0.290*** (0.060)
Ethnicity Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Childhood Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Adult Control	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
N	9756	8345	8113	6074	4917	4799	9756	8345	8113	6074	4917	4799
r2	0.081	0.14	0.280	0.198	0.220	0.304	0.051	0.079	0.160	0.109	0.119	0.182

Standard errors in parentheses

Ethnicity controls: ethnicity of child

Childhood controls: maternal education, maternal employment, father's occupation,

maternal background (height at pregnancy, age, and marital status),

pregnancy characteristics (mother in pregnancy, and birthweight), region of childhood

Adult Controls: region of residence, marital status, a graduate dummy, and general health status

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A10: Impact of Skills Measured at Ages 7/16 on Job Tasks at Age 42

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	NRA	NRA	NRA	NRA	NRA	NRA	NRI	NRI	NRI	NRI	NRI	NRI
	Age 7	Age 7	Age 7	Age 16	Age 16	Age 16	Age 7	Age 7	Age 7	Age 16	Age 16	Age 16
Male Dummy	0.044*** (0.005)	0.043*** (0.005)	0.039*** (0.006)	0.028*** (0.006)	0.029*** (0.007)	0.029*** (0.007)	-0.034*** (0.004)	-0.036*** (0.004)	-0.040*** (0.004)	-0.040*** (0.005)	-0.044*** (0.005)	-0.048*** (0.005)
Cognitive	0.034*** (0.004)	0.028*** (0.004)	0.019*** (0.005)	0.066*** (0.006)	0.056*** (0.007)	0.037*** (0.008)	0.021*** (0.003)	0.015*** (0.003)	0.010*** (0.004)	0.033*** (0.005)	0.027*** (0.005)	0.014** (0.006)
Cognitive x Male	-0.006 (0.006)	-0.002 (0.006)	-0.002 (0.006)	0.018** (0.008)	0.022** (0.009)	0.015 (0.01)	-0.004 (0.004)	0.002 (0.004)	-0.002 (0.005)	0.018*** (0.006)	0.024*** (0.007)	0.019** (0.008)
Emotional-Health	0.025*** (0.005)	0.020*** (0.005)	0.017*** (0.006)	0.00390 (0.006)	0.002 (0.006)	0.005 (0.007)	0.014*** (0.004)	0.015*** (0.004)	0.010** (0.004)	0.003 (0.004)	0.002 (0.005)	0.004 (0.005)
Emotional-Health x Male	0.000 (0.007)	0.005 (0.007)	0.004 (0.007)	-0.017** (0.009)	-0.013 (0.010)	-0.015 (0.010)	0.000 (0.005)	-0.002 (0.005)	0.000 (0.006)	-0.008 (0.006)	-0.004 (0.007)	-0.005 (0.008)
Social	0.014** (0.006)	0.013** (0.006)	0.009 (0.007)	0.001 (0.007)	0.004 (0.008)	0.001 (0.009)	0.006 (0.004)	0.005 (0.005)	0.005 (0.005)	0.002 (0.005)	0.004 (0.006)	-0.003 (0.007)
Social x Male	-0.016** (0.008)	-0.013 (0.008)	-0.012 (0.009)	0.005 (0.010)	0.001 (0.011)	-0.002 (0.012)	-0.006 (0.006)	-0.005 (0.006)	-0.007 (0.007)	0.006 (0.007)	0.007 (0.008)	0.015 (0.009)
Perseverance	0.000 (0.006)	0.001 (0.007)	0.003 (0.007)	0.005 (0.010)	0.001 (0.011)	-0.002 (0.012)	-0.002 (0.005)	-0.006 (0.005)	-0.005 (0.005)	0.006 (0.007)	0.007 (0.008)	0.015 (0.009)
Perseverance x Male	0.012 (0.008)	0.006 (0.009)	-0.002 (0.009)	-0.002 (0.008)	-0.001 (0.009)	0.006 (0.010)	0.099* (0.006)	0.012* (0.006)	0.011 (0.007)	-0.008 (0.006)	-0.013* (0.007)	-0.014* (0.007)
Constant	0.228*** (0.004)	0.102 (0.070)	0.207*** (0.073)	0.233*** (0.004)	0.0606 (0.088)	0.104 (0.094)	0.267*** (0.003)	0.192*** (0.052)	0.238*** (0.056)	0.266*** (0.003)	0.233*** (0.067)	0.246*** (0.071)
Ethnicity Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Childhood Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Adult Control	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
N	8639	7396	6371	5425	4404	3881	8639	7396	6371	5425	4404	3881
r2	0.041	0.061	0.121	0.091	0.101	0.135	0.037	0.048	0.082	0.058	0.066	0.089

Standard errors in parentheses

Ethnicity controls: ethnicity of child

Childhood controls: maternal education, maternal employment, father's occupation,

maternal background (height at pregnancy, age, and marital status),

pregnancy characteristics (mother in pregnancy, and birthweight), region of childhood

Adult Controls: region of residence, marital status, a graduate dummy, and general health status

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A11: Impact of Skills Measured at age 7/16 on RC Tasks Aged 33

	(1)	(2)	(3)	(4)	(5)	(6)
	RC	RC	RC	RC	RC	(RC
	Age 7	Age 7	Age 7	Age 16	Age16	Age16
Male Dummy	-0.102*** (0.00467)	-0.102*** (0.00508)	-0.0978*** (0.00507)	-0.0978*** (0.00608)	-0.101*** (0.00677)	-0.0990*** (0.00667)
Cognitive	0.0127*** (0.00380)	0.0162*** (0.00419)	0.0255*** (0.00418)	0.00730 (0.00627)	0.0200*** (0.00727)	0.0516*** (0.00735)
Cognitive x Male Dummy	-0.0121** (0.00524)	-0.0143** (0.00567)	-0.0141** (0.00565)	-0.00634 (0.00848)	-0.0100 (0.00944)	-0.00667 (0.00931)
Emotional- Health	0.00204 (0.00478)	0.00596 (0.00511)	0.0101** (0.00507)	-0.0103* (0.00572)	-0.00583 (0.00619)	-0.00667 (0.00608)
Emotional- Health x Male Dummy	-0.00270 (0.00621)	-0.00691 (0.00665)	-0.00647 (0.00660)	0.00916 (0.00862)	0.00246 (0.00945)	-0.000890 (0.00930)
Social	-0.00545 (0.00552)	-0.00198 (0.00599)	0.000785 (0.00599)	0.0143** (0.00726)	0.0130 (0.00809)	0.0144* (0.00793)
Social x Male Dummy	0.00654 (0.00726)	0.00441 (0.00785)	0.00519 (0.00784)	-0.0168* (0.00975)	-0.0175 (0.0109)	-0.0164 (0.0107)
Perseverance	0.0135** (0.00575)	0.0140** (0.00636)	0.0134** (0.00629)	0.0107* (0.00617)	0.00856 (0.00670)	0.0179*** (0.00663)
Perseverance x Male Dummy	-0.0109 (0.00734)	-0.00872 (0.00804)	-0.00766 (0.00799)	-0.00772 (0.00835)	-0.00394 (0.00916)	-0.00120 (0.00903)
Constant	0.271*** (0.00338)	0.294*** (0.0666)	0.258*** (0.0668)	0.271*** (0.00426)	0.296*** (0.0889)	0.273*** (0.0882)
Ethnicity Control	Yes	Yes	Yes	Yes	Yes	Yes
Childhood Controls	No	Yes	Yes	No	Yes	Yes
Adult Control	No	No	Yes	No	No	Yes
N	9756	8345	8113	6074	4917	4799
r2	0.0567	0.0710	0.115	0.0526	0.0680	0.133

Standard errors in parentheses

Ethnicity controls: ethnicity of child

Childhood controls: maternal education, maternal employment, father's occupation, maternal background (height at pregnancy, age, and marital status),

pregnancy characteristics (mother in pregnancy, and birthweight), region of childhood

Adult Controls: region of residence, marital status, a graduate dummy, and general health status

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A12: Impact of Skills Measured at age 7/16 on RC Tasks Aged 42

	(1) RC Age 7	(2) RC Age 7	(3) RC Age 7	(4) RC Age 16	(5) RC Age16	(6) (RC Age16
Male Dummy	-0.048*** (0.005)	-0.048*** (0.005)	-0.044*** (0.006)	-0.041*** (0.006)	-0.039*** (0.007)	-0.034*** (0.008)
Cognitive	-0.002 (0.004)	0.001 (0.005)	0.005 (0.005)	0.000 (0.006)	0.007 (0.008)	0.020** (0.008)
Cognitive x Male Dummy	0.001 (0.006)	-0.003 (0.006)	-0.002 (0.007)	-0.002 (0.009)	-0.012 (0.010)	-0.003 (0.011)
Emotional-Health	-0.003 (0.005)	-0.005 (0.006)	-0.004 (0.006)	-0.011* (0.006)	-0.009 (0.007)	-0.009 (0.007)
Emotional- Health x Male Dummy	0.002 (0.007)	0.004 (0.007)	0.004 (0.008)	0.009 (0.009)	0.003 (0.010)	-0.003 (0.011)
Social	-0.004 (0.006)	-0.007 (0.006)	0.000 (0.007)	0.019** (0.008)	0.019** (0.009)	0.022** (0.010)
Social x Male Dummy	0.003 (0.007)	0.004 (0.008)	-0.003 (0.009)	-0.026*** (0.010)	-0.023** (0.011)	-0.028** (0.013)
Perseverance	0.011* (0.006)	0.013* (0.007)	0.012 (0.008)	-0.005 (0.006)	-0.004 (0.007)	0.004 (0.008)
Perseverance x Male Dummy	-0.009 (0.008)	-0.010 (0.009)	-0.005 (0.009)	0.003 (0.009)	0.003 (0.010)	0.002 (0.010)
Constant	0.225*** (0.004)	0.293*** (0.070)	0.275*** (0.076)	0.223*** (0.004)	0.338*** (0.093)	0.320*** (0.100)
Ethnicity Control	Yes	Yes	Yes	Yes	Yes	Yes
Childhood Controls	No	Yes	Yes	No	Yes	Yes
Adult Control	No	No	Yes	No	No	Yes
N	8639	7396	6371	5425	4404	3881
r2	0.016	0.021	0.039	0.014	0.022	0.046

Standard errors in parentheses

Ethnicity controls: ethnicity of child

Childhood controls: maternal education, maternal employment, father's occupation, maternal background (height at pregnancy, age, and marital status), pregnancy characteristics (mother in pregnancy, and birthweight), region of childhood

Adult Controls: region of residence, marital status, a graduate dummy, and general health status

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A13: Impact of Skills Measured at Ages 7/16 on Job Tasks at Age 33

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	RM	RM	RM	RM	RM	RM	NRM	NRM	NRM	NRM	NRM	NRM
	Age 7	Age 7	Age 7	Age 16	Age 16	Age 16	Age 7	Age 7	Age 7	Age 16	Age 16	Age 16
Male Dummy	0.006*	0.007*	0.008**	0.016***	0.014***	0.013***	0.045***	0.044***	0.051***	0.066***	0.063***	0.066***
	(0.003)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.007)	(0.008)	(0.008)
Cognitive	-0.019***	-0.014***	-0.010***	-0.045***	-0.037***	-0.028***	-0.054***	-0.043***	-0.032***	-0.106***	-0.097***	-0.081***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.007)	(0.008)	(0.008)
Cognitive x Male	0.001	-0.002	0.000	0.002	-0.002	-0.001	0.000	-0.003	-0.002	-0.034***	-0.038***	-0.035***
	(0.004)	(0.004)	(0.004)	(0.006)	(0.007)	(0.007)	(0.006)	(0.007)	(0.007)	(0.009)	(0.011)	(0.011)
Emotional-Health	-0.011***	-0.010***	-0.008**	0.005	0.005	0.006	-0.031***	-0.026***	-0.022***	-0.005	-0.007	-0.007
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)
Emotional-Health x Male	-0.004	-0.004	-0.003	-0.013**	-0.016**	-0.017***	-0.002	-0.005	-0.002	0.012	0.016	0.013
	(0.004)	(0.005)	(0.005)	(0.006)	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)	(0.010)	(0.011)	(0.011)
Social	-0.006	-0.005	-0.004	-0.010**	-0.013**	-0.013**	-0.015**	-0.011	-0.007	-0.009	-0.008	-0.007
	(0.004)	(0.004)	(0.004)	(0.005)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)	(0.008)	(0.009)	(0.009)
Social x Male	0.009*	0.009*	0.012**	0.015**	0.020***	0.021***	0.0031	-0.002	0.000	0.008	0.003	0.002
	(0.005)	(0.006)	(0.006)	(0.007)	(0.008)	(0.008)	(0.008)	(0.009)	(0.009)	(0.011)	(0.012)	(0.012)
Perseverance	-0.001	-0.002	-0.002	-0.010**	-0.014***	-0.012**	-0.019***	-0.021***	-0.020***	-0.041***	-0.042***	-0.037***
	(0.004)	(0.005)	(0.005)	(0.004)	(0.005)	(0.005)	(0.007)	(0.008)	(0.008)	(0.007)	(0.007)	(0.008)
Perseverance x Male	-0.006	-0.006	-0.007	-0.004	-0.003	-0.004	0.004	0.007	0.007	0.022**	0.020*	0.019*
	(0.0053)	(0.0058)	(0.0058)	(0.0058)	(0.006)	(0.006)	(0.009)	(0.010)	(0.010)	(0.009)	(0.010)	(0.010)
	0.063***	0.118**	0.102**	0.063***	0.013	-0.005	0.238***	0.456***	0.406***	0.232***	0.232**	0.254**
	(0.002)	(0.048)	(0.048)	(0.003)	(0.062)	(0.063)	(0.004)	(0.080)	(0.080)	(0.005)	(0.099)	(0.100)
Ethnicity Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Childhood Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Adult Control	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
N	9756	8345	8113	6074	4917	4799	9756	8345	8113	6074	4917	4799
r2	0.023	0.043	0.067	0.062	0.076	0.089	0.074	0.110	0.157	0.165	0.183	0.198

Standard errors in parentheses

Ethnicity controls: ethnicity of child

Childhood controls: maternal education, maternal employment, father's occupation,

maternal background (height at pregnancy, age, and marital status),

pregnancy characteristics (mother in pregnancy, and birthweight), region of childhood

Adult Controls: region of residence, marital status, a graduate dummy, and general health status

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A14: Impact of Skills Measured at Ages 7/16 on Job Tasks at Age 42

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	RM	RM	RM	RM	RM	RM	NRM	NRM	NRM	NRM	NRM	NRM
	Age 7	Age 7	Age 7	Age 16	Age 16	Age 16	Age 7	Age 7	Age 7	Age 16	Age 16	Age 16
Male Dummy	0.008*** (0.003)	0.010*** (0.003)	0.012*** (0.004)	0.010*** (0.004)	0.010** (0.004)	0.013*** (0.005)	0.030*** (0.006)	0.031*** (0.007)	0.033*** (0.007)	0.043*** (0.007)	0.043*** (0.008)	0.041*** (0.009)
Cognitive	-0.007*** (0.0025)	-0.006** (0.003)	-0.004 (0.003)	-0.021*** (0.004)	-0.021*** (0.005)	-0.016*** (0.005)	-0.047*** (0.005)	-0.038*** (0.006)	-0.030*** (0.006)	-0.077*** (0.008)	-0.070*** (0.009)	-0.055*** (0.010)
Cognitive x Male	-0.001 (0.003)	-0.001 (0.004)	0.000 (0.004)	-0.005 (0.005)	-0.001 (0.006)	0.000 (0.007)	0.010 (0.007)	0.004 (0.007)	0.006 (0.008)	-0.028*** (0.010)	-0.034*** (0.011)	-0.030** (0.012)
Emotional-Health	-0.002 (0.003)	0.000 (0.003)	0.001 (0.004)	0.009** (0.004)	0.009** (0.004)	0.007 (0.004)	-0.035*** (0.006)	-0.030*** (0.007)	-0.024*** (0.007)	-0.005 (0.007)	-0.003 (0.008)	-0.006 (0.008)
Emotional-Health x Male	-0.007* (0.004)	-0.009** (0.004)	-0.010** (0.004)	-0.010* (0.005)	-0.010* (0.006)	-0.008 (0.007)	0.005 (0.008)	0.001 (0.009)	0.002 (0.009)	0.027** (0.011)	0.024** (0.012)	0.031** (0.012)
Social	-0.005 (0.004)	-0.003 (0.004)	-0.003 (0.004)	-0.003 (0.005)	-0.005 (0.005)	-0.003 (0.006)	-0.011 (0.007)	-0.008 (0.008)	-0.011 (0.008)	-0.019** (0.009)	-0.021** (0.010)	-0.016 (0.011)
Social x Male	0.006 (0.005)	0.002 (0.005)	0.006 (0.006)	0.003 (0.006)	0.003 (0.007)	0.002 (0.008)	0.013 (0.010)	0.011 (0.010)	0.017 (0.011)	0.012 (0.012)	0.012 (0.013)	0.013 (0.015)
Perseverance	-0.004 (0.004)	-0.003 (0.004)	-0.003 (0.005)	-0.003 (0.004)	-0.002 (0.004)	0.000 (0.005)	-0.005 (0.008)	-0.005 (0.009)	-0.007 (0.009)	-0.013* (0.008)	-0.019** (0.008)	-0.013 (0.009)
Perseverance x Male	0.000 (0.005)	0.001 (0.005)	0.001 (0.006)	0.000 (0.005)	0.000 (0.006)	-0.003 (0.006)	-0.012 (0.010)	-0.009 (0.011)	-0.004 (0.011)	0.006 (0.010)	0.011 (0.011)	0.009 (0.012)
Constant _cons	0.046*** (0.002)	0.094** (0.043)	0.044 (0.047)	0.048*** (0.003)	0.031 (0.056)	0.007 (0.061)	0.235*** (0.004)	0.319*** (0.086)	0.236*** (0.091)	0.231*** (0.005)	0.338*** (0.109)	0.323*** (0.115)
Ethnicity Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Childhood Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Adult Control	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
N	8639	7396	6371	5425	4404	3881	8639	7396	6371	5425	4404	3881
r2	0.011	0.019	0.030	0.024	0.029	0.036	0.046	0.059	0.090	0.085	0.096	0.102

Standard errors in parentheses

Ethnicity controls: ethnicity of child

Childhood controls: maternal education, maternal employment, father's occupation,

maternal background (height at pregnancy, age, and marital status),

pregnancy characteristics (mother in pregnancy, and birthweight), region of childhood

Adult Controls: region of residence, marital status, a graduate dummy, and general health status

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

XVI APPENDIX C: IMPACT OF NRA AND NRI TASKS INCLUDING ONLY COGNITIVE AND SOCIAL SKILLS

XVI.1 NRA Tasks

Table A15: Impact of Skills Measured at age 7/16 on NRA Tasks Aged 33

	(1)	(2)	(3)	(4)	(5)	(6)
	NRA	NRA	NRA	NRA	NRA	(NRA
	Age 7	Age 7	Age 7	Age 16	Age16	Age16
Male Dummy	0.073*** (0.004)	0.076*** (0.005)	0.068*** (0.004)	0.057*** (0.005)	0.063*** (0.005)	0.062*** (0.005)
Cognitive	0.048*** (0.002)	0.040*** (0.002)	0.022*** (0.002)	0.114*** (0.003)	0.102*** (0.004)	0.059*** (0.004)
Social	0.023*** (0.003)	0.018*** (0.003)	0.009*** (0.003)	0.007* (0.007*)	0.011** (0.011**)	0.007 (0.007)
Constant	0.195*** (0.003)	0.0291 (0.062)	0.091 (0.059)	0.194*** (0.003)	0.190** (0.075)	0.198*** (0.072)
Ethnicity Control	Yes	Yes	Yes	Yes	Yes	Yes
Childhood Controls	No	Yes	Yes	No	Yes	Yes
Adult Control	No	No	Yes	No	No	Yes
N	9757	8346	8114	6549	5296	5166
r2	0.0725	0.130	0.276	0.189	0.207	0.300

Standard errors in parentheses

Ethnicity controls: ethnicity of child

Childhood controls: maternal education, maternal employment, father's occupation, maternal background (height at pregnancy, age, and marital status),

pregnancy characteristics (mother in pregnancy, and birthweight), region of childhood

Adult Controls: region of residence, marital status, a graduate dummy, and general health status

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A16: Impact of Skills Measured at age 7/16 on NRA Tasks Aged 42

	(1)	(2)	(3)	(4)	(5)	(6)
	NRA	NRA	NRA	NRA	NRA	(NRA
	Age 7	Age 7	Age 7	Age 16	Age16	Age16
Male Dummy	0.039*** (0.005)	0.039*** (0.005)	0.034*** (0.005)	0.027*** (0.005)	0.029*** (0.006)	0.028*** (0.006)
Cognitive	0.036*** (0.002)	0.030*** (0.003)	0.020*** (0.003)	0.080*** (0.004)	0.073*** (0.005)	0.047*** (0.005)
Social	0.036*** (0.002)	0.030*** (0.003)	0.020*** (0.003)	0.008* (0.004)	0.009* (0.005)	0.003 (0.005)
Constant	0.233*** (0.003)	0.110 (0.070)	0.220*** (0.073)	0.231*** (0.004)	0.104 (0.085)	0.141 (0.090)
Ethnicity Control	Yes	Yes	Yes	Yes	Yes	Yes
Childhood Controls	No	Yes	Yes	No	Yes	Yes
Adult Control	No	No	Yes	No	No	Yes
N	8639	7396	6371	5844	4743	4165
r2	0.033	0.054	0.117	0.089	0.098	0.134

Standard errors in parentheses

Ethnicity controls: ethnicity of child

Childhood controls: maternal education, maternal employment, father's occupation, maternal background (height at pregnancy, age, and marital status), pregnancy characteristics (mother in pregnancy, and birthweight), region of childhood

Adult Controls: region of residence, marital status, a graduate dummy, and general health status

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

XVI.2 NRI Tasks

Table A17: Impact of Skills Measured at age 7/16 on NRI Tasks Aged 33

	(1)	(2)	(3)	(4)	(5)	(6)
	NRI	NRI	NRI	NRI	NRI	(NRI
	Age 7	Age 7	Age 7	Age 16	Age16	Age16
Male Dummy	-0.032*** (0.003)	-0.033*** (0.004)	-0.037*** (0.003)	-0.043*** (0.004)	-0.042*** (0.004)	-0.041*** (0.004)
Cognitive	0.027*** (0.002)	0.020*** (0.002)	0.010*** (0.002)	0.062*** (0.003)	0.054*** (0.003)	0.027*** (0.003)
Social	0.012*** (0.002)	0.009*** (0.002)	0.004** (0.002)	0.005 (0.003)	0.005 (0.003)	0.003 (0.003)
Constant	0.240*** (0.002)	0.129*** (0.047)	0.164*** (0.046)	0.242*** (0.003)	0.255*** (0.058)	0.260*** (0.058)
Ethnicity Control	Yes	Yes	Yes	Yes	Yes	Yes
Childhood Controls	No	Yes	Yes	No	Yes	Yes
Adult Control	No	No	Yes	No	No	Yes
N	9757	8346	8114	6549	5296	5166
r2	0.041	0.070	0.154	0.103	0.110	0.173

Standard errors in parentheses

Ethnicity controls: ethnicity of child

Childhood controls: maternal education, maternal employment, father's occupation, maternal background (height at pregnancy, age, and marital status), pregnancy characteristics (mother in pregnancy, and birthweight), region of childhood

Adult Controls: region of residence, marital status, a graduate dummy, and general health status

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A18: Impact of Skills Measured at age 7/16 on NRI Tasks Aged 42

	(1)	(2)	(3)	(4)	(5)	(6)
	NRI	NRI	NRI	NRI	NRI	(NRI
	Age 7	Age 7	Age 7	Age 16	Age16	Age16
Male Dummy	-0.036*** (0.003)	-0.037*** (0.004)	-0.041*** (0.004)	-0.039*** (0.004)	-0.040*** (0.005)	-0.043*** (0.005)
Cognitive	0.022*** (0.002)	0.018*** (0.002)	0.010*** (0.002)	0.045*** (0.003)	0.042*** (0.003)	0.023*** (0.004)
Social	0.008*** (0.002)	0.007*** (0.002)	0.004* (0.003)	0.006* (0.003)	0.007** (0.004)	0.004 (0.004)
Constant	0.268*** (0.003)	0.196*** (0.052)	0.245*** (0.056)	0.265*** (0.003)	0.228*** (0.065)	0.231*** (0.069)
Ethnicity Control	Yes	Yes	Yes	Yes	Yes	Yes
Childhood Controls	No	Yes	Yes	No	Yes	Yes
Adult Control	No	No	Yes	No	No	Yes
N	8639	7396	6371	5425	4404	3881
r2	0.032	0.043	0.080	0.059	0.066	0.088

Standard errors in parentheses

Ethnicity controls: ethnicity of child

Childhood controls: maternal education, maternal employment, father's occupation, maternal background (height at pregnancy, age, and marital status), pregnancy characteristics (mother in pregnancy, and birthweight), region of childhood

Adult Controls: region of residence, marital status, a graduate dummy, and general health status

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

XVII APPENDIX D: INCLUDING MOTHER ROBUSTNESS CHECKS

Table A19: Impact of Skills Measured at age 7/16 on Employment aged 33

	(1)	(2)	(3)	(4)	(5)	(6)
	Age 7	Age 7	Age 7	Age 16	Age16	Age16
Male Dummy	0.126*** (0.009)	0.123*** (0.009)	0.112*** (0.009)	0.106*** (0.012)	0.106*** (0.012)	0.103*** (0.012)
Cognitive	0.040*** (0.004)	0.031*** (0.005)	0.021*** (0.005)	0.056*** (0.008)	0.056*** (0.008)	0.038*** (0.009)
Emotional-Health	0.040*** (0.004)	0.031*** (0.005)	0.021*** (0.005)	0.017** (0.017**)	0.017** (0.017**)	0.016** (0.016**)
Social	0.007 (0.006)	0.004 (0.006)	0.003 (0.006)	0.033*** (0.008)	0.033*** (0.008)	0.025*** (0.009)
Perseverance	0.011** (0.006)	0.014** (0.006)	0.010 (0.006)	0.007 (0.007)	0.007 (0.007)	0.000 (0.007)
Constant	0.785*** (0.007)	0.655*** (0.109)	0.678*** (0.110)	0.764*** (0.141)	0.764*** (0.141)	0.765*** (0.142)
Ethnicity Control	Yes	Yes	Yes	Yes	Yes	Yes
Childhood Controls	No	Yes	Yes	No	Yes	Yes
Adult Control	No	No	Yes	No	No	Yes
N	10360	8849	8603	5189	5189	5064
r2	0.150	0.158	0.186	0.162	0.162	0.184

Standard errors in parentheses

Ethnicity controls: ethnicity of child

Childhood controls: maternal education, maternal employment, father's occupation,

maternal background (height at pregnancy, age, and marital status),

pregnancy characteristics (mother in pregnancy, and birthweight), region of childhood

Adult Controls: region of residence, marital status, a graduate dummy, and general health status

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A20: Impact of Skills Measured at age 7/16 on Employment aged 42

	(1)	(2)	(3)	(4)	(5)	(6)
	Age 7	Age 7	Age 7	Age 16	Age16	Age16
Male Dummy	0.104*** (0.007)	0.102*** (0.008)	0.095*** (0.008)	0.075*** (0.010)	0.079*** (0.010)	0.084*** (0.010)
Cognitive	0.034*** (0.004)	0.029*** (0.004)	0.018*** (0.005)	0.044*** (0.006)	0.043*** (0.007)	0.019** (0.008)
Emotional-Health	0.023*** (0.005)	0.022*** (0.005)	0.008 (0.005)	0.014** (0.006)	0.013** (0.007)	0.002 (0.007)
Social	0.008 (0.005)	0.006 (0.006)	0.006 (0.006)	0.025*** (0.007)	0.026*** (0.008)	0.016** (0.008)
Perseverance	0.021*** (0.005)	0.018*** (0.005)	0.013** (0.00608)	0.016** (0.006)	0.013** (0.007)	0.011 (0.007)
Constant	0.807*** (0.00539)	0.622*** (0.102)	0.720*** (0.103)	0.904*** (0.128)	0.904*** (0.128)	0.859*** (0.130)
Ethnicity Control	Yes	Yes	Yes	Yes	Yes	Yes
Childhood Controls	No	Yes	Yes	No	Yes	Yes
Adult Control	No	No	Yes	No	No	Yes
N	10423	8882	7563	5194	5194	4557
r2	0.0591	0.0693	0.160	0.0779	0.0779	0.170

Standard errors in parentheses

Ethnicity controls: ethnicity of child

Childhood controls: maternal education, maternal employment, father's occupation, maternal background (height at pregnancy, age, and marital status),

pregnancy characteristics (mother in pregnancy, and birthweight), region of childhood

Adult Controls: region of residence, marital status, a graduate dummy, and general health status

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

XVIII APPENDIX E: LOGIT MODELS ROBUST- NESS CHECKS

Table A21: Impact of Skills Measured at age 7/16 on Employment aged 33

	(1)	(2)	(3)	(4)	(5)	(6)
	Age 7	Age 7	Age 7	Age 16	Age16	Age16
Male Dummy	1.073*** (0.068)	1.077*** (0.076)	1.055*** (0.080)	1.026*** (0.091)	1.006*** (0.103)	1.049*** (0.109)
Cognitive	0.315*** (0.035)	0.249*** (0.041)	0.189*** (0.044)	0.525*** (0.065)	0.527*** (0.080)	0.410*** (0.087)
Emotional-Health	0.185*** (0.037)	0.156*** (0.042)	0.117*** (0.044)	0.0908 (0.059)	0.122* (0.067)	0.106 (0.070)
Social	0.063 (0.045)	0.041 (0.050)	0.050 (0.053)	0.200*** (0.058)	0.239*** (0.066)	0.177** (0.071)
Perseverance	0.141*** (0.046)	0.170*** (0.052)	0.128** (0.054)	0.168*** (0.059)	0.150** (0.066)	0.0902 (0.070)
Constant	1.332*** (0.045)	-0.470 (0.974)	-1.120 (1.050)	1.454*** (0.060)	1.123 (1.329)	0.438 (1.428)
Ethnicity Control	Yes	Yes	Yes	Yes	Yes	Yes
Childhood Controls	No	Yes	Yes	No	Yes	Yes
Adult Control	No	No	Yes	No	No	Yes
N	8224	7024	6733	5070	4088	3940
r2	0.062	0.075	0.133	0.083	0.093	0.135

Standard errors in parentheses

Ethnicity controls: ethnicity of child

Childhood controls: maternal education, maternal employment, father's occupation, maternal background (height at pregnancy, age, and marital status), pregnancy characteristics (mother in pregnancy, and birthweight), region of childhood

Adult Controls: region of residence, marital status, a graduate dummy, and general health status

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A22: Impact of Skills Measured at age 7/16 on Employment aged 42

	(1)	(2)	(3)	(4)	(5)	(6)
	Age 7	Age 7	Age 7	Age 16	Age16	Age16
Male Dummy	0.920*** (0.064)	0.928*** (0.072)	1.071*** (0.089)	0.728*** (0.086)	0.780*** (0.099)	0.990*** (0.119)
Cognitive	0.277*** (0.033)	0.245*** (0.038)	0.190*** (0.047)	0.445*** (0.060)	0.435*** (0.073)	0.202** (0.092)
Emotional-Health	0.180*** (0.035)	0.171*** (0.039)	0.083* (0.050)	0.154*** (0.055)	0.154** (0.063)	0.051 (0.075)
Social	0.106** (0.042)	0.106** (0.047)	0.136** (0.058)	0.130** (0.056)	0.126* (0.0654)	0.045 (0.0849)
Perseverance	0.166*** (0.043)	0.142*** (0.048)	0.105* (0.060)	0.110** (0.056)	0.087 (0.063)	0.071 (0.075)
Constant	1.466*** (0.040)	0.332 (0.902)	1.068 (1.090)	1.674*** (0.054)	3.080** (1.247)	2.482* (1.470)
Ethnicity Control	Yes	Yes	Yes	Yes	Yes	Yes
Childhood Controls	No	Yes	Yes	No	Yes	Yes
Adult Control	No	No	Yes	No	No	Yes
N	9531	8112	6876	5885	4754	4151
r2	0.053	0.064	0.170	0.053	0.072	0.179

Standard errors in parentheses

Ethnicity controls: ethnicity of child

Childhood controls: maternal education, maternal employment, father's occupation, maternal background (height at pregnancy, age, and marital status),

pregnancy characteristics (mother in pregnancy, and birthweight), region of childhood

Adult Controls: region of residence, marital status, a graduate dummy, and general health status

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

XIX APPENDIX F: GENDER SPECIFIC EFFECTS ON EMPLOYMENT

Table A23: Impact of Skills Measured at age 7/16 on Employment aged 33

	(1) Age 7	(2) Age 7	(3) Age 7	(4) Age 16	(5) Age 16	(6) Age 16
Male Dummy	0.127*** (0.008)	0.125*** (0.009)	0.119*** (0.008)	0.112*** (0.010)	0.107*** (0.011)	0.113*** (0.011)
Cognitive	0.042*** (0.007)	0.024*** (0.008)	0.014* (0.008)	0.053*** (0.011)	0.044*** (0.013)	0.030** (0.013)
Male Dummy x Cognitive	-0.006 (0.009)	0.007 (0.010)	0.006 (0.010)	-0.001 (0.014)	0.010 (0.015)	0.007 (0.015)
Emotional-Health	0.035*** (0.008)	0.033*** (0.009)	0.027*** (0.008)	0.003 (0.010)	-0.001 (0.011)	0.002 (0.011)
Male Dummy x Emotional-Health	-0.017* (0.010)	-0.020* (0.011)	-0.019* (0.011)	0.014 (0.013)	0.028* (0.015)	0.021 (0.015)
Social	-0.011 (0.010)	-0.017 (0.011)	-0.015 (0.011)	0.042*** (0.012)	0.054*** (0.014)	0.046*** (0.013)
Male Dummy x Social	0.027** (0.012)	0.032** (0.013)	0.026** (0.013)	-0.019 (0.015)	-0.030* (0.017)	-0.045*** (0.017)
Perseverance	0.028*** (0.011)	0.035*** (0.012)	0.027** (0.011)	0.014 (0.011)	0.007 (0.012)	-0.004 (0.012)
Male Dummy x Perseverance	-0.017 (0.013)	-0.022 (0.014)	-0.019 (0.013)	0.006 (0.013)	0.016 (0.015)	0.018 (0.015)
Constant	0.785*** (0.006)	0.569*** (0.109)	0.508*** (0.109)	0.798*** (0.008)	0.744*** (0.138)	0.686*** (0.139)
Ethnicity Control	Yes	Yes	Yes	Yes	Yes	Yes
Childhood Controls	No	Yes	Yes	No	Yes	Yes
Adult Control	No	No	Yes	No	No	Yes
N	8242	7055	6764	5078	4105	3957
r2	0.053	0.063	0.113	0.065	0.075	0.111

Standard errors in parentheses

Ethnicity controls: ethnicity of child

Childhood controls: maternal education, maternal employment, father's occupation, maternal background (height at pregnancy, age, and marital status), pregnancy characteristics (mother in pregnancy, and birthweight), region of childhood

Adult Controls: region of residence, marital status, a graduate dummy, and general health status

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

XX REFERENCES

- ABRAHAM, K. G. AND M. S. KEARNEY (2020): "Explaining the Decline in the US Employment-to-Population Ratio: A Review of the Evidence," *Journal of Economic Literature*, 58, 585–643.
- ACEMOGLU, D. AND D. AUTOR (2011): "Skills, Tasks and Technologies: Implications for Employment and Earnings," in *Handbook of Labor Economics*, Elsevier, vol. 4, 1043–1171.
- ALMLUND, M., A. L. DUCKWORTH, J. HECKMAN, AND T. KAUTZ (2011): "Personality Psychology and Economics," in *Handbook of the Economics of Education*, Elsevier, vol. 4, 1–181.

Table A24: Impact of Skills Measured at age 7/16 on Employment aged 42

	(1)	(2)	(3)	(4)	(5)	(6)
	Age 7	Age 7	Age 7	Age 16	Age 16	Age 16
Male Dummy	0.103*** (0.007)	0.099*** (0.007)	0.093*** (0.008)	0.072*** (0.009)	0.076*** (0.010)	0.082*** (0.010)
Cognitive	0.042*** (0.006)	0.033*** (0.007)	0.027*** (0.006)	0.042*** (0.009)	0.044*** (0.011)	0.019* (0.011)
Male Dummy x Cognitive	-0.016* (0.008)	-0.008 (0.008)	-0.015* (0.009)	0.004 (0.012)	-0.003 (0.013)	-0.003 (0.014)
Emotional-Health	0.018** (0.007)	0.022*** (0.008)	0.008 (0.008)	0.016* (0.008)	0.015 (0.009)	0.002 (0.009)
Male Dummy x Emotional-Health	0.008 (0.010)	0.002 (0.010)	0.000 (0.010)	0.011 (0.012)	0.005 (0.014)	0.008 (0.014)
Social	0.012 (0.009)	-0.001 (0.009)	0.007 (0.009)	0.017* (0.010)	0.015 (0.011)	0.006 (0.012)
Male Dummy x Social	0.002 (0.011)	0.021* (0.012)	0.011 (0.012)	0.002 (0.014)	0.005 (0.015)	0.003 (0.016)
Perserverance	0.026*** (0.009)	0.023** (0.010)	0.008 (0.010)	0.016* (0.009)	0.0124 (0.010)	0.0135 (0.010)
Male Dummy x Perserverance	-0.009 (0.011)	-0.011 (0.012)	0.004 (0.012)	-0.007 (0.012)	-0.006 (0.013)	-0.012 (0.013)
Constant	0.807*** (0.005)	0.648*** (0.101)	0.750*** (0.101)	0.833*** (0.006)	0.941*** (0.128)	0.901*** (0.128)
Ethnicity Control	Yes	Yes	Yes	Yes	Yes	Yes
Childhood Controls	No	Yes	Yes	No	Yes	Yes
Adult Control	No	No	Yes	No	No	Yes
N	9549	8129	6892	5898	4762	4160
r2	0.045	0.053	0.162	0.040	0.0537	0.165

Standard errors in parentheses

Ethnicity controls: ethnicity of child

Childhood controls: maternal education, maternal employment, father's occupation,

maternal background (height at pregnancy, age, and marital status),

pregnancy characteristics (mother in pregnancy, and birthweight), region of childhood

Adult Controls: region of residence, marital status, a graduate dummy, and general health status

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

- ATTANASIO, O., R. BLUNDELL, G. CONTI, AND G. MASON (2020a): “Inequality in Socio-Emotional skills: A Cross-Cohort Comparison,” *Journal of Public Economics*, 191, 104171.
- ATTANASIO, O., Á. DE PAULA, AND A. TOPPETA (2020b): “The Persistence of Socio-Emotional Skills: Life Cycle and Intergenerational Evidence,” *NBER Working Paper* 27823.
- AUTOR, D., D. DORN, AND G. HANSON (2019): “When Work Disappears: Manufacturing Decline and the Falling Marriage Market Value of Young Men,” *American Economic Review: Insights*, 1, 161–78.
- AUTOR, D. H. (2015): “Why Are There Still So Many Jobs? The History and Future of Workplace Automation,” *The Journal of Economic Perspectives*, 29, 3–30.
- AUTOR, D. H. AND M. J. HANDEL (2013): “Putting Tasks to the Test: Human Capital, Job Tasks, and Wages,” *Journal of Labor Economics*, 31, S59–S96.
- AUTOR, D. H., F. LEVY, AND R. J. MURNANE (2003): “The Skill Content of Recent Technological Change: An Empirical Exploration,” *The Quarterly Journal of Economics*, 118, 1279–1333.
- BACCINI, L. AND S. WEYMOUTH (2021): “Gone for Good: Deindustrialization, White Voter Backlash, and US Presidential Voting,” *American Political Science Review*, 115, 550–567.
- BASK, M. (2015): “Externalising and Internalising Problem Behaviour among Swedish Adolescent Boys and Girls,” *International Journal of Social Welfare*, 24, 182–192.
- BEATTY, C. AND S. FOTHERGILL (2017): “The Impact on Welfare and Public Finances of Job Loss in Industrial Britain,” *Regional Studies, Regional Science*, 4, 161–180.
- BERTRAND, M. AND J. PAN (2013): “The Trouble with Boys: Social Influences and the Gender Gap in Disruptive Behavior,” *American Economic Journal: Applied Economics*, 5, 32–64.
- BETHÄUSER, B. A., M. BOURNE, AND E. BUKODI (2016): “Comparative Data Note: Harmonising the measurement of social origin, cognitive ability and educational attainment across the National Child Development Study (NCDS), the British Cohort Study (BCS70), the Longitudinal Study of Young People in England (LSYPE), and the Avon Study of Parents and Children (ALSPAC),” *SOCED Project Data Note*.
- BINDER, A. J. AND J. BOUND (2019): “The Declining Labor Market Prospects of Less-Educated Men,” *Journal of Economic Perspectives*, 33, 163–90.
- BLACK, S. E. AND A. SPITZ-OENER (2010): “Explaining Women’s Success: Technological Change and the Skill Content of Women’s Work,” *The Review of Economics and Statistics*, 92, 187–194.
- BLAIR, C. AND C. C. RAVEN (2016): “Poverty, Stress, and Brain Development: New

- Directions for Prevention and Intervention,” *Academic Pediatrics*, 16, S30–S36.
- BLOOM, N., L. GARICANO, R. SADUN, AND J. VAN REENEN (2014): “The Distinct Effects of Information Technology and Communication Technology on Firm Organization,” *Management Science*, 60, 2859–2885.
- BOLT, U., E. FRENCH, J. H. MACCUISH, AND C. O’DEA (2021): “The Intergenerational Elasticity of Earnings: Exploring the Mechanisms,” *IFS Working Papers*.
- BORGHANS, L., B. TER WEEL, AND B. A. WEINBERG (2014): “People Skills and the Labor-Market Outcomes of Underrepresented Groups,” *ILR Review*, 67, 287–334.
- CASE, A. AND A. DEATON (2020): *Deaths of Despair and the Future of Capitalism*, Princeton: Princeton University Press.
- CAUDILL, S. B. ET AL. (1988): “An Advantage of the Linear Probability Model over Probit or Logit,” *Oxford Bulletin of Economics and Statistics*, 50, 425–427.
- COBB-CLARK, D. A. AND M. TAN (2011): “Noncognitive Skills, Occupational Attainment, and Relative Wages,” *Labour Economics*, 18, 1–13.
- COOPER, K. (2017): “Poverty and Parenting in the UK,” Ph.D. thesis, The London School of Economics and Political Science (LSE).
- COOPER, K. AND K. STEWART (2021): “Does Household Income Affect Children’s Outcomes? A Systematic Review of the Evidence,” *Child Indicators Research*, 14, 981–1005.
- CORTES, G. M., N. JAIMOVICH, AND H. E. SIU (2017): “Disappearing Routine Jobs: Who, How, and Why?” *Journal of Monetary Economics*, 91, 69–87.
- (2018): “The “End of Men” and Rise of Women in the High-Skilled Labor Market,” Tech. rep., National Bureau of Economic Research.
- CUNHA, F., J. J. HECKMAN, L. LOCHNER, AND D. V. MASTEROV (2006): “Interpreting the Evidence on Life Cycle Skill Formation,” *Handbook of the Economics of Education*, 1, 697–812.
- DEMING, D. AND L. B. KAHN (2018): “Skill Requirements across Firms and Labor Markets: Evidence from Job Postings for Professionals,” *Journal of Labor Economics*, 36, S337–S369.
- DEMING, D. J. (2017): “The Growing Importance of Social Skills in the Labor Market,” *The Quarterly Journal of Economics*, 132, 1593–1640.
- DONATI, G., E. MEABURN, AND I. DUMONTHEIL (2021): “Internalising and Externalising in Early Adolescence Predict Later Executive Function, Not the Other Way Around: A Cross-lagged Panel Analysis,” *Cognition and Emotion*, 1–13.
- DUNCAN, G. J., K. MAGNUSON, ET AL. (2011): “The Nature and Impact of Early Achievement Skills, Attention Skills, and Behavior Problems,” *Whither opportunity*, 47–70.
- EISENBERG, N., A. L. DUCKWORTH, T. L. SPINRAD, AND C. VALIENTE (2014): “Con-

- scientiousness: Origins in Childhood?” *Developmental Psychology*, 50, 1331.
- FREY, C. (2019): *The Technology Trap: Capital, Labor, and Power in the age of Automation*, Princeton, New Jersey: Princeton University Press.
- GARICANO, L. AND E. ROSSI-HANSBERG (2015): “Knowledge-Based Hierarchies: Using Organizations to Understand the Economy,” *Annu. Rev. Econ.*, 7, 1–30.
- GOODMAN, A., H. JOSHI, B. NASIM, AND C. TYLER (2015): “Social and Emotional Skills in Childhood and Their Long-term Effects on Adult Life,” *London: Institute of Education*.
- GOOS, M. AND A. MANNING (2007): “Lousy and Lovely Jobs: The Rising Polarization of Work in Britain,” *The Review of Economics and Statistics*, 89, 118–133.
- GOOS, M., A. MANNING, AND A. SALOMONS (2014): “Explaining Job Polarization: Routine-biased Technological Change and Offshoring,” *American Economic Review*, 104, 2509–26.
- GÓRKA, S., W. HARDY, R. KEISTER, P. LEWANDOWSKI, ET AL. (2017): “Tasks and Skills in European Labour Markets. Background Paper for the World Bank Report “Growing United: Upgrading Europe’s Convergence Machine”,” Tech. rep., Instytut Badan Strukturalnych.
- GREGORY, M. (2011): “Gender and Economic Inequality,” in *The Oxford Handbook of Economic Inequality*.
- GUTMAN, L. M. AND N. C. McMASTER (2020): “Gendered Pathways of Internalizing Problems from Early Childhood to Adolescence and Associated Adolescent Outcomes,” *Journal of Abnormal Child Psychology*, 1–16.
- HASKEL, J. (2018): *Capitalism Without Capital : The Rise of the Intangible Economy*, Princeton, New Jersey: Princeton University Press.
- HECKMAN, J., R. PINTO, AND P. SAVELYEV (2013): “Understanding the Mechanisms Through which An Influential Early Childhood Program Boosted Adult Outcomes,” *American Economic Review*, 103, 2052–86.
- HECKMAN, J. J., J. E. HUMPHRIES, AND G. VERAMENDI (2018): “Returns to Education: The Causal Effects of Education on Earnings, Health, and Smoking,” *Journal of Political Economy*, 126, S197–S246.
- HECKMAN, J. J., J. STIXRUD, AND S. URZUA (2006): “The Effects of Cognitive and Noncognitive Abilities on Labor Market Outcomes and Social Behavior,” *Journal of Labor Economics*, 24, 411–482.
- HUMPHRIES, J. E. AND F. KOSSE (2017): “On the Interpretation of Non-cognitive Skills—What is Being Measured and Why It Matters,” *Journal of Economic Behavior & Organization*, 136, 174–185.
- IVERSEN, T. AND D. SOSKICE (2019): *Democracy and Prosperity: The Reinvention of*

- Capitalism in a Turbulent Century*, Princeton, NJ: Princeton University Press.
- JACOB, B. A. (2002): “Where the Boys Aren’t: Non-Cognitive Skills, Returns to School and the Gender Gap in Higher Education,” *Economics of Education Review*, 21, 589–598.
- KAUTZ, T., J. J. HECKMAN, R. DIRIS, B. TER WEEL, L. BORGHANS, ET AL. (2014): “Fostering and Measuring Skills: Improving Cognitive and Non-Cognitive Skills to Promote Lifetime Success,” *NBER Working Papers 20749*.
- KIM, S. AND G. KOCHANSKA (2019): “Evidence for Childhood Origins of Conscientiousness: Testing A Developmental Path from Toddler Age to Adolescence.” *Developmental Psychology*, 55, 196.
- KORHONEN, M., I. LUOMA, R. SALMELIN, A. SIIRTOLA, AND K. PUURA (2018): “The Trajectories of Internalizing and Externalizing Problems from Early Childhood to Adolescence and Young Adult Outcomes,” *Journal of Child and Adolescent Psychology*, 7–12.
- KRAMER, M. S., L. SÉGUIN, J. LYDON, AND L. GOULET (2000): “Socio-economic Disparities in Pregnancy Outcomes: Why Do the Poor Fare so Poorly?” *Paediatric and Perinatal Epidemiology*, 14, 194–210.
- LARSON, C. P. (2007): “Poverty During Pregnancy: Its Effects on Child Health Outcomes,” *Paediatrics & Child Health*, 12, 673–677.
- LINDQVIST, E. AND R. VESTMAN (2011): “The Labor Market Returns to Cognitive and Noncognitive Ability: Evidence from the Swedish Enlistment,” *American Economic Journal: Applied Economics*, 3, 101–28.
- MCVICAR, D. (2008): “Why Have UK Disability Benefit Rolls Grown so Much?” *Journal of Economic Surveys*, 22, 114–139.
- MIHAYLOV, E. AND K. G. TIJDENS (2019): “Measuring the Routine and Non-Routine Task Content of 427 Four-Digit ISCO-08 Occupations,” *Tinbergen Institute Discussion Paper 2019-035/V*.
- MORRIS, T. (2012): “Occupational Coding (SOC2000) NCDS and BCS70,” .
- MULLAINATHAN, S. (2013): *Scarcity: Why Having Too Little Means So Much*, New York: Times Books, Henry Holt and Company.
- NEDELKOSKA, L. AND G. QUINTINI (2018): “Automation, Skills Use and Training,” *OECD Social, Employment, and Migration Working Papers*.
- NIXON, D. (2006): “‘I Just Like Working with my Hands’: Employment Aspirations and the Meaning of Work for Low-skilled Unemployed Men in Britain’s Service Economy,” *Journal of Education and Work*, 19, 201–217.
- OLIVETTI, C. AND B. PETRONGOLO (2016): “The Evolution of Gender Gaps in Industrialized Countries,” *Annual Review of Economics*, 8, 405–434.
- OLSEN, A., E. L. DENNIS, K. A. I. EVENSEN, I. M. H. HOLLUND, G. C. LØHAUGEN,

- P. M. THOMPSON, A.-M. BRUBAKK, L. EIKENES, AND A. K. HÅBERG (2018): “Preterm Birth Leads to Hyper-reactive Cognitive Control Processing and Poor White Matter Organization in Adulthood,” *Neuroimage*, 167, 419–428.
- PAPAGEORGE, N. W., V. RONDA, AND Y. ZHENG (2019): “The Economic Value of Breaking Bad: Misbehavior, Schooling and the Labor Market,” *NBER Working Paper 25602*.
- PLENTY, S., C. MAGNUSSON, AND S. B. LÅFTMAN (2021): “Internalising and Externalising Problems During Adolescence and the Subsequent Likelihood of Being Not in Employment, Education or Training (NEET) Among Males and Females: The Mediating Role of School Performance,” *SSM-Population Health*, 15, 100873.
- PUTNAM, R. D. (2015): *Our Kids: The American Dream in Crisis*, Simon and Schuster.
- QUINTINI, G. AND D. VENN (2013): “Back to Work: Re-employment, Earnings and Skill Use After Job Displacement,” *OECD*.
- REEVES, A., M. FRANSHAM, K. STEWART, AND R. PATRICK (2021): “Does Capping Social Security Harm Health? A Natural experiment in the UK,” *Social Policy & Administration*.
- RHODES, C. (2020): “Manufacturing: Statistics and Policy,” <https://researchbriefings.files.parliament.uk/documents/SN01942/SN01942.pdf>.
- ROANTREE, B. AND K. VIRA (2018): “The Rise and Rise of women’s employment in the UK,” *IFS Working Papers*.
- SANDHER, J. (2021): “Men without university degrees have suffered the biggest hit to employment since COVID,” <https://theconversation.com/men-without-university-degrees-have-suffered-the-biggest-hit-to-employment-since-covid>
- SHEPHERD, P. (2013): *1958 National Child Development Study Bristol Social Adjustment Guides at 7 and 11 years*, Centre for Longitudinal Studies.
- SOCIAL MOBILITY AND CHILD POVERTY COMMISSION (2019): “State of the Nation 2018-19: Social Mobility in Great Britain,” .
- STEWART, K. (2013): “Labour’s Record on the Under Fives: Policy, Spending and Outcomes 1997-2010,” *CASE Working Paper*.
- (2014): “Employment Trajectories and Later Employment Outcomes for Mothers in the British Household Panel Survey: An Analysis by Skill Level,” *Journal of Social Policy*, 43, 87–108.
- UNGER, R. (2019): *The Knowledge Economy*, London New York: Verso.
- VAITILINGAM, R. (2009): “Recession Britain: Findings from Economic and Social Research,” Accessed: 20/03/2020, <https://esrc.ukri.org/files/news-events-and-publications/publications/themed-publications/>

[recession-britain/](#).

- WEINBERGER, C. J. (2014): “The Increasing Complementarity Between Cognitive and Social Skills,” *Review of Economics and Statistics*, 96, 849–861.
- WOLCOTT, E. L. (2021): “Employment Inequality: Why do the Low-skilled Work Less Now?” *Journal of Monetary Economics*, 118, 161–177.
- YAMAGUCHI, S. (2018): “Changes in Returns to Task-specific Skills and Gender Wage Gap,” *Journal of Human Resources*, 53, 32–70.
- ZILANAWALA, A., A. SACKER, AND Y. KELLY (2019): “Internalising and Externalising Behaviour Profiles Across Childhood: The Consequences of Changes in the Family Environment,” *Social Science & Medicine*, 226, 207–216.